



Laois Habitats Survey 2008



Wet grassland with conifer plantation in the background in Gortahile

Report prepared for Laois Heritage Forum:

PART 2: Appendices

An Action of the Laois Heritage Plan 2007 - 2011

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SUMMARY

This report contains the Appendices to accompany Part 1 of the Laois Habitats Survey 2008 Report.

Part 1 presents results of habitat mapping carried out in 2005, 2006, 2007 and 2008 in County Laois. Parts of the north east, south west and south east of the county were mapped. The land surveyed in 2005, 2006 and 2007 was fairly typical of lowland Laois and included the town of Portarlinton. In 2008 the survey focussed on the the south east of the county which included the upland region of the Castlecomer Plateau and the River Barrow adjacent to and south of Carlow town.

Information for the map was gathered through fieldwork assisted by colour aerial photographs (2000 and 2005). Habitats were mapped principally through fieldwork. In the summers of 2005, 2006, 2007 and 2008 ecologists examined habitats field by field within the survey area. A total of 211 townlands were surveyed over four years in an area covering 351.93 sq km. Permission was always sought before survey work took place and a series of discussions took place with the IFA in 2005 to assist in informing landowners about the purpose of the survey.

Habitats were examined and mapped using methodologies promoted by the Heritage Council in 'A Guide to Habitats of Ireland' (Fossitt 2000) and Draft Habitat Survey Guidelines: A standard methodology for habitat survey and mapping in Ireland (The Heritage Council 2002). Each field or habitat was given a code on a field map. Lists were compiled of flowering plants associated with habitats and notes were compiled of noteworthy features.

Results from the marked up maps were digitised to produce computerised versions of the final maps. To date digitising has been carried out on all the land surveyed. Target notes (made in 2006, 2007 and 2008) have been linked to the digital data base.

Principal findings are:

A total of 60 habitats are present in the area of Laois surveyed. Forty seven habitats were found in 2005, in 2006 an additional eight habitats were recorded with an additional two in 2007. In 2008 three new habitats were documented. They include four new types to describe either different types of garden habitats and land under development which are not contained in the original classification (Fossitt 2000).

Most of the land is covered in two habitats; improved grassland and arable land which are typical of intensive farming systems and which are of relatively low biodiversity value. Within such intensively farmed areas, habitats of greater biodiversity interest are found, such as hedgerows and drainage ditches. Field mapping confirmed the presence of 6.56 km of hedgerow per square kilometre.

Semi-natural habitats, some of which are of high biodiversity value, account for just over 5% the total area surveyed. These include limestone/ marl lakes, scrub, old grasslands, woodland, wetlands, bogs and fen and flush. Some habitats are only found at one or two sites. The hums (upstanding outcrops of limestone which resemble small steep hills) north of Stradbally are particularly associated with oak-ash-hazel woodland.

The 60 habitats which have been identified support 464 plant species. In the first year (2005), 349 species were found with a further 38 species being added in 2006, 57 more species were recorded in 2007, while in 2008 a further 20 species were added to the total. Species diversity varies greatly between habitats. The most valuable habitats for plants are wet grassland (>175 species) dry calcareous and neutral grassland (>154) and scrub with >153 species. Those with the lowest number of native species include amenity grassland, set aside land, spoil and bare ground, garden shrubberies and some types of woodland. A bee orchid found in a derelict quarry is a protected species under the Wildlife Act. Several other plants found are rare in the region and in Laois.

The habitat survey provides an essential report on biodiversity for parts of Laois. The map and associated statistics provide a baseline against which change can be benchmarked. Its contents can be used to inform the public about their local biodiversity and guide decisions on land use options and strategic planning. The Laois Biodiversity Action Plan requires to be informed by this survey. The vast majority of habitats in the countryside have developed as a result of some form of local development. In future local development will be required to take greater regard for biodiversity. The survey should be expanded to all parts of the county. This would increase the value of the information which has been gathered and enable informed decision making on biodiversity on a county wide basis.

The report concludes with a number of suggestions on how the results of the mapping exercise can be used to generate greater awareness of habitats and their management needs.

APPENDIX 1. INFORMATION LEAFLET

New Maps of LAOIS

Maps of habitats are being prepared for Laois this summer. Through making maps of habitats it will be possible to learn about their characteristic diversity of wild plants and animals. This information will raise awareness of the importance of biodiversity in all parts of the county.

HABITATS ARE HOMES for wild plants and animals. On farms, habitats may include dry and wet grasslands, arable land, hedgerows and buildings. On steep sand and gravel ridges, old grasslands and old woodland may still survive. In towns different types of habitats may be found in gardens.

In previous years mapping has taken place around Emo, Stradbally, Portarlinton and Aghaboe. This year the project is concentrating on the south-east corner of the county and it is hoped to cover the entire county within the next few years.

The preparation of these maps is an objective of the Laois Heritage Plan and the research has been commissioned by the County Council. The project is being managed by Mary Tubridy and Associates. Fieldwork is being carried out by Drs Betsy Hickey, Fiona McGowan, Mark Mc Corry and Mary Tubridy. Aerial photos and fieldwork will provide information for the maps. If it is necessary to go on to private land permission will always be requested.

If you have information about habitats/biodiversity or would like to find out more about the project contact Betsy Hickey (086-3793858) or Catherine Casey, Heritage Officer, Laois County Council (057-8674348).

APPENDIX 2. LIST OF LANDOWNERS

Many thanks to the landowners listed below and sincere apologies and thanks to those we unwittingly omitted, all of who gave freely of their time and knowledge while the survey was being carried out.

Names of landowners			
B. Cushen	Bridie Scully	Brigit Cushen	Thomas Nerney
Carter Family	Crowley Family	Dan Scully	Eddie Mulhall
Eddie Fitzgerald	Ellen Conroy	Frank Maloney	Ger Baldwin
Gerry Byrne	Hugh Ryan	Isaac and Robert Dobson	Jackie Hyland
James Gleeson	James Murphy	Jim Brennan	John Delaney
John Dunne	John Lacy	John Nurney	Lewis Family
Margaret Cushen	Michael and Sheila Cushen	Mrs. Browne	Robert and Chris Miller
Paddy Doherty	Paddy Lawlor	Pat and Peggy Drennan	Johnny Kane
Peter Ging	Séan Conroy	Séan Scully	Thomas Conroy
Tom Bond	Tom Cushen	Tom Fingleton	Terry O' Connell
Tom Mulhall	Whelan Family	John Fletcher	Joe Kane
Winnie Champ	Lily Champ	Mary Dunne	Colette Manley
Brian Walsh	Mrs. Fitzpatrick	Geraldine O' Reilly	Pat Hyland
Molly and Liam Kavanagh	Michael Milner	Liam Bennet	Ray Cobb
Irwin Cobb	Martin Whelan	Mrs. Cobb	Peter Lutral
Paddy Behan	Julie Murray	Maureen Nerney	Paddy Sheridan
Frank Nerney	Michael Whelehan	John Kenny	Cathy and Pat Nolan

Names of landowners			
Robin and Ann Talbot	Tom Donoher	Tony Connell	Mrs Boland
Jim Scully	Joe Brophy	Alice McCormack	Anthony Bennet
Tony Miller	Dan Miller	Ann and Robin Talbot	Moyne estate
Martin Stapleton	Helen Shortall	Martin Pillin	Slevin Family
Brian Nolan	Helen Shortall	Ann and Frank Handy	Paddy Moore
Liam McNamara	Jim Moloney	Eddie Fitzpatrick	Dooley Family
John Donoher	Chris and Owen Mullans	David Lawlor	Pat Proctor
John Brennan	Cecil Byrne	Mairead Kinsella	Edward Hughes
Michael Dowling	Keith Fennell	John Scully	Paul Dowling
Eamon Ryan	James Lawlor	Tom Quinn	Finbar Fitzgerald
Eamon Quinn	Brendan Sealey	Mathew Bolton	Annie Connolly
Tom Malone	Brian and John O'Sullivan	Michael and Liam Moran	Honor and Seán Kennedy
Bridie Hennessey	Raymond Dunne	Broderick Family	Mikey Price
Earls	Tom Kelly	James Lawlor	Mary Eyre
Liam Brennan	Caroline Nolan Bradley		

APPENDIX 3. LAYOUT USED IN FIELD SURVEY (PHOTOGRAPHS & MAPS)

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HABITAT SURVEY 2006 Grid Reference N5511 Scale 1:6000	Surveyor Name: Date: NOTES:	 Scale Box 50mX50m
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APPENDIX 4. CHECKLIST OF ALL SPECIES

Checklist of all species recorded during 2005, 2006, 2007 and 2008.

Species are listed alphabetically by Latin name, species followed by an asterisk are additional species recorded in 2006, those followed by a double asterisk are additional species recorded in 2007 and those followed by hash are additional species recorded in 2008.

Scientific name	English name
<i>Abies</i> sp.	Fir
<i>Acer campestre</i> **	Field maple
<i>Acer platanoides</i> Crimson King**	Norway maple
<i>Acer pseudoplatanus</i>	Sycamore
<i>Achillea millefolium</i>	Yarrow
<i>Aesculus hippocastanum</i>	Velvet bent grass
<i>Agrostis canina</i>	Common bent
<i>Agrostis capillaris</i>	Common bent grass
<i>Agrostis stolonifera</i>	Creeping bent grass
<i>Ajuga reptans</i>	Bugle
<i>Alisma plantago-aquatica</i> **	Common water-plantain
<i>Alliaria petiolata</i>	Garlic mustard
<i>Allium ampeloprasum</i> *	Leeks
<i>Allium cepa</i>	Onions
<i>Allium ursinum</i> *	Ramsons
<i>Alnus glutinosa</i>	Alder
<i>Alopecurus geniculatus</i>	Marsh foxtail
<i>Alopecurus pratensis</i>	Meadow foxtail
<i>Anagallis arvensis</i>	Scarlet pimpernel
<i>Andromeda polifolia</i>	Bog rosemary
<i>Anemone nemorosa</i> *	Wood anemone
<i>Angelica sylvestris</i>	Wild angelica
<i>Antennaria dioica</i>	Mountain everlasting
<i>Anthoxanthum odoratum</i>	Sweet vernal grass
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Anthyllis vulgaris</i> *	Kidney vetch
<i>Antirrhinum majus</i> **	Snapdragon
<i>Aquilega vulgaris</i> *	Columbine

Scientific name	English name
<i>Arabis hirsuta</i> **	Hairy rock-cress
<i>Arctium minor</i>	Lesser burdock
<i>Arrhenatherum elatius</i>	False oat grass
<i>Arum maculatum</i>	Arum lily
<i>Asplenium adiantum nigrum</i>	Black spleenwort
<i>Asplenium ruta-muraria</i> *	Wall-rue
<i>Asplenium trichomanes</i> *	Maidenhair spleenwort
<i>Athyrium filix-femina</i>	Lady fern
<i>Aucuba japonica</i> **	Japanese laurel
<i>Avena fatua</i> **	Oat
<i>Baldellia ranunculoides</i>	Lesser water plantain
<i>Bellis perennis</i>	Daisy
<i>Beta vulgaris</i>	Sugar beet
<i>Betula pendula</i> *	Weeping birch
<i>Betula pubescens</i>	Downy birch
<i>Blackstonia perfoliata</i>	Yellow-wort
<i>Blechnum spicant</i>	Hard fern***
<i>Brachypodium sylvaticum</i>	False brome
<i>Brassica oleracea var. capitata</i> *	Cabbage
<i>Briza media</i>	Quaking grass
<i>Bromus sp.</i> **	Brome
<i>Buddleja davidii</i> **	Butterfly bush
<i>Buxus sempervirens</i> **	Box
<i>Callitriche stagnalis</i>	Common water starwort
<i>Calluna vulgaris</i>	Ling heather
<i>Caltha palustris</i>	Marsh marigold
<i>Calystegia sepium</i>	Hedge bindweed
<i>Capsella bursa-pastoris</i> **	Shepherd's-purse
<i>Cardamine flexuosa</i>	Wavy bittercress
<i>Cardamine hirsuta</i> **	Hairy bitter-cress
<i>Cardamine pratensis</i>	Lady's smock
<i>Carex acutiformis</i>	Lesser pond sedge
<i>Carex binervis</i> ***	Green-ribbed sedge
<i>Carex distichia</i> **	Brown sedge
<i>Carex divulsa</i>	Grey sedge
<i>Carex echinata</i>	Star sedge

Scientific name	English name
<i>Carex flacca</i>	Glaucous sedge
<i>Carex hirta</i>	Hairy sedge
<i>Carex hostiana</i>	Tawny sedge
<i>Carex nigra</i>	Common sedge
<i>Carex otrubae</i> **	False fox sedge
<i>Carex ovalis</i>	Oval sedge
<i>Carex panicea</i>	Carnation sedge
<i>Carex paniculata</i> **	Greater tussock sedge
<i>Carex pendula</i> **	Pendulous sedge
<i>Carex pulicaris</i>	Flea sedge
<i>Carex remota</i>	Remote sedge
<i>Carex rostrata</i>	Bottle sedge
<i>Carex sylvatica</i>	Wood sedge
<i>Carex vesicaria</i>	Bladder sedge
<i>Carex viridula</i>	Yellow sedge
<i>Carex viridula ssp. demissa</i>	Common yellow sedge
<i>Carlina vulgaris</i> *	Carlina thistle
<i>Castanea sativa</i>	Spanish chestnut
<i>Ceanothus sp.</i> **	Californian lilac
<i>Centaurea nigra</i>	Black knapweed
<i>Centaurium erythraea</i>	Common centaury
<i>Centranthus ruber</i> **	Red valerian
<i>Cerastium fontanum</i>	Mouse ear chickweed
<i>Chamaecyparis sp.</i>	Lawson cypress
<i>Chenopodium album</i>	Fat hen
<i>Chrysosplenium oppositifolium</i>	Opposite-leaved golden saxifrage
<i>Cicerbita macrophylla</i> ***	Blue sow-thistle
<i>Circaea lutetiana</i>	Enchanter's nightshade
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium dissectum</i>	Meadow thistle
<i>Cirsium palustre</i>	Marsh thistle
<i>Cirsium sp.</i>	Thistle
<i>Cirsium vulgare</i>	Spear thistle
<i>Cladium mariscus</i> *	Great fen sedge
<i>Cladonia foerkiana</i> **	Match stick lichen
<i>Cladonia portentosa</i> *	Lichen

Scientific name	English name
<i>Cladophera</i> sp.	Green algae
<i>Clematis vitalba</i> *	Traveller's joy
<i>Conopodium majus</i>	Pignut
<i>Cornus</i> sp.**	Dogwood
<i>Corylus avellana</i>	Hazel
<i>Cotoneaster horizontalis</i> **	Horizontal rockspray
<i>Cotoneaster</i> sp.	Cotoneaster
<i>Crataegus monogyna</i>	Hawthorn
<i>Crepis capillaris</i>	Smooth hawk's-beard
<i>Crocsmia x crocosmiflora</i>	Montbretia
<i>Cymbalaria muralis</i> **	Ivy-leaved toadflax
<i>Cynosurus cristatus</i>	Crested dog's-tail
<i>Dactylis glomerata</i>	Cock's-foot
<i>Dactylorhiza incarnata</i>	Early marsh orchid
<i>Dactylorhiza maculata</i>	Heath spotted orchid
<i>Dactylorhiza maculata fuchsii</i>	Common spotted orchid
<i>Dactylorhiza majalis</i>	Southern marsh orchid
<i>Daucus carota</i>	Wild carrot
<i>Deschampsia caespitosa</i>	Tufted hair-grass
<i>Deschampsia flexuosa</i>	Wavy hair grass
<i>Dianthus</i> sp.	Carnation
<i>Digitalis purpurea</i>	Foxglove
<i>Dipsacus fullonum</i> **	Teasel
<i>Drosera rotundifolia</i>	Round-leaved sundew
<i>Dryopteris affinis</i>	Scaly male fern
<i>Dryopteris dilatata</i>	Broad buckler fern
<i>Dryopteris filix-mas</i>	Male fern
<i>Eleocharis</i> sp.	Spike-rush
<i>Elocharis palustris</i>	Common spike-rush
<i>Elodea canadensis</i> **	Canadian pond weed
<i>Elymus repens</i>	Couch grass
<i>Epilobium angustifolium</i>	Rosebay willow herb
<i>Epilobium hirsutum</i>	Great willowherb
<i>Epilobium montanum</i>	Broad-leaved willowherb
<i>Epilobium obscurum</i> *	Short-fruited willowherb
<i>Epilobium palustre</i>	Marsh willowherb

Scientific name	English name
<i>Epilobium parviflorum</i>	Hoary willowherb
<i>Epilobium</i> sp.	Willowherb
<i>Epipactis helleborine</i> ***	Broad-leaved helleborine
<i>Epipactis palustris</i>	Marsh helleborine
<i>Equisetum arvense</i>	Field horsetail
<i>Equisetum fluviatile</i>	Water horsetail
<i>Equisetum palustre</i> *	Marsh horsetail
<i>Equisetum</i> sp.	Horsetail
<i>Equisetum sylvaticum</i>	Wood horsetail
<i>Equisetum x littoral</i> **	Horsetail
<i>Erica cinerea</i> **	Bell heather
<i>Erica tetralix</i>	Cross-leaved heath
<i>Eriophorum angustifolium</i>	Common cotton-sedge
<i>Eriophorum vaginatum</i>	Hare's-tail cotton-sedge
<i>Euonymus europaeus</i>	Spindle
<i>Euonymus fortunei</i> Emerald and Gold**	Wintercreeper
<i>Eupatorium cannabinum</i>	Hemp agrimony
<i>Euphorbia helioscopia</i> **	Sun spurge
<i>Euphorbia peplus</i> **	Petty spurge
<i>Euphrasia rostkoviana</i>	Eyebright
<i>Euphrasia</i> sp.	Eyebright
<i>Fagus sylvatica</i>	Beech
<i>Fagus sylvatica</i> Purpurea**	Weeping copper beech
<i>Festuca arundinacea</i>	Tall fescue
<i>Festuca gigantea</i>	Giant fescue
<i>Festuca ovina</i>	Sheep's fescue
<i>Festuca pratensis</i> *	Meadow fescue
<i>Festuca rubra</i>	Red fescue
<i>Festuca</i> sp.	Fescue
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fontinalis</i> sp.*	Moss
<i>Fragaria vesca</i>	Wild strawberry
<i>Fraxinus excelsior</i>	Ash
<i>Fraxinus excelsior pendula</i>	Weeping ash
<i>Fumaria officinale</i> **	Fumitory
<i>Fuchsia magellanica</i> ***	Fuchsia

Scientific name	English name
<i>Galium aparine</i>	Cleavers
<i>Galium odoratum</i>	Woodruff
<i>Galium palustre</i>	Marsh bedstraw
<i>Galium saxatile**</i>	Heath bedstraw
<i>Galium verum</i>	Lady's bedstraw
<i>Geranium dissectum</i>	Cut-leaved crane's-bill
<i>Geranium molle</i>	Dove's-foot crane's-bill
<i>Geranium robertianum</i>	Herb robert
<i>Geranium</i> sp.	Cranesbill
<i>Geum rivale**</i>	Water avens
<i>Geum urbanum</i>	Herb bennet
<i>Glechoma hederacea</i>	Ground ivy
<i>Glyceria fluitans</i>	Floating sweet-grass
<i>Glyceria maxima</i>	Reed sweet-grass
<i>Glyceria notata</i>	Plicate sweet-grass
<i>Glyceria</i> sp.	Sweet-grass
<i>Grisilina littoralis</i>	Grisilina
<i>Gymnadenia conopsea</i>	Fragrant orchid
<i>Hebe</i> sp.**	Veronica
<i>Hedera helix</i>	Ivy
<i>Helictotrichon pubescens</i>	Downy oat-grass
<i>Heracleum sphondylium</i>	Hogweed
<i>Hieracium</i> sp.	Hawkweed
<i>Hippuris vulgaris*</i>	Marestail
<i>Holcus lanatus</i>	Yorkshire fog
<i>Hordeum vulgare</i>	Barley
<i>Hyacinthoides non-scriptus</i>	Bluebell
<i>Hydrocotyle vulgaris</i>	Navelwort
<i>Hypericum androsaemum</i>	Tutsan
<i>Hypericum humifusum</i>	Trailing St. John's-wort
<i>Hypericum maculatum</i>	Imperforate St. John's-wort
<i>Hypericum perforatum</i>	Perforate St. John's-wort
<i>Hypericum pulchrum</i>	Slender St. John's-wort
<i>Hypericum</i> sp.	St. John's-wort
<i>Hypericum tetrapterum</i>	Square-stalked St. John's-wort
<i>Hypochoeris radicata</i>	Car's-ear

Scientific name	English name
<i>Ilex aquifolium</i>	Holly
<i>Impatiens glandulifera</i> ***	Indian balsam
<i>Iris foetidissima</i> **	Stinking iris
<i>Iris pseudacorus</i>	Flag iris
<i>Juncus acutiflorus</i>	Sharp-flowered rush
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus bufonius</i>	Toad rush
<i>Juncus conglomeratus</i>	Compact rush
<i>Juncus effusus</i>	Soft rush
<i>Juncus inflexus</i>	Hard rush
<i>Juncus</i> sp.	Rush
<i>Juncos squarrosus</i> ***	Heath rush
<i>Juniperus squamata</i> sp.	Flaky juniper
<i>Knautia arvensis</i>	Field scabious
<i>Kniphofia</i> sp.	Red hot poker
<i>Lamium purpureum</i> **	Red dead-nettle
<i>Lapsana communis</i>	Nipplewort
<i>Larix decidua</i>	European larch
<i>Lathyrus montanus</i>	Bitter-vetch
<i>Lathyrus pratensis</i>	Meadow vetchling
<i>Latuca sativa</i> *	Lettuce
<i>Lemna minor</i>	Common duckweed
<i>Leontodon autumnalis</i>	Autumn hawkbit
<i>Leontodon hispidus</i> *	Rough hawkbit
<i>Leucanthemum vulgare</i>	Ox-eye daisy
<i>Ligustrum ovalifolium</i>	Privet
<i>Ligustrum vulgare</i>	Common privet
<i>Linum bienne</i>	Pale flax
<i>Linum catharticum</i>	Fairy flax
<i>Listeria ovata</i>	Common twayblade
<i>Littorella uniflora</i> *	Shore-weed
<i>Lolium perenne</i>	Perennial ryegrass
<i>Lonicera nitida</i>	Wilson's honeysuckle
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lotus corniculatus</i>	Bird's-foot-trefoil
<i>Lotus uliginosus</i>	Greater bird's-foot trefoil

Scientific name	English name
<i>Lupinus</i> sp.	Lupin
<i>Luzula campestris</i>	Field woodrush
<i>Luzula multiflora</i>	Heath woodrush
<i>Luzula sylvatica</i>	Wood rush
<i>Lychnis flos-cuculi</i>	Ragged robin
<i>Lycopus europaeus</i> ***	Gipsywort
<i>Lysimachia nemorum</i>	Yellow pimpernel
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Malus domestica</i> var.	Apple trees
<i>Malus</i> sp.	Crab
<i>Malva sylvestris</i> **	Common mallow
<i>Matricaria discoidea</i>	Pineapple weed
<i>Medicago lupulina</i>	Black medick
<i>Melampyrum pratense</i> ***	Common cow wheat
<i>Melica uniflora</i>	Wood melick
<i>Mentha aquatica</i>	Water mint
<i>Mentha</i> sp.	Mint
<i>Mentha spicata</i>	Spear mint
<i>Menyanthes trifoliata</i>	Bogbean
<i>Molinia caerulea</i> *	Purple moor-grass
<i>Myosotis arvensis</i> **	Field for-get-me-not
<i>Myosotis discolor</i>	Changing forget-me-not
<i>Myosotis laxa</i> ***	Tufted forget-me-not
<i>Myosotis scorpiodes</i>	Water forget-me-not
<i>Myosotis secunda</i> ***	Creeping forget-me-not
<i>Narthecium ossifragum</i>	Bog asphodel
<i>Nasturtium officinale</i>	Water-cress
<i>Nasturtium</i> sp.	Water-cress
<i>Nuphar lutea</i> **	Yellow water lily
<i>Odondites verna</i>	Red bartsia
<i>Ophioglossum vulgatum</i>	Adder's tongue
<i>Ophrys apifera</i> *	Bee orchid
<i>Origanum vulgare</i> *	Marjoram
<i>Osmunda regalis</i>	Royal fern
<i>Oxalis acetosella</i>	Wood sorrel
<i>Paeonia</i> sp.	Peony rose

Scientific name	English name
<i>Papaver orientalis</i>	Oriental poppy
<i>Papaver rhoeas</i> **	Common poppy
<i>Parentucellia viscosa</i> **	Yellow bartsia
<i>Parietaria diffusa</i> *	Pellitory of the wall
<i>Pedicularis</i> sp.	Lousewort
<i>Pedicularis sylvatica</i>	Lousewort
<i>Petasites hybridus</i> ***	Butterbur
<i>Phalaris arundinacea</i>	Reed canary-grass
<i>Phallus impudicus</i> ***	Stinkhorn mushroom
<i>Phleum bertolini</i> **	Small cat's-tail
<i>Phleum pratensis</i>	Timothy
<i>Phragmites australis</i>	Common reed
<i>Phyllitis scolopendrium</i>	Hart's-tongue fern
<i>Picea abies</i>	Norway spruce
<i>Picea sitchensis</i>	Sitka spruce
<i>Pinguicula vulgaris</i> *	Common butterwort
<i>Pinus contorta</i>	Lodgepole pine
<i>Pinus sylvestris</i>	Scot's pine
<i>Plantago lanceolata</i>	Narrow leaved plantain
<i>Plantago major</i>	Broad leaved plantain
<i>Platanthera bifolia</i>	Lesser butterfly orchid
<i>Platanthera clorantha</i>	Greater butterfly orchid
<i>Poa annua</i>	Annual meadow-grass
<i>Poa pratensis</i> *	Smooth meadow-grass
<i>Poa</i> sp.	Meadow-grass
<i>Poa trivialis</i>	Rough meadow-grass
<i>Polygala vulgaris</i>	Common milkwort
<i>Polygonum amphibium</i>	Amphibious bistwort
<i>Polygonum aviculare</i> **	Common knotgrass
<i>Polygonum persicaria</i>	Redshank
<i>Polypodium vulgare</i>	Common polypody fern
<i>Polystichum aculeatum</i>	Hard shield fern
<i>Polystichum setiferum</i>	Soft shield fern
<i>Polytrichum commune</i> *	Moss
<i>Populus</i> sp.	Poplar
<i>Populus x canescens</i> ***	Grey poplar

Scientific name	English name
<i>Populus tremula</i>	Aspen
<i>Potamogeton</i> sp.	Pondweed
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla palustre</i>	Marsh cinquefoil
<i>Potentilla reptans</i>	Creeping cinquefoil
<i>Potentilla sterilis</i>	Barren strawberry
<i>Primula veris</i>	Cowslip
<i>Primula vulgaris</i>	Primrose
<i>Prunus avium</i>	Wild cherry
<i>Prunus domestica</i>	Wild plum
<i>Prunus kanzan</i>	Flowering cherry
<i>Prunus laurocerasus</i> Otto Luyken**	English laurel
<i>Prunus laurocerasus</i> *	English laurel
<i>Prunus</i> sp.	Cherry
<i>Prunus spinosa</i>	Blackthorn
<i>Pseudotsuga menzeii</i>	Douglas fir
<i>Pteridium aquilinum</i>	Bracken
<i>Pulicaria dysenterica</i>	Common fleabane
<i>Pyrus pyraeaster</i>	Pear
<i>Quercus robur</i>	Pedunculate oak
<i>Ranunculus acris</i>	Meadow buttercup
<i>Ranunculus auricomus</i>	Goldilocks buttercup
<i>Ranunculus bulbosus</i> *	Bulbous buttercup
<i>Ranunculus ficaria</i>	Lesser celandine
<i>Ranunculus flammula</i>	Lesser spearwort
<i>Ranunculus lingua</i>	Greater spearwort
<i>Ranunculus peltatus</i>	Pond water-crowfoot
<i>Ranunculus repens</i>	Creeping buttercup
<i>Reseda luteola</i> **	Wild mignonette
<i>Reynoutria japonica</i>	Japanese knotweed
<i>Rheum rhabarbarum</i>	Rhubarb
<i>Rhinanthus minor</i>	Yellow rattle
<i>Rhododendron ponticum</i>	Rhododendron
<i>Rhus typhina</i> **	Stag's-horn sumach
<i>Rhynchospora alba</i>	White-beaked sedge

Scientific name	English name
<i>Ribes rubrum</i>	White or red currant
<i>Ribes</i> sp.	Currant
<i>Ribes uva-crispa</i> **	Gooseberry
<i>Rosa arvensis</i>	Field rose
<i>Rosa canina</i>	Dog rose
<i>Rosa</i> sp.	Wild rose
<i>Rosmarinus officinalis</i>	Rosemary
<i>Rubus caesius</i>	Dewberry
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rubus idaeus</i> **	Raspberry
<i>Rumex acetosa</i> *	Common sorrel
<i>Rumex acetosella</i>	Sheep's sorrel
<i>Rumex conglomeratus</i>	Clustered dock
<i>Rumex crispus</i>	Curled dock
<i>Rumex obtusifolius</i>	Broad leaved dock
<i>Rumex sanguineus</i>	Wood dock
<i>Rumex</i> sp.	Dock
<i>Sagina procumbens</i>	Procumbent pearlwort
<i>Salix alba</i>	White willow
<i>Salix aurita</i>	Eared willow
<i>Salix caprea</i>	Goat willow
<i>Salix cinerea</i>	Grey willow
<i>Salix fragilis</i>	Crack willow
<i>Salix</i> sp.	Willow
<i>Salix viminalis</i>	Osier
<i>Salix x multinervis</i>	Willow hybrid
<i>Sambucus nigra</i>	Elder
<i>Sanguisorba minor</i>	Salad burnet
<i>Sanicula europaea</i>	Wood sanicle
<i>Saponaria officinalis</i>	Soapwort
<i>Schoenoplectus lacustris</i>	Club-rush
<i>Schoenus nigricans</i>	Black bog-rush
<i>Scrophularia nodosa</i>	Common figwort
<i>Sedum acre</i>	Biting stonecrop
<i>Sedum album</i> **	White stonecrop
<i>Senecio aquaticus</i>	Marsh ragwort

Scientific name	English name
<i>Senecio erucifolius</i> ***	Hoary ragwort
<i>Senecio jacobaea</i>	Common ragwort
<i>Senecio vulgaris</i>	Groundsel
<i>Sherardia arvensis</i> **	Field madder
<i>Silene alba</i> **	White campion
<i>Silene dioica</i>	Red campion
<i>Silene latifolia</i>	White campion
<i>Sisymbrium officinale</i>	Hedge mustard
<i>Solanum dulcamara</i>	Bittersweet
<i>Solanum tuberosum</i> *	Potato
<i>Solidago virgaurea</i> **	Goldenrod
<i>Sonchus arvensis</i>	Perennial sow-thistle
<i>Sonchus asper</i>	Prickly sow-thistle
<i>Sonchus oleraceus</i>	Smooth sow-thistle
<i>Sorbaria sp.</i> **	False spiraea
<i>Sorbus aria</i>	Whitebeam
<i>Sorbus aucuparia</i>	Mountain ash
<i>Sparganium erectum</i>	Branched bur-reed
<i>Sphagnum capillifolium</i>	Sphagnum moss
<i>Sphagnum cuspidatum</i>	Sphagnum moss
<i>Sphagnum imbricatum</i>	Sphagnum moss
<i>Sphagnum papillosum</i>	Sphagnum moss
<i>Stachys byzantina</i>	Lamb's ears
<i>Stachys palustris</i>	Marsh woundwort
<i>Stachys sylvatica</i>	Hedge woundwort
<i>Stellaria graminea</i>	Lesser stitchwort
<i>Stellaria holostea</i>	Greater stitchwort
<i>Stellaria media</i>	Common chickweed
<i>Stellaria uliginosa</i>	Bog stitchwort
<i>Succisa pratensis</i>	Devil's-bit scabious
<i>Symphoricarpos orbiculatus</i> *	Snowberry
<i>Symphytum sp.</i>	Comfrey
<i>Taraxacum officinale</i>	Dandelion
<i>Taxus baccata</i> *	Yew
<i>Teucrium scorodonia</i>	Woodsage
<i>Thymus praecox</i> **	Wild thyme

Scientific name	English name
<i>Tilia cordata</i>	Small leaved lime
<i>Tilia x europaea</i> *	Common lime
<i>Torilis japonica</i>	Upright hedge parsley
<i>Tragopogon pratensis</i>	Goat's-beard
<i>Trichophorum caespitosum</i>	Deer-sedge
<i>Trifolium campestre</i>	Hop trefoil
<i>Trifolium dubium</i>	Lesser trefoil
<i>Trifolium pratense</i>	Red clover
<i>Trifolium repens</i>	White clover
<i>Triglochin palustris</i>	Marsh arrowgrass
<i>Trisetum flavescens</i> *	Yellow oat-grass
<i>Triticum aestivum</i>	Wheat
<i>Tussilago farfara</i>	Colt's-foot
<i>Typha latifolia</i>	Common reedmace
<i>Ulex europaeus</i>	Gorse
<i>Ulmus glabra</i>	Wych elm
<i>Ulmus procera</i>	English elm
<i>Urtica dioica</i>	Stinging nettle
<i>Vaccinium myrtillus</i> ***	Bilberry
<i>Vaccinium oxycoccus</i> ***	Cranberry
<i>Valeriana officinalis</i>	Common valerian
<i>Veronica agrestis</i>	Green field speedwell
<i>Veronica beccabunga</i>	Brooklime
<i>Veronica chamaedrys</i>	Germander speedwell
<i>Veronica montana</i>	Wood speedwell
<i>Veronica officinalis</i>	Heath speedwell
<i>Veronica</i> sp.	Speedwell
<i>Viburnum opulus</i>	Guelder rose
<i>Vicia cracca</i>	Tufted vetch
<i>Vicia hirsuta</i> **	Hairy tare
<i>Vicia sativa</i>	Common vetch
<i>Vicia sepium</i>	Bush vetch
<i>Vicia</i> sp.	Vetch
<i>Viola arvensis</i> **	Field pansy
<i>Viola reichenbackiana</i> *	Wood dog violet
<i>Viola riviniana</i>	Common dog violet

Scientific name	English name
<i>Viola</i> sp.	Violet
<i>Vulpia bromoides</i> ***	Squirrel-tail fescue
<i>x Cupressocyparis leylandii</i>	Leyland cypress
<i>x Cupressus macrocarpa</i> *	Macrocarpa

APPENDIX 5. RARE OR OCCASIONAL PLANT SPECIES

Species followed by an asterisk were identified in 2006, those followed by two asterisks were identified in 2007 and those followed by three asterisks were identified in 2008.

Scientific name	Common name
<i>Andromeda polifolia</i>	Bog rosemary
<i>Antennaria dioica</i>	Mountain everlasting
<i>Anthyllis vulneraria</i> *	Kidney vetch
<i>Aquilega vulgaris</i> *	Columbine
<i>Artemisia vulgaris</i>	Mugwort
<i>Blackstonia perfoliata</i>	Yellow-wort
<i>Bromus racemosus</i>	Smooth brome
<i>Centaurium erythraea</i>	Common centaury
<i>Clinopodium vulgare</i>	Wild basil
<i>Epipactis helleborine</i> ***	Broad-leaved helleborine
<i>Epipactis palustris</i>	Marsh helleborine
<i>Gymnadenia conopsea</i>	Fragrant orchid
<i>Helictotrichon pubescens</i>	Downy oat-grass
<i>Lathyrus montanus</i>	Bitter vetch
<i>Linum bienne</i>	Pale flax
<i>Littorella uniflora</i> *	Shore weed
<i>Ophioglossum vulgatum</i>	Adder's tongue
<i>Ophrys apifera</i> *	Bee orchid
<i>Origanum vulgare</i>	Marjoram
<i>Parentucellia viscosa</i> **	Yellow Bartsia
<i>Platanthera bifolia</i>	Lesser butterfly-orchid
<i>Platanthera clorantha</i>	Greater butterfly-orchid
<i>Polystichum aculeatum</i>	Hard shield fern
<i>Prunus padus</i> ***	Bird cherry
<i>Pulicaria dysenterica</i>	Fleabane
<i>Pyrus pyraster</i> *	Pear
<i>Rhynchospora alba</i>	White beaked sedge
<i>Ribes uva-crispa</i> **	Gooseberry
<i>Rubus caesius</i>	Dewberry
<i>Sanguisorba minor</i>	Salad burnet

Scientific name	Common name
<i>Sherardia arvensis</i> **	Field madder
<i>Smyrniolum olusatrum</i>	Alexanders
<i>Taxus baccata</i> *	Yew
<i>Tragopogon pratensis</i>	Goatsbeard
<i>Trisetum flavescens</i>	Yellow oat grass
<i>Vaccinium oxycoccos</i>	Cranberry

APPENDIX 6. ADDITIONAL SPECIES RECORDED IN STUDY AREA BY BSBI

Scientific name	Common name
= <i>M. x rotundifolia</i>	False apple-mint
<i>Achillea ptarmica</i>	Sneezewort
<i>Aegopodium podagraria</i>	Ground elder
<i>Aethusa cynapium</i>	Fool's parsley
<i>Agrimonia eupatoria</i>	Agrimony
<i>Agrimonia procera</i>	Fragrant Agrimony
<i>Anisantha sterilis</i>	Barren brome
<i>Aphanes arvensis</i>	Parsley-piert
<i>Apium nodiflorum</i>	Fool's water-cress
<i>Arenaria serpyllifolia</i>	Thyme-leaved sandwort
<i>Artemisia vulgaris</i>	Mugwort
<i>Atriplex laciniata</i>	Frosted orache
<i>Atriplex patua</i>	Common orache
<i>Barbarea vulgaris</i>	Winter cress
<i>Bromopsis ramosa</i>	Hairy-brome
<i>Calystegia sylvatica</i>	Large bindweed
<i>Carex demissa</i>	Common yellow sedge
<i>Carex pseudocyperus</i>	Cyperus Sedge
<i>Catapodium rigidum</i>	Fern grass
<i>Ceterach officinarum</i>	Rusty-back
<i>Chaenorhinum minus</i>	Small toadflax
<i>Clinopodium vulgare</i>	Wild Basil
<i>Conium maculatum</i>	Hemlock
<i>Epilobium ciliatum</i>	American willowherb
<i>Euphrasia officinalis</i> agg.	Eyebright
<i>Fallopia convolvulus</i>	Black-bindweed
<i>Fumaria muralis</i>	Common Ramping-fumitory
<i>Fumaria officinalis</i>	Common Fumitory
<i>Galeopsis bifida</i>	Bifid hemp nettle
<i>Geranium lucidum</i>	Shining cranesbill
<i>Hieracium murorum</i> agg.	Hawkweed
<i>Juncus bulbosus</i>	Bulbous Rush
<i>Lamium album</i>	White-dead-nettle

Scientific name	Common name
<i>Lamium hybridum</i>	Cut-leaved dead-nettle
<i>Lamium purpureum</i>	Red Dead-nettle
<i>Lathyrus montanus</i>	Bitter-vetch
<i>Leontodon saxatilis</i>	Lesser Hawkbit
<i>Mentha arvensis</i>	Corn Mint
<i>Mentha suaveolens x longifolia</i>	
<i>Nymphaea alba</i>	White Water-lily
<i>Papaver dubium ssp. dubium</i>	Long-headed Poppy
<i>Persicaria amphibium</i>	Amphibious bistort
<i>Persicaria hydropiper</i>	Water-pepper
<i>Persicaria lapathifolia</i>	Pale Persicaria
<i>Persicaria maculosa</i>	Redshank
<i>Petasites fragrans</i>	Winter Heliotrope
<i>Pimpinella saxifraga</i>	Burnet-saxifrage
<i>Polygonum cognatum</i>	Indian Knotgrass
<i>Potamogeton natans</i>	Broad-leaved Pondweed
<i>Potentilla anglica</i>	Trailing tormentil
<i>Quercus petraea</i>	Sessile Oak
<i>Ranunculus trichophyllus</i>	Thread-leaved Water-crowfoot
<i>Reseda luteola</i>	Weld
<i>Rosa agrestis</i>	Small-leaved sweetbriar
<i>Rosa canina x R. caesia</i>	
<i>Rosa mollis</i>	Northern downy rose
<i>Rosa sherardii</i>	Sherard's Downy-rose
<i>Rubus ulmifolius</i>	Elm-leaf blackberry
<i>Salix purpurea</i>	Purple osier
<i>Salix repens</i>	Creeping Willow
<i>Silene vulgaris ssp. Vulgaris</i>	Bladder campion
<i>Sinapis arvensis</i>	Charlock
<i>Smyrniium olusatrum</i>	Alexanders
<i>Spergula arvensis</i>	Corn Spurrey
<i>Tanacetum parthenium</i>	Feverfew
<i>Thymus vulgaris</i>	Garden Thyme
<i>Trisetum flavescens</i>	Yellow Oat-grass
<i>Veronica anagallis-aquatica</i>	Blue Water-Speedwell
<i>Veronica arvensis</i>	Wall speedwell

Scientific name	Common name
<i>Veronica hederifolia</i> ssp. <i>Hederifolia</i>	Ivy-leaved speedwell
<i>Veronica persica</i>	Common field speedwell
<i>Veronica scutellata</i>	Marsh speedwell
<i>Vinca major</i>	Greater Periwinkle
<i>Viola odorata</i>	Sweet Violet

APPENDIX 7. ADDITIONAL SPECIES RECORDED BY DUBLIN NATURALIST'S FIELD CLUB ON HEWSON HILL, COOLNACARRICK, CO. LAOIS

Scientific name	Common name
<i>Aira praecox</i>	Early hair-grass
<i>Cotoneaster microphyllus</i> auct.	Cotoneaster
<i>Polypodium cambricum</i>	Southern polypody

APPENDIX 8. SPECIES RECORDED IN EACH HABITAT

Additional species recorded in each habitat 2006 are indicated by 1 asterisk, those in 2007 by 2 asterisks and those in 2008 by 3 asterisks.

FL3 Limestone/marl lakes

Epilobium palustre
*Equisetum fluviatile**
Eupatorium cannabinum
Galium palustre
Glyceria sp.
*Hippuris vulgaris**
Hydrocotyle vulgaris
Iris pseudacorus
Juncus acutiflorus
Juncus effusus
*Juncus inflexus**
*Littorella uniflora**
Mentha aquatica
Potentilla anserina

FL4 Mesotrophic lakes

*Agrostis stolonifera***
*Anagallis tenella**
*Calystegia sepium***
*Carex flacca**
*Carex rostrata**
*Epilobium parviflorum***
*Filipendula ulmaria***
*Galium palustre***
*Glyceria fluitans***
*Iris pseudacorus***
*Juncus acutiflorus**
*Juncus effusus***
*Lolium perenne***
*Lythrum salicaria***
*Mentha aquatica**
*Phalaris arundinacea***
Potamogeton sp.*
Ranunculus sp. crowfoot**
*Sparganium emersum***

FL5 Eutrophic lakes

Acer pseudoplatanus
Aesculus hippocastanum
*Betula pendula**
Cardamine pratensis
Cladophera algae
Corylus avellana
Crataegus monogyna
Crocsmia x crocsmiflora
Eleocharis sp.
Equisetum fluviatile
Equisetum sp.
Fagus sylvatica
Fraxinus excelsior
Glyceria fluitans
Iris pseudacorus
Juncus effusus
Juncus inflexus
Juncus sp.
Mentha sp.**
Molinia caerulea
*Myosotis scorpiodes***
Nasturtium sp.
*Phalaris arundinacea***
Populus tremula
Prunus sp.
Prunus spinosa
*Ranunculus repens***
Ranunculus sp. crowfoot
Rubus fruticosus agg.
*Rumex crispus***
Salix caprea
Salix cinerea
Sambucus nigra
*Senecio aquaticus****
*Sparganium erectum***
Typha latifolia
Urtica dioica
Veronica beccabunga

FL8 Other artificial lakes and ponds

*Agrostis stolonifera***
*Alnus glutinosa***
*Carex viridula***
*Cirsium arvense***
Juncus effusus
Polygonum amphibium
Potamogeton sp.
*Potentilla anserina***
*Salix cinerea***
*Sparganium erectum****
*Urtica dioica***

FW1 Eroding/upland rivers

Fontinalis sp.

FW2 Depositing/lowland rivers

*Alisma plantago-aquatica****
Callitriche sp.
Callitriche stagnalis
*Caltha palustris***
Calystegia sepium
Cladophora sp.
Epilobium hirsutum
*Epilobium palustre**
*Equisetum fluviatile***
*Filipendula ulmaria***
Fontinalis sp.*
Glyceria fluitans
Glyceria maxima
Glyceria notata
Iris pseudacorus
*Juncus inflexus***
Lemna minor
Lemna sp.**
*Lythrum salicaria***
Mentha aquatica
Mentha sp.**
Myosotis scorpiodes
Nasturtium officinale
*Nuphar lutea****
Oenanthe sp.**

FW2 Depositing/lowland rivers

Phalaris arundinacea
Phragmites australis
Polygonum persicaria
Potamogeton sp.
Potentilla anserina
Prunella vulgaris
Ranunculus peltatus
*Ranunculus repens***
Ranunculus sp.*
*Rumex crispus***
*Rumex obtusifolius***
Salix alba
Salix caprea
*Salix cinerea***
Salix fragilis
Schoenoplectus lacustris
Scrophularia nodosa
Senecio aquaticus
*Stachys sylvatica***
*Typha latifolia****
Ulex europaeus
Ulmus glabra
Urtica dioica
*Valeriana officinalis***
*Vicia cracca***

FW3 Canals

*Algae***
*Alisma plantago-aquatica***
*Angelica sylvestris**
*Arum maculatum**
*Caltha palustris**
*Carex vesicaria***
*Corylus avellana**
*Crataegus monogyna**
*Elodea canadensis***
*Equisetum fluviatile**
*Filipendula ulmaria**
*Fraxinus excelsior**
*Galium aparine**
*Glyceria maxima**
*Hedera helix**

*Heracleum sphondylium**
*Iris pseudacorus**
*Ligustrum vulgaris**
*Lonicera periclymenum**
*Nasturtium officinale**
*Nuphar lutea***
*Phalaris arundinacea**
*Poa sp.**
*Potamogeton sp.***
*Prunus domestica**
*Prunus spinosa**
*Rosa sp.**
*Rubus fruticosus agg.**
*Salix sp.**
*Schoenoplectus lacustris***
*Typha latifolia**
*Urtica dioica**
*Valeriana officinalis***
*Veronica beccabunga**

FW4 Drainage ditches

Agrostis stolonifera
*Alisma plantago-aquatica***
Angelica sylvestris
Anthoxanthum odoratum
Briza media
*Callitriche sp.***
Caltha palustre
*Calystegia sepium***
Cardamine pratensis
Carex acutiformis
Carex nigra
Carex panicea
Carex rostrata
Carex sp.
*Cirsium arvensis***
Cirsium palustre
Crataegus monogyna
*Cynosurus cristatus***
Dactylorhiza maculata
Dactylorhiza majalis
*Epilobium angustifolium***
Epilobium hirsutum
*Epilobium obscurum**

Epilobium palustre
Epilobium sp.
Equisetum arvense
*Equisetum fluviatile***
Equisetum sp.
Eriophorum angustifolium
Eupatorium cannabinum
Festuca rubra
Filipendula ulmaria
Galium palustre
Glyceria fluitans
Holcus lanatus
*Hydrocotyle vulgaris***
Hypericum pulchrum
*Iris pseudacorus***
Juncus acutiflorus
Juncus articulatus
Juncus effusus
*Juncus inflexus***
Lolium perenne
Lotus corniculatus
Lythrum salicaria
Mentha aquatica
Mentha sp.
Menyanthes trifoliata
*Myosotis scorpiodes***
Nasturtium officinale
Phalaris arundinacea
Phragmites australis
Platanthera bifolia
Polygala vulgaris
*Potamogeton sp.***
*Potentilla anserina***
Potentilla erecta
Potentilla palustre
Ranunculus flammula
*Rumex crispus***
*Rumex obtusifolius***
Salix cinerea
*Schoenoplectus lacustris***
*Sparganium sp.***
Succisa pratensis
Trifolium pratense
Trifolium repens

Triglochin palustris
Typha latifolia
Urtica dioica
*Valeriana officinalis***
Vicia cracca

FP2 Non-calcareous springs

Agrostis stolonifera
Cirsium palustre
Crataegus monogyna
Fraxinus excelsior
Glyceria sp.
Holcus lanatus
Juncus acutiflorus
Mentha sp.
Nasturtium officinale
Phragmites australis
Plantago major
Ranunculus acris
Ranunculus repens
Rumex obtusifolius
Salix sp.
Trifolium pratense
Urtica dioica

FS1 Reed and large sedge swamp

*Alnus glutinosa***
*Anthoxanthum odoratum***
*Arrhenatherum elatius***
*Calystegia sepium***
*Carex hirta***
*Carex ovalis***
*Carex paniculata***
*Carex pendula***
*Carex vesicaria***
*Centaurea nigra***
*Corylus avellana***
*Crataegus monogyna***
*Dactylis glomerata***
*Elymus repens***
*Epilobium angustifolium***
*Epilobium hirsutum***
*Equisetum x littoral***
*Eupatorium cannabinum***

*Filipendula ulmaria***
*Fraxinus excelsior***
*Galium palustre***
*Galium verum***
*Holcus lanatus***
*Iris pseudacorus***
*Juncus effusus***
Juncus inflexus
*Lolium perenne***
Lythrum salicaria
Mentha sp. **
*Molinia caerulea***
*Phalaris arundinacea***
*Phleum pratense***
*Potentilla anserina***
*Prunus spinosa***
*Pteridium aquilinum***
*Ranunculus flammula***
*Ranunculus repens*****
Rubus fruticosus agg.
*Rumex crispus***
*Salix caprea***
*Salix cinerea***
*Schoenoplectus lacustris***
*Typha latifolia***
*Urtica dioica***
*Valeriana officinale***
*Vicia cracca***
*Vicia sepium***

FS2 Tall-herb swamp

*Alisma plantago-aquatica****
*Epilobium sp.***
*Filipendula ulmaria***
*Iris pseudacorus***
*Nuphar lutea****
*Phalaris arundinacea****
*Phragmites australis****
*Salix alba****
*Salix cinerea****
*Schoenoplectus lacustris****
*Typha sp.****
*Valeriana officinalis****

GA1 Improved agricultural grassland

Agrostis canina
Alopecurus geniculatus
Alopecurus pratensis
Anthoxanthum odoratum
Arrhenatherum elatius
Bellis perennis
Carex sp.
*Centaurea nigra**
Cerastium fontanum
Cirsium arvense
*Cirsium vulgare**
*Cynosurus cristatus**
Dactylis glomerata
Elymus repens
*Festuca rubra**
Galium odoratum
Heracleum sphondylium
Holcus lanatus
*Juncus effusus**
Lolium perenne
Plantago lanceolata
Plantago major
Poa annua
Poa sp.
Poa trivialis
Ranunculus acris
Ranunculus repens
Rubus fruticosus agg.
Rumex acetosa
Rumex conglomeratus
Rumex obtusifolius
Rumex sp. *
Salix sp. *
Senecio jacobaea
Stellaria graminea
Taraxacum officinale
*Trifolium pratense**
Trifolium repens
*Ulex europaeus**
Urtica dioica

GA2 Amenity grassland (improved)

Bellis perennis

Cirsium arvense
Dactylis glomerata
Festuca rubra
Lolium perenne
Plantago lanceolata
Poa annua
Prunella vulgaris
Ranunculus repens
Rumex obtusifolius
Taraxacum officinale
Trifolium repens
Veronica chamaedrys

GS1 Dry calcareous and neutral grassland

Achillea millefolium
*Agrimonia eupatorium***
Agrostis capillaris
Agrostis stolonifera
*Alnus glutinosa**
*Alopecurus pratensis***
*Anagallis arvensis***
Antennaria dioica
Anthoxanthum odoratum
*Anthyllis vulgaris**
*Arabis hirsuta***
Arrhenatherum elatius
*Bellis perennis***
*Betula pubescens**
Blackstonia perfoliata
*Brachypodium sylvaticum**
Brassica sp. **
Briza media
*Calystegia sepium**
*Cardamine flexuosa***
Carex flacca
*Carex hirta***
*Carex otrubae***
Carex panicea
Carex viridula
*Carlina vulgaris**
Centaurea nigra
*Centaurium erythraea**
Cerastium fontanum
Cirsium arvense

Crataegus monogyna
*Cynosurus cristatus**
Dactylis glomerata
*Dactylorhiza fuchsii**
Dactylorhiza maculata
*Dactylorhiza majalis**
Daucus carota
*Digitalis purpurea****
*Dryopteris filix-mas***
Elymus repens
*Epilobium angustifolium***
*Epilobium ciliatum***
*Epilobium obscurum***
*Epipactis palustris***
Epipactis sp. *
*Equisetum arvense**
Eupatorium cannabinum
*Euphorbia helioscopia***
Euphrasia sp.
Festuca rubra
Filipendula ulmaria
*Fraxinus excelsior**
*Galium aparine***
Galium verum
*Geranium dissectum***
*Gymnadenia conopsea***
*Helictotrichon pubescens**
Heracleum sphondylium
*Hieracium sp.****
Holcus lanatus
*Hypericum maculatum***
*Hypericum perforatum***
*Hypericum pulchrum**
Hypericum sp. **
*Hypericum tetrapterum***
*Hypochoeris radicata**
*Ilex aquifolium**
*Juncus effusus****
*Juncus inflexus***
Knautia arvensis
*Lapsana communis****
Lathyrus pratensis
Leontodon autumnalis
Leucanthemum vulgare
Linum catharticum
Listeria ovata
Lolium perenne
*Lonicera periclymenum****
Lotus corniculatus
*Luzula campestris**
*Luzula multiflora***
Lythrum salicaria
*Malus domestica***
*Malva sylvestris***
*Matricaria discoidea***
*Medicago lupulina***
Mentha sp.
Molinia caerulea
Myosotis sp. **
Nasturtium officinale
Odondites verna
Ophioglossum vulgatum
*Ophrys apifera**
*Origanum vulgare**
Orobanche sp. **
*Papaver rhoeas***
*Phleum pratensis***
*Pilosella officinalis**
Plantago lanceolata
*Plantago major***
*Poa pratensis**
Poa sp.
Poa trivialis
Polygala vulgaris
*Polygonum aviculare****
Polygonum sp. **
*Potentilla anserina**
Potentilla erecta
*Potentilla reptans**
Primula veris
Prunella vulgaris
*Prunus spinosa***
Pteridium aquilinum
Quercus robur *
Ranunculus acris
*Ranunculus bulbosus**
Ranunculus repens
Rhinanthus minor

*Rosa canina**
Rosa sp. **
Rubus fruticosus agg.
Rumex crispus
*Rumex obtusifolius***
Rumex sp. **
Salix caprea
Salix cinerea
*Sanguisorba minor***
*Scrophularia nodosa***
Senecio jacobaea
*Senecio vulgaris****
*Silene alba***
Sonchus oleraceus
Stellaria graminea
*Stellaria holostea****
Stellaria uliginosa
*Succisa pratensis**
Taraxacum officinale
*Taraxacum sp.****
*Torilis japonica**
*Trifolium dubium**
*Trifolium pratense**
Trifolium repens
*Trisetum flavescens**
Ulex europaeus
*Ulmus glabra***
Urtica dioica
*Valeriana officinale***
*Veronica chamaedrys**
*Veronica serpyllifolia***
Vicia cracca
*Vicia hirsuta***
*Vicia sativa***
Vicia sepium
Vicia sp.

GS2 Dry meadows and grassy verges

Achillea millefolium
Agrostis capillaris
Agrostis sp.
*Agrostis stolonifera**
*Alopecurus pratensis**
*Angelica sylvestris***

Anthoxanthum odoratum
Anthriscus sylvestris
Arrhenatherum elatius
*Artemisia vulgaris****
*Arum maculatum**
Bellis perennis
*Brachypodium sylvaticum**
Briza media
*Calystegia sepium***
Carex flacca
*Carex hirta**
*Carex panicea**
*Carex paniculata***
Carex pendula
*Carex pulicaris**
Centaurea nigra
Cerastium fontanum
Cirsium arvense
*Cirsium dissectum**
*Cirsium palustre***
Cirsium vulgare
*Corylus avellana***
*Crataegus monogyna***
Crepis capillaris
Cynosurus cristatus
Dactylis glomerata
*Dactylorhiza fuchsii**
*Dactylorhiza maculata***
Daucus carota
*Deschampsia caespitosa**
*Elymus repens***
*Epilobium angustifolium**
*Epilobium hirsutum***
Equisetum arvense
*Equisetum fluviatile***
*Equisetum sp.***
*Euonymus europaeus**
Euphrasia rostkoviana
Euphrasia sp.
*Festuca arundinacea***
Festuca ovina
*Festuca pratensis**
Festuca rubra
*Filipendula ulmaria**

<i>Galium aparine</i>	<i>Poa pratensis</i> ***
<i>Galium palustre</i> **	<i>Polygala vulgare</i>
<i>Galium saxatile</i>	<i>Polystichum setiferum</i> **
<i>Galium verum</i>	<i>Potentilla anserina</i>
<i>Geranium molle</i>	<i>Potentilla reptans</i> *
<i>Geranium robertianum</i>	<i>Potentilla sterilis</i>
<i>Geum urbanum</i> ***	<i>Primula veris</i>
<i>Helictotrichon pubescens</i>	<i>Prunella vulgaris</i>
<i>Heracleum sphondylium</i> ***	<i>Prunus</i> sp.
<i>Hieracium</i> sp.	<i>Prunus spinosa</i> **
<i>Holcus lanatus</i>	<i>Ranunculus acris</i> *
<i>Hyacinthoides-non-scriptus</i> *	<i>Ranunculus repens</i>
<i>Hypericum maculatum</i>	<i>Rhinanthus minor</i>
<i>Hypericum pulchrum</i> **	<i>Rosa arvensis</i> **
<i>Hypochoeris radicata</i> **	<i>Rosa</i> sp.
<i>Ilex aquifolium</i> *	<i>Rubus fruticosus</i> agg.
<i>Impatiens glandulifera</i> ***	<i>Rumex acetosa</i>
<i>Iris pseudacorus</i> *	<i>Rumex crispus</i>
<i>Juncus acutiflorus</i> *	<i>Rumex obtusifolius</i> ***
<i>Juncus conglomeratus</i> *	<i>Salix alba</i> **
<i>Juncus effusus</i> *	<i>Salix cinerea</i>
<i>Juncus inflexus</i> **	<i>Salix</i> sp. *
<i>Juncus</i> sp. *	<i>Scrophularia nodosa</i> ***
<i>Knautia arvensis</i> **	<i>Senecio jacobaea</i>
<i>Lapsana communis</i>	<i>Silene latifolia</i>
<i>Lathyrus pratensis</i>	<i>Solanum dulcamara</i> ***
<i>Leontodon autumnalis</i>	<i>Sonchus oleraceus</i> ***
<i>Leontodon hispidus</i> *	<i>Stachys sylvatica</i> ***
<i>Leucanthemum vulgare</i>	<i>Succisa pratensis</i> *
<i>Linum catharticum</i>	<i>Taraxacum officinale</i>
<i>Lolium perenne</i>	<i>Trifolium campestre</i>
<i>Lotus corniculatus</i>	<i>Trifolium dubium</i> ***
<i>Luzula campestris</i>	<i>Trifolium pratense</i>
<i>Lysimachia vulgaris</i> **	<i>Trifolium repens</i>
<i>Lythrum salicaria</i> **	<i>Ulmus glabra</i> **
<i>Medicago lupulina</i>	<i>Urtica dioica</i>
<i>Mentha</i> sp. **	<i>Valeriana officinalis</i> **
<i>Odonites verna</i> ***	<i>Veronica chamaedrys</i>
<i>Origanum vulgare</i> **	<i>Vicia cracca</i>
<i>Phalaris arundinacea</i> **	<i>Vicia sepium</i>
<i>Phleum pratense</i> **	<i>Viola riviniana</i> *
<i>Plantago lanceolata</i>	
<i>Plantago major</i> *	GS3 Dry-humid acid grassland
<i>Poa annua</i>	<i>Achillea millefolium</i>

*Agrostis capillaris****
Agrostis stolonifera
*Alopecurus geniculatus****
*Angelica sylvestris****
Anthoxanthum odoratum
*Bellis perennis****
 Bryophytes
*Cardamine pratensis****
Carex sp.***
Centaurea nigra
*Cerastium fontanum****
*Cirsium dissectum****
Cirsium sp.
*Cirsium vulgare****
Cynosurus cristatus
*Dactylorhiza maculata****
Dactylis glomerata
*Deschampsia caespitose****
*Deschampsia flexuosa****
*Digitalis purpurea****
*Eriophorum angustifolium****
Galium aparine
Galium palustris
Galium verum
Glyceria fluitans
*Glyceria notata****
Holcus lanatus
*Hypochoeris radicata****
*Juncus bufonius****
*Juncus effusus****
Lathyrus pratensis
*Lotus corniculatus****
*Lotus uliginosa****
*Luzula multiflora****
Molinia caerulea
*Myosotis discolor****
 Orchid
*Pedicularis sylvatica****
Plantago lanceolata
Poa sp.
Potentilla anserina
*Potentilla erecta****
Potentilla reptans
*Prunella vulgaris****

*Ranunculus acris****
*Ranunculus flammula****
Ranunculus repens
Rubus fruticosus agg.
*Rumex acetosa****
*Rumex acetosella****
Rumex obtusifolius
Rumex sp.
*Senecio jacobaea****
Sphagnum sp.***
*Stellaria graminea****
*Succisa pratensis****
Taraxacum officinale
*Trifolium dubium****
*Trifolium pratense****
*Trifolium repens****
*Ulex europaeus****
Vicia sepium
*Vulpia bromoides****

GS4 Wet grassland

*Achillea millefolium***
Agrostis canina
Agrostis capillaris
Agrostis stolonifera
Alopecurus geniculatus
*Alopecurus pratensis**
*Anagallis tenella**
Angelica sylvestris
Anthoxanthum odoratum
*Aquilegia vulgaris**
Arrhenatherum elatius
*Bellis perennis***
*Betula pubescens***
*Brachypodium sylvaticum**
Briza media
Calluna vulgaris
Caltha palustris
*Calystegia sepium***
Calystegia sp. *
*Cardamine flexuosa****
Cardamine pratensis
*Carex binervis****
*Carex distichia***

<i>Carex flacca</i>	<i>Festuca pratensis**</i>
<i>Carex hirta</i>	<i>Festuca rubra</i>
<i>Carex nigra</i>	<i>Filipendula ulmaria</i>
<i>Carex otrubae**</i>	<i>Galium aparine*</i>
<i>Carex ovalis***</i>	<i>Galium palustre</i>
<i>Carex panicea</i>	<i>Galium saxatile**</i>
<i>Carex paniculata**</i>	<i>Galium verum*</i>
<i>Carex pulicaris</i>	<i>Geranium robertianum***</i>
<i>Carex rostrata</i>	<i>Geum rivale***</i>
<i>Carex viridula</i>	<i>Glyceria fluitans</i>
<i>Centaurea nigra</i>	<i>Glyceria maxima*</i>
<i>Cerastium fontanum</i>	<i>Gymnadenia conopsea</i>
<i>Cirsium arvense</i>	<i>Helictotrichon pubescens*</i>
<i>Cirsium dissectum</i>	<i>Heracleum sphondylium**</i>
<i>Cirsium palustre</i>	<i>Holcus lanatus</i>
<i>Cirsium vulgare</i>	<i>Hydrolyte vulgaris</i>
<i>Corylus avellana</i>	<i>Hypericum pulchrum</i>
<i>Crataegus monogyna</i>	<i>Hypericum tetrapterum</i>
<i>Cynosurus cristatus</i>	<i>Hypochoeris radicata</i>
<i>Dactylis glomerata</i>	<i>Iris pseudacorus</i>
<i>Dactylorhiza fuchsii</i>	<i>Juncus acutiflorus</i>
<i>Dactylorhiza incarnata</i>	<i>Juncus articulatus</i>
<i>Dactylorhiza maculata</i>	<i>Juncus conglomeratus</i>
<i>Dactylorhiza majalis**</i>	<i>Juncus effusus</i>
<i>Deschampsia caespitosa</i>	<i>Juncus inflexus</i>
<i>Deschampsia flexuosa</i>	<i>Juncus squarrosus***</i>
<i>Eleocharis palustris</i>	<i>Knautia arvensis**</i>
<i>Elymus repens*</i>	<i>Lapsana communis**</i>
<i>Epilobium angustifolium**</i>	<i>Lathyrus pratensis</i>
<i>Epilobium hirsutum</i>	<i>Leontodon autumnalis</i>
<i>Epilobium montanum*</i>	<i>Leontodon hispidus*</i>
<i>Epilobium parviflorum</i>	<i>Leucanthemum vulgare**</i>
<i>Epilobium sp.</i>	<i>Linum catharticum</i>
<i>Equisetum arvense</i>	<i>Liverworts***</i>
<i>Equisetum fluviatile*</i>	<i>Lolium perenne</i>
<i>Equisetum palustre*</i>	<i>Lotus corniculatus</i>
<i>Equisetum sp.</i>	<i>Lotus uliginosa*</i>
<i>Erica tetralix</i>	<i>Luzula campestris</i>
<i>Eriophorum angustifolium*</i>	<i>Luzula multiflora**</i>
<i>Eriophorum vaginatum</i>	<i>Lychnis flos-cuculi</i>
<i>Eupatorium cannabinum</i>	<i>Lysimachia vulgaris**</i>
<i>Festuca arundinacea**</i>	<i>Lythrum salicaria</i>
<i>Festuca gigantea</i>	<i>Mentha aquatica</i>
<i>Festuca ovina***</i>	<i>Mentha sp.</i>

Menyanthes trifoliata
Molinia caerulea
*Myosotis secunda****
*Origanum vulgare***
*Parentucellia viscosa***
Pedicularis sylvatica
Phalaris arundinacea
*Phleum bertolini***
Phleum pratense
Phragmites australis
*Picea sitchensis***
Plantago lanceolata
*Platanthera bifolia**
Poa sp.
Poa trivialis
Polygala vulgaris
Potamogeton sp.
Potentilla anserina
Potentilla erecta
*Potentilla palustris***
Potentilla reptans
Primula veris
Prunella vulgaris
*Pulicaria dysenterica***
*Quercus robur***
Ranunculus acris
Ranunculus flammula
Ranunculus lingua
Ranunculus repens
*Rhinanthus minor**
*Rosa canina**
Rubus fruticosus agg.
Rumex acetosa
*Rumex acetosella****
*Rumex conglomeratus***
Rumex crispus
*Rumex obtusifolius***
Sagina procumbens
*Salix alba***
*Salix aurita****
*Salix caprea**
Salix cinerea
*Schoenus nigricans***
Senecio aquaticus

Senecio jacobaea
*Silene dioica***
Sonchus asper
*Sonchus oleraceus***
*Sphagnum moss****
Stachys palustris
Stellaria aparine
Stellaria graminea
*Stellaria uliginosa****
*Succisa pratensis****
*Trifolium repens****
Triglochin palustre
Ulex europaeus
*Urtica dioica***
Valeriana officinalis
*Veronica agrestis****
Veronica beccabunga
Veronica chamaedrys
*Viburnum opulus**
Vicia cracca
Vicia sepium
Vicia sp.

GM1 Marsh

Agrostis capillaris
*Agrostis stolonifera**
Angelica sylvestris
Anthoxanthum odoratum
Caltha palustre
Carex nigra
*Cardamine pratensis****
*Carex ovalis****
*Carex rostrata****
Carex vesicaria
*Centaurea nigra**
Cirsium palustre
*Cladium mariscus**
*Crataegus monogyna**
Epilobium palustre
Equisetum sp.
Filipendula ulmaria
*Fraxinus excelsior**
Gallium palustre
Holcus lanatus
Iris pseudacorus
Juncus acutiflorus
Juncus effusus
Juncus effusus
Lathyrus pratensis
Lolium perenne
Lythrum salicaria
Lythrum salicaria
Mentha aquatica
Molina caerulea
Myosotis palustris
Phleum pratensis
*Phragmites australis**
Potentilla anserina
Potentilla anserina
Potentilla erecta
Potentilla palustre
Ranunculus acris
Ranunculus repens
Rubus fruticosus agg.
Rumex sp.
*Rumex acetosella****
Salix aurita

Salix cinerea
*Schoenus nigricans**
Silene dioica
*Valeriana officinalis**
Vicia cracca

HH1 Dry siliceous heath

*Agrostis stolonifera****
*Alopecurus geniculatus****
*Andromeda polifolia****
*Anthoxanthum odoratum****
*Calluna vulgaris****
*Carex nigra****
*Carex panicea****
*Cerastium fontanum****
*Cladonia portensis****
*Crataegus monogyna****
*Deschampsia flexuosa****
*Digitalis purpurea****
*Dryopteris dilatata****
*Erica tetralix****
*Eriophorum angustifolium****
*Eriophorum vaginatum****
*Gallium saxatile****
*Juncus articulatus****
*Juncus effusus****
*Juncus squarrosus****
*Luzula multiflora****
*Narthecium ossifragum****
*Poa annua****
*Polygala vulgaris****
*Potentilla erecta****
*Rubus fruticosus****
*Rumex acetosella****
*Salix aurita****
*Sorbus aucuparia****
Sphagnum sp. ***
*Succisa pratensis****
*Trichophorum caespitosum****
*Trifolium repens****
*Vaccinium myrtillus****
*Vaccinium oxycoccus****

HH3 Wet heath

Angelica sylvestris
Anthoxanthum odoratum
 Bryophytes
Carex panicea
Cirsium palustre
*Cirsium vulgare****
Dactylis glomerata
Deschampsia sp.***
*Eriophorum vaginatum****
*Erica tetralix****
Festuca ovina
Festuca rubra
Filipendula ulmaria
Holcus lanatus
*Juncus effusus****
Luzula campestris
Molinia caerulea
Populus sp.
Potentilla erecta
Ribes sp.
Rubus fruticosus agg.
Schoenus nigricans
*Salix cinerea****
Succisa pratensis
*Ulex europaeus****
*Vaccinium myrtillus****

HD1 Dense bracken

Agrostis canina
Anthoxanthum odoratum
Carex echinata
Carex flacca
Cirsium vulgare
Dactylorhiza fuchsii
Deschampsia caespitosa
Festuca arundinacea
Holcus lanatus
Hypericum sp.
Juncus acutiflorus
Juncus effusus
Luzula multiflora
Pedicularis sp.

Plantago lanceolata
Potentilla erecta
Prunella vulgaris
Pteridium aquilinum
Ranunculus acris
Rubus fruticosus agg.
Succisa pratensis
Trifolium pratense

PB1 Raised bog

*Andromeda polifolia**
Angelica sylvestris
Anthoxanthum odoratum
Betula pubescens
Calluna vulgaris
*Carex rostrata**
*Cladonia portentosa**
Dactylorhiza fuchsii
Drosera rotundifolia
Dryopteris dilatata
Epilobium angustifolium
Equisetum sp.
Erica tetralix
Eriophorum angustifolium
Eriophorum vaginatum
*Juncus bufonius**
Luzula multiflora
Molinia caerulea
Narthecium ossifragum
Osmunda regalis
*Pinguicula vulgaris**
Potentilla erecta
Pteridium aquilinum
Rhynchospora alba
Salix aurita
Sphagnum capillifolium
Sphagnum cuspidatum
Sphagnum imbricatum
Sphagnum papillosum
Succisa pratensis
Trichophorum caespitosum
Ulex europaeus
*Vaccinium myrtillus****

PB4 Cutover bog

Andromeda polifolia
Angelica sylvestris
Anthoxanthum odoratum
Betula pubescens
Callitriche sp.**
Calluna vulgaris
*Carex nigra**
*Carex panicea***
*Carex rostrata**
*Cladonia portentosa**
Dactylorhiza fuchsii
Drosera rotundifolia
Dryopteris dilatata
Epilobium angustifolium
Equisetum sp.
Erica tetralix
Eriophorum angustifolium
Eriophorum vaginatum
*Galium palustre***
*Geum rivale***
*Iris pseudacorus**
*Juncus effusus***
*Lonicera periclymenum**
Luzula multiflora
Molina caerulea
Narthecium ossifragum
Osmunda regalis
*Polystichum commune**
Potamogeton sp. **
Potentilla erecta
*Potentilla palustre**
*Potentilla reptans**
Pteridium aquilinum
*Rhododendron ponticum**
Rhynchospora alba
*Rumex acetosa***
Salix aurita
*Salix cinerea**
Sorbus aucuparia *
Sphagnum capillifolium
Sphagnum cuspidatum

PF1 Rich fen and flush

Alnus glutinosa
*Angelica sylvestris***
*Briza media***
*Calluna vulgaris***
*Carex flacca***
Carex panicea
*Carex pulicaris***
*Carex viridula***
*Cirsium palustre***
*Dactylorhiza maculata***
Equisetum sp.
*Erica cinerea***
Filipendula ulmaria
*Galium palustre***
Holcus lanatus
*Juncus effusus***
Mentha aquatica
Molina caerulea
Phragmites australis
Pinus sp.
*Polygala vulgaris***
Potentilla erecta
Schoenus nigricans
Succisa pratensis
Ulex europaeus

WN1 Oak-birch-holly woodland

*Alnus glutinosa****
*Athyrium filix-femina****
Betula pubescens
*Blechnum spicant****
*Brachypodium sylvatica****
*Carex sylvatica****
*Cirsium vulgare****
*Crataegus monogyna****
*Digitalis purpurea****
*Dryopteris affinis****
*Dryopteris dilatata****
*Dryopteris filix-mas****
Fraxinus excelsior
*Geranium robertianum****
*Geum urbanum****

Hedera helix
*Ilex aquifolium****
*Lonicera periclymenum****
*Lysimachia nemorum****
*Oxalis acetosella****
*Phallus impudicus****
Poa sp. ***
*Polypodium vulgare****
*Prunus avium****
*Prunus spinosa****
*Pteridium aquilinum****
*Quercus robur****
Rubus fruticosus agg. ***
*Salix caprea****
*Salix cinerea****
Salix sp.
*Veronica chamaedrys****

WN2 Oak-ash-hazel woodland

Acer pseudoplatanus
*Aesculus hippocastanum***
*Agrostis capillaris***
Agrostis stolonifera
Ajuga reptans
Alliaria petiolata
*Allium ursinum**
*Alnus glutinosa***
*Anemone nemorosa**
Angelica sylvestris
*Anthriscus sylvestris***
*Arctium minor***
Arrhenatherum elatius
Arum maculatum
Asplenium adiantum-nigrum
Athyrium filix-femina
Aucuba japonica var. **
Bellis perennis
*Betula pubescens***
*Blechnum spicant****
Brachypodium sylvaticum
Bromus sp. **
Buxus sp. **
Caltha palustris
*Calystegia sepium***

*Cardamine hirsuta****
*Carex divulsa***
*Carex flacca***
*Carex pendula***
*Carex remota***
Carex sp.
Carex sylvatica
Castanea sativa
*Centaurea nigra***
Cerastium fontanum
*Chrysosplenium oppositifolium****
Circaea lutetiana
Cirsium dissectum
Cirsium vulgare
*Clematis vitalba**
Corylus avellana
Crataegus monogyna
*Dactylorhiza maculata****
*Dactylorhiza majalis****
Dactylis glomerata
Deschampsia caespitosa
*Digitalis purpurea****
Dryopteris affinis
Dryopteris dilatata
Dryopteris filix-mas
*Epilobium angustifolium***
*Epilobium hirsutum***
*Epilobium montanum***
Epilobium sp.
*Epipactis helleborine****
*Epipactis palustre****
Equisetum arvense
*Equisetum fluviatile***
Equisetum sp.
Euonymus europaeus
Fagus sylvatica
*Festuca rubra***
Filipendula ulmaria
*Fragaria vesca***
Fraxinus excelsior
*Fuchsia ricartonia****
Galium aparine
Galium odoratum
*Galium palustre***

*Galium saxatile****
Geranium robertianum
Geum urbanum
Glechoma hederacea
Hedera helix
Heracleum sphondylium
Holcus lanatus
Hyacinthoides non-scriptus
*Hypericum pulchrum***
Hypericum sp. ***
*Hypericum tetrapterum***
*Hypochoeris radicata***
Ilex aquifolium
*Iris pseudacorus***
*Juncus effusus***
Juncus inflexus
Juncus sp.
Lapsana communis
*Lathyrus pratensis****
*Leycesteria formosa****
*Ligustrum vulgare***
Listeria ovata
*Lonicera nitida****
Lonicera periclymenum
*Luzula sylvatica****
*Lycopus europaeus****
Lysimachia nemorum
*Malus domestica***
*Melampyrum pratense****
Melica uniflora
Mentha aquatica
Mentha sp.
Oxalis acetosella
*Phalaris arundinacea***
Phragmites australis
Phyllitis scolopendrium
*Picea abies***
Picea sitchensis
Pinus sp.
*Pinus sylvestris***
*Plantago lanceolata***
*Plantago major***
Poa annua
*Poa palustre****

Poa sp. ***
*Poa trivialis**
Polygonatum sp. **
Polypodium vulgare
Polystichum setiferum
Populus tremula
Potentilla erecta
*Potentilla reptans***
Potentilla setiferum
Potentilla sterilis
*Primula veris**
Primula vulgaris
*Prunus avium***
Prunus sp.
Prunus spinosa
*Pseudosuga menziesii***
Pteridium aquilinum **
Quercus robur
*Ranunculus acris**
Ranunculus ficaria
Ranunculus repens
Ribes rubrum
*Rosa arvensis***
Rosa canina
Rosa sp.
Rubus fruticosus agg.
*Rubus idaeus***
Rumex crispus
Rumex sanguineus
Rumex sp.
*Salix aurita****
Salix caprea
Salix cinerea
Salix sp.
Sambucus nigra
Sanicula europaeus
*Scrophularia nodosa***
*Senecio aquaticus****
*Senecio jacobaea***
Sobaria sp. **
Sonchus asper
*Sonchus oleraceus***
Sorbus aucuparia
Stachys sylvatica

Stellaria holostea
*Succisa pratensis***
Taraxacum officinale
*Taxus baccata**
Teucrium scorodonia
*Trifolium repens****
Ulex europaeus
Ulmus glabra
Urtica dioica
Veronica beccabunga
Veronica chamaedrys
Veronica montana
Veronica sp.
Viburnum opulus
Vicia sepium
Viola riviniana
Viola sp.

WN6 Wet willow-alder-ash woodland

Acer pseudoplatanus
Alnus glutinosa
Arum maculatum
Betula pubescens
*Blechnum spicant****
Brachypodium sylvaticum
Callitriche sp. ***
Carex flacca
Carex remota
*Carex sylvatica****
Chrysosplenium oppositifolium
Circaea lutetiana
Corylus avellana
Crataegus monogyna
Deschampsia caespitosa
Dryopteris dilatata
Epilobium hirsutum
Epilobium montanum
Equisetum sylvaticum
*Euonymus europaeus***
*Eupatorium cannabinum***
Fagus sylvatica
Filipendula ulmaria
Fraxinus excelsior

Galium aparine
Geranium robertianum
Geum urbanum
Glechoma hederacea
Glyceria fluitans
*Glyceria maxima****
*Hedera helix***
Heracleum sphondylium
*Holcus lanatus***
*Ilex aquifolium***
Iris pseudacorus
Lemna sp. ***
Lonicera periclymenum
Mentha aquatica
*Myosotis laxa****
*Nasturtium officinale****
*Phragmites australis***
*Prunus spinosa****
*Pteridium aquilinum****
Quercus robur
Ranunculus flammula
*Ranunculus repens****
*Rosa canina***
Rubus fruticosus agg.
*Rumex sanguineus****
Salix cinerea
Sambucus nigra
Sanicula europaea
*Schoenoplectus lacustris***
*Senecio jacobaea****
Solanum dulcamara
Stachys sylvatica
Ulex europaeus
Ulmus glabra
*Ulmus procera***
Urtica dioica
*Valeriana officinalis***
*Vicia cracca***
Viola sp.

WN7 Bog woodland

*Agrostis stolonifera***
Alnus glutinosa
*Anthoxanthum odoratum***

Betula pubescens
*Brachypodium sylvaticum***
*Calluna vulgaris***
Carex sp. **
*Corylus avellana***
Crataegus monogyna
*Dactylis glomerata***
*Dryopteris affinis***
*Dryopteris dilatata***
*Epilobium hirsutum***
*Epilobium montanum***
*Filipendula ulmaria***
Fraxinus excelsior
*Galium aparine***
*Geranium robertianum***
*Hedera helix***
*Heracleum sphondylium***
*Holcus lanatus***
*Ilex aquifolium***
*Ligustrum vulgare***
*Lonicera periclymenum***
*Molinia caerulea***
Prunus avium
Prunus spinosa
*Pteridium aquilinum***
*Ranunculus acris***
*Ranunculus repens***
*Rosa arvensis***
Rubus fruticosus agg.
*Rumex obtusifolius***
*Salix alba***
Salix aurita
Salix cinerea
Salix sp. **
Sambucus nigra
*Solidago virgaurea***
*Sonchus oleraceus***
*Urtica dioica***
*Veronica beccabunga***
*Vicia sepium***

WD1 (Mixed) broadleaved woodland

Acer pseudoplatanus
Aesculus hippocastanum

*Agrostis stolonifera***
*Alliaria petiolata**
*Allium ursinum**
*Alnus glutinosa**
*Anthoxanthum odoratum***
Anthriscus sylvestris
Arctium minor
*Arrhenatherum elatius***
Arum maculatum
*Araucaria araucaria****
*Betula pubescens***
Brachypodium sylvaticum
*Briza media***
*Buxus sempervirens***
*Calluna vulgaris***
Cardamine flexuosa
*Carex panicea***
Carex sylvatica
*Centaurea erythraea***
*Centaurea nigra***
Cerastium fontanum
Circaea lutetiana
*Cirsium palustre***
Cirsium vulgare
Conopodium majus
*Cordyline australis****
Corylus avellana
Crataegus monogyna
*Cynosurus cristatus***
Dactylis glomerata
*Dactylorhiza maculata***
*Deschampsia caespitosa***
*Dryopteris affinis***
*Dryopteris dilatata***
*Dryopteris filix-mas***
*Epilobium angustifolium***
*Epilobium hirsutum***
*Epilobium parviflorum***
Epilobium sp.
*Equisetum fluviatile***
*Euonymus europaeus***
*Euonymus x fortuneii****
Euphrasia sp. **
Fagus sylvatica

*Fagus sylvatica pendula****
*Fagus sylvatica Purpurea***
Festuca rubra **
*Filipendula ulmaria**
*Fragaria vesca***
Fraxinus excelsior
*Fuchsia sp.****
Galium aparine
*Galium odoratum***
*Galium palustre***
Geranium robertianum
Geum urbanum
*Glechoma hederacea***
Hedera helix
Heracleum sphondylium
*Holcus lanatus***
*Houttuynia cordata Chameleon****
Hyacinthoides non-scriptus
*Hypericum androsaemum***
*Hypericum hidcote****
Hypericum sp. **
Ilex aquifolium
*Iris pseudacorus***
*Juncus effusus***
*Lapsana communis**
*Laurus nobilis**
*Leontodon autumnalis***
*Leucanthemum vulgare***
Ligustrum sp.
*Ligustrum vulgare***
*Linum catharticum***
Lonicera periclymenum
Lysimachia nemorum
*Medicago lupulina***
*Melissa officinale****
*Origanum vulgare***
*Oxalis acetosella***
*Phyllitis scolopendrium***
*Picea abies**
*Picea sitchensis***
*Pinus sylvestris***
Poa sp.
Polystichum aculeatum *
Polystichum setiferum
Potentilla sterilis
Primula vulgaris
*Prunus laurocerasus**
Prunus spinosa
Pteridium aquilinum **
*Pyracantha sp.****
Quercus robur
Ranunculus auricomus
Ranunculus ficaria
*Ranunculus repens**
*Rosa canina***
Rosa sp. *
Rubus fruticosus agg.
*Rumex crispus**
Rumex obtusifolius
Rumex sanguineus
Rumex sp.
*Salix caprea***
*Salix cinerea***
Salix sp.
Sambucus nigra
*Sanguisorba minor***
*Sanicula europaea***
*Scrophularia nodosa***
*Senecio jacobaea**
*Sonchus oleraceus***
*Sorbus aucuparia***
*Sparganium erectum****
Stachys sylvatica
Stellaria media
*Symphoricarpos orbiculatus**
Taraxacum officinale
*Thymus vulgaris***
Tilia cordata
Tilia sp. **
Tilia x europaea *
*Torilis japonica***
*Trifolium pratense***
*Trifolium repens***
*Ulex europaeus***
Ulmus glabra
Ulmus procera
Urtica dioica
*Veronica chamaedrys***

Veronica montana
Veronica officinalis
*Veronica serpyllifolia***
*Viburnum opulus**
*Vicia sepium***
Vicia sp.
*Viola reichenbackiana**
Viola sp.

WD2 Mixed broadleaved/conifer woodland

Abies sp.
Acer pseudoplatanus
*Agrostis stolonifera****
*Alliaria petiolata****
Alnus glutinosa
*Anthriscus sylvestris****
Arum maculatum
Betula pubescens
Brachypodium sylvaticum
*Calystegia sepium***
Circaea lutetiana
*Clematis vitalba***
Cornus sp. **
Corylus avellana
Cotoneaster sp.***
Crataegus monogyna
*Digitalis purpurea****
Dryopteris affinis
Dryopteris dilatata
Dryopteris filix-mas
*Epilobium hirsutum***
Euonymus europaeus
Fagus sylvatica
Fraxinus excelsior
*Galium aparine****
Geranium robertianum
Geum urbanum
*Geum urbanum****
Hedera helix
*Hyacinthoides non-scriptus****
Hypericum humifusum
Ilex aquifolium
*Lapsana communis****
*Larix decidua***

*Ligustrum vulgare***
Lonicera periclymenum
*Petasites fragrans****
*Phalaris arundinacea***
Phragmites australis
*Picea abies**
Picea sitchensis
Pinus sylvestris
*Polystichum setiferum****
Prunus domestica
Prunus kanzan
Prunus spinosa
Pseudosuga menziesii
*Pteridium aquilinum****
Quercus robur
*Ranunculus repens****
*Rosa canina****
Rosa sp.
Rubus fruticosus agg.
*Rumex sanguineus****
Salix caprea
Salix cinerea
*Salix fragilis***
Sambucus nigra
Sanicula europaea
*Senecio vulgaris****
*Sparganium emersum***
*Taxus baccata***
Ulex europaeus
Ulmus sp. ***
Urtica dioica
Veronica chamaedrys
Viburnum opulus
*Vicia sepium****
Viola sp.

WD3 (Mixed) conifer woodland

*Ajuga reptans****
*Alnus glutinosa****
*Anthriscus sylvestris****
*Asplenium scolopendrium****
*Athyrium filix-femina****
*Brachypodium sylvaticum****
*Carex pendula****

*Carex sylvatica****
*Chrysosplenium oppositifolium****
*Circaea lutetiana****
*Cirsium vulgare****
*Corylus avellana****
*Crataegus monogyna****
*Dryopteris affinis****
*Dryopteris dilatata****
*Dryopteris filix-mas****
*Epilobium parviflorum****
*Fagus sylvatica seedlings****
*Filipendula ulmaria****
*Fragaria vesca****
*Fraxinus excelsior****
*Galium aparine****
*Geranium robertianum****
*Geum urbanum****
*Hedera helix****
*Holcus lanatus****
*Hyacinthoides non-scriptus****
*Ilex aquifolium****
*Lapsana communis****
*Larix decidua**
*Lonicera periclymenum****
*Luzula sylvatica****
*Melica uniflora****
*Oxalis acetosella****
*Picea abies**
Picea sitchensis
*Pinus sylvestris***
*Polystichum setiferum****
*Populus x canescens****
*Prunus laurocerasus****
*Prunus spinosa****
*Quercus robur****
*Ranunculus repens****
Rosa sp. ***
*Rubus fruticosus****
*Sambucus nigra****
*Sanicula europaeus****
*Sorbus aucuparia****
*Stellaria holostea****
*Veronica chamaedrys****

*Vicia sepium****
Viola sp. ***

WD4 Conifer plantation

Abies sp.
Larix sp.
Picea abies
Picea sitchensis
Pinus contorta
Pinus sylvestris
Pseudotsuga menziesii

WD5 Scattered trees and parkland

*Acer pseudoplatanus**
Aesculus hippocastanum
*Agrostis stolonifera***
*Cerastium fontanum***
*Cirsium arvense***
*Dactylis glomerata***
Fagus sylvatica
Fraxinus excelsior
Fraxinus excelsior pendula
*Galium aparine***
*Geranium robertianum***
*Geum urbanum***
*Lapsana communis***
*Lolium perenne***
*Quercus robur***
*Ranunculus repens***
*Rumex crispus***
*Ulmus procera**
*Urtica dioica***
Viola sp. **
Tilia sp.***

WS1 Scrub

Acer pseudoplatanus
Achillea millefolium
*Agrostis capillaris***
Agrostis stolonifera
Alnus glutinosa
Andromeda polifolia
Angelica sylvestris

<i>Arctium minor*</i>	<i>Filipendula ulmaria</i>
<i>Arum maculatum</i>	<i>Fraxinus excelsior</i>
<i>Bellis perennis</i>	<i>Galium aparine</i>
<i>Betula pubescens</i>	<i>Galium palustre**</i>
<i>Brachypodium sylvaticum</i>	<i>Galium verum</i>
<i>Briza media</i>	<i>Geranium molle</i>
<i>Calluna vulgaris</i>	<i>Geranium robertianum</i>
<i>Cardamine pratensis</i>	<i>Geum urbanum**</i>
<i>Carex flacca**</i>	<i>Glechoma hederacea</i>
<i>Carex panicea</i>	<i>Glyceria maxima***</i>
<i>Carex pilulifera</i>	<i>Gymnadenia conopsea**</i>
<i>Carex sylvatica**</i>	<i>Hedera helix</i>
<i>Centaurea nigra</i>	<i>Heracleum sphondylium</i>
<i>Cerastium fontanum</i>	<i>Holcus lanatus</i>
<i>Circaea lutetiana**</i>	<i>Hyacinthoides non-scriptus</i>
<i>Cirsium arvense**</i>	<i>Hypericum humifusum</i>
<i>Cirsium dissectum</i>	<i>Hypericum pulchrum**</i>
<i>Cirsium vulgare</i>	<i>Ilex aquifolium</i>
<i>Corylus avellana</i>	<i>Juncus acutiflorus</i>
<i>Crataegus monogyna</i>	<i>Juncus articulatus**</i>
<i>Cynosurus cristatus</i>	<i>Juncus effusus***</i>
<i>Dactylis glomerata</i>	<i>Juncus inflexus**</i>
<i>Dactylorhiza fuchsii</i>	<i>Larix decidua</i>
<i>Dactylorhiza maculata</i>	<i>Leontodon autumnalis</i>
<i>Dactylorhiza majalis</i>	<i>Leucanthemum vulgare**</i>
<i>Daucus carota**</i>	<i>Ligustrum sp.</i>
<i>Deschampsia caespitosa</i>	<i>Ligustrum vulgare</i>
<i>Drosera rotundifolia</i>	<i>Listeria ovata</i>
<i>Dryopteris dilatata</i>	<i>Lolium perenne</i>
<i>Dryopteris filix-mas</i>	<i>Lonicera periclymenum</i>
<i>Epilobium angustifolium</i>	<i>Lotus corniculatus</i>
<i>Epilobium hirsutum**</i>	<i>Luzula multiflora</i>
<i>Epilobium palustre</i>	<i>Luzula sylvatica</i>
<i>Equisetum fluviatile**</i>	<i>Malus sp.</i>
<i>Equisetum sp.</i>	<i>Mentha arvensis</i>
<i>Erica cinerea</i>	<i>Mentha sp. **</i>
<i>Erica tetralix</i>	<i>Molina caerulea</i>
<i>Eriophorum angustifolium</i>	<i>Narthecium ossifragum</i>
<i>Eriophorum vaginatum</i>	<i>Osmunda regalis</i>
<i>Euonymus europaeus **</i>	<i>Pedicularis sylvatica</i>
<i>Eupatorium cannabinum**</i>	<i>Phalaris arundinacea**</i>
<i>Euphrasia sp.</i>	<i>Phragmites australis</i>
<i>Fagus sylvatica</i>	<i>Phyllitis scolopendrium**</i>
<i>Festuca rubra**</i>	<i>Plantago lanceolata</i>

*Poa annua***
*Poa palustris****
Poa sp.
Polygala vulgaris
*Polypodium vulgare***
Polystichum aculeatum
Populus sp.
Potentilla anserina
Potentilla erecta
Potentilla reptans
*Potentilla sterilis***
Primula vulgaris
Prunus avium
*Prunus domestica**
Prunus spinosa
Pteridium aquilinum
Quercus robur
Ranunculus ficaria
Ranunculus flammula
Ranunculus repens
Rhynchospora alba
*Rosa canina**
Rosa sp.
Rubus fruticosus agg.
*Rumex crispus**
*Rumex sanguineus***
Salix aurita
Salix caprea
Salix cinerea
*Salix fragilis**
Salix sp.
Sambucus nigra
Schoenus nigricans
*Senecio jacobaea***
Silene dioica
Sorbus aucuparia
Sphagnum capillifolium
Sphagnum cuspidatum
Sphagnum imbricatum
Sphagnum papillosum
*Stellaria media***
Succisa pratensis
Taraxacum officinale
*Taxus baccata***

*Torilis japonica***
Trichophorum caespitosum
Trifolium dubium
Trifolium pratense
Trifolium repens
Ulex europaeus
Ulmus glabra
Ulmus procera
Urtica dioica
Valeriana officinalis *
Veronica chamaedrys
Viburnum opulus
Vicia cracca
*Vicia sepium***
Viola riviniana
Viola sp. **

WS2 Immature woodland

Abies sp.**
Acer pseudoplatanus
Agrostis stolonifera
Alnus glutinosa
Arrhenatherum elatius
Betula pubescens
Cirsium arvense
Cirsium palustre
*Corylus avellana***
Digitalis purpurea
Epilobium angustifolium
Epilobium sp.
Fagus sylvatica
Fraxinus excelsior
Holcus lanatus
Hypericum pulchrum
Juncus acutiflorus
Juncus effusus
Lathyrus pratensis
Luzula multiflora
Picea sp. **
Populus sp. **
Potamogeton sp.
Potentilla reptans
*Quercus cerise***
Quercus robur

Ranunculus flammula
*Reynoutria japonica***
Rubus fruticosus agg.
Rumex acetosella
*Salix cinerea***
Salix sp.
Senecio jacobaea
Silene dioica
Taraxacum officinalis
Trifolium pratense
Ulex europaeus

WS3 Ornamental/non-native shrub

*Chamaecyparis lawsoniana***
*Cotoneaster horizontalis***
Fagus sylvatica
Grisilina littoralis
*Hypericum hidcote***
Ligustrum ovalifolium
Lonicera nitida
Pyracantha sp. **
x Cupressocyparis leylandii

WS4 Short rotation coppice

Salix sp.

WS5 Recently felled woodland

*Acer pseudoplatanus***
*Agrostis stolonifera***
Anthoxanthum odoratum
Arrhenatherum elatius
*Arum maculatum***
Athyrium filix-femina
Betula pubescens
*Brachypodium sylvaticum***
Calluna vulgaris
Calystegia sepium
Carex flacca
*Carex sylvatica***
Cirsium arvense
Cirsium vulgare
*Corylus avellana***
*Crataegus monogyna***
Dactylis glomerata

Dryopteris dilatata
*Dryopteris filix-mas***
Epilobium angustifolium
*Epilobium hirsutum***
Epilobium parviflorum
*Fagus sylvatica***
Festuca gigantea
*Festuca rubra***
Filipendula ulmaria
Fraxinus excelsior
*Galium aparine***
Galium palustre
Geranium robertianum
*Geum urbanum***
*Hedera helix***
*Heracleum sphondylium***
Holcus lanatus
*Hypericum perforatum***
Hypericum repens
Hypericum tetrapterum
*Hypochoeris radicata***
*Ilex aquifolium***
Juncus acutiflorus
Juncus effusus
Juncus inflexus
*Lapsana communis***
Lonicera periclymenum
Luzula multiflora
Lythrum salicaria
Medicago lupulina
Odontites verna
Oxalis acetosella
Phleum pratense
*Phyllitis scolopendrium***
*Picea sitchensis***
*Plantago lanceolata***
*Plantago major***
Polygonum persicaria
Potentilla anserina
Potentilla erecta
Potentilla reptans
*Primula vulgaris***
Prunella vulgaris
*Quercus robur***

*Ranunculus acris***
Ranunculus flammula
Ranunculus repens
Ribes rubrum
Rubus fruticosus agg.
Salix cinerea
*Scrophularia nodosa***
Senecio jacobaea
*Senecio vulgaris***
Sisymbrium officinale
Solanum dulcamara
Sonchus arvensis
*Sonchus asper***
Stachys sylvatica
Taraxacum officinale
Trifolium repens
Ulex europaeus
*Ulmus glabra***
Urtica dioica
Veronica beccabunga
*Veronica chamaedrys***
Vicia cracca
Vicia sepium
Viola sp. **

WL1 Hedgerows

Acer pseudoplatanus
Achillea millefolium
Aesculus hippocastanum
Agrostis capillaris
Agrostis stolonifera
*Ajuga reptans****
*Alnus glutinosa**
*Alopecurus pratensis**
Anthoxanthum odoratum
*Anthriscus sylvestris***
Arrhenatherum elatius
Asplenium adiantum-nigrum
*Asplenium trichomanes****
*Asplenium ruta-muraria****
*Athyrium filix-femina****
*Bellis perennis****
*Betula pendula**
*Betula pubescens***

*Blechnum spicant****
Brachypodium sylvaticum
Carex divulsa
Centaurea nigra
Centaureum erythraea
Cerastium fontanum
*Circaea lutetiana****
Cirsium arvensis
*Cirsium dissectum****
Cirsium vulgare
*Clematis vitalba**
Corylus avellana
Crataegus monogyna
*Cynosurus cristatus****
*Cytisus scoparius****
Dactylis glomerata
Daucus carota
*Digitalis purpureum****
*Dryopteris affinis****
*Dryopteris dilatata****
*Dryopteris filix-mas****
Epilobium hirsutum
*Epilobium montanum****
Epilobium parviflorum
Equisetum arvense
Euonymus europaeus
Fagus sylvatica
Festuca rubra
Filipendula ulmaria
*Fragaria vesca****
Fraxinus excelsior
*Galium aparine***
Galium palustris
Galium verum
*Galium odoratum****
*Galium saxatile****
Geranium robertianum
Glechoma hederacea
Glyceria fluitans
Hedera helix
Helictotrichon pubescens
Heracleum sphondylium
Holcus lanatus
*Hyacinthus non-scriptus****

Hypericum androsaemum
*Hypericum androsaemum****
Hypericum maculatum
Hypericum perforatum
*Hypericum pulchrum****
*Hypochoeris radicata****
Ilex aquifolium
Iris pseudacorus
*Juncus effusus****
Knautia arvensis
Larix decidua
Lathyrus pratensis
Leontodon autumnalis
*Leucanthemum vulgare****
Ligustrum sp.
*Ligustrum vulgaris**
Lolium perenne
Lonicera periclymenum
Lotus corniculatus
*Luzula sylvatica****
*Lychnis flos-cuculi****
*Lysimachia nemorum****
Lythrum salicaria
*Malus domestica**
Medicago lupulina
Mentha spicata
Myosotis discolor
Myosotis palustris
Phleum pratensis
Phyllitis scolopendrium
*Pinus sylvestris***
Plantago lanceolata
Plantago major
Polystichum setiferum
*Populus tremula****
Potentilla anserina
Potentilla reptans
Primula vulgaris
*Prunella vulgaris****
*Prunus avium****
Prunus domestica
*Prunus laurocerasus****
Prunus spinosa
Pteridium aquilinum
*Pyrus pyraster**
*Quercus robur**
*Ranunculus repens***
Reynoutria japonica
Rosa arvensis
Rosa canina
Rosa sp.
Rubus fruticosus agg.
*Rumex acetosa****
Rumex obtusifolius
*Rumex sanguineus***
Rumex sp.
Salix aurita
Salix caprea
Salix cinerea
Salix sp.
Salix viminalis
Salix x multinervis
Sambucus nigra
Schoenplectus lacustris
*Scrophularia nodosa****
*Senecio erucifolius****
Senecio jacobaea
Silene latifolia
Sonchus oleraceus
Sorbus aria
Sorbus aucuparia
*Stachys sylvatica****
Stellaria holostea
Symphoricarphus sp. ***
Symphytum sp.
Taraxacum officinale
*Taxus baccata**
*Teucrium scorodonia****
*Tilia x europaea**
Torilis japonica
*Trifolium repens****
Ulex europaeus
Ulmus glabra
Ulmus procera
Urtica dioica
*Vaccinium myrtillus****
*Valeriana officinalis****
Veronica chamaedrys

Veronica officinalis
Viburnum opulus
Vicia sepium
Viola sp.

WL2 Treelines

Acer pseudoplatanus
Aesculus hippocastanum
Chamaecyparis sp.
Corylus avellana
Crataegus monogyna
Fagus sylvatica
Fraxinus excelsior
Hedera helix
Larix decidua
Lonicera periclymenum
Pinus sylvestris
Populus sp.
*Quercus robur**
Rosa canina
Salix cinerea
Sorbus aucuparia
Tilia sp. **
Ulmus sp.

ER1 Exposed siliceous rock

Ferns
 Grasses
Hedera helix
Lonicera periclymenum
Potentilla erecta
Saxifraga sp.
Ulex europaeus

ER2 Exposed calcareous rock

Briza media
Centaurea nigra
Cerastium fontanum
Cirsium vulgare
Crataegus monogyna
Dactylis glomerata
Festuca sp.
Fragaria vesca
Fraxinus excelsior

Geranium dissectum
Geranium robertianum
Geum urbanum
Hedera helix
Leucanthemum vulgare
Linum bienne
Lotus corniculatus
Medicago lupulina
Orchid withered
Plantago lanceolata
Potentilla reptans
Potentilla sterilis
Prunus spinosa
Rosa canina
Rubus fruticosus agg.
Sanguisorba minor
Sedum acre
Senecio jacobaea
Stachys sylvatica
Trifolium dubium
Trifolium repens
Ulex europaeus
Vicia sativa

ED1 Exposed sand, gravel or till

Callitriche stagnalis
Epilobium palustre
Glyceria maxima
Glyceria notata
Nasturtium officinale
Phragmites australis
Ranunculus peltatus
*Rumex crispus**
Salix fragilis
Scrophularia nodosa

ED2 Spoil and bare ground

*Poa annua**
Salix sp. *
*Senecio vulgaris**
*Taraxacum officinale**

ED3 Recolonising bare ground

*Achillea millefolium***

Agrostis stolonifera
Anagallis arvensis
*Antennaria dioica****
Anthoxanthum odoratum
*Anthriscus sylvestris***
*Arctium minor***
Arrhenatherum elatius
Calystegia sepium
Centaurea nigra
*Cerastium fontanum***
Chenopodium alba
Cirsium arvense
Cirsium vulgare
Cotoneaster sp.
*Crataegus monogyna****
Dactylis glomerata
Daucus carota
*Dipsacus fullonum***
*Elymus repens****
Epilobium angustifolium
Epilobium hirsutum
Epilobium parviflorum
Equisetum arvense
Festuca sp. ***
Fraxinus excelsior
*Fumaria officinalis***
*Geranium robertianum***
Hedera helix
Helictotrichon pubescens
Heracleum sphondylium
Holcus lanatus
Hypericum sp.
Juncus acutiflorus
Juncus bufonius
*Lamium purpureum***
Lathyrus pratensis
*Leontodon autumnalis***
*Leucanthemum vulgare***
*Lonicera periclymenum***
*Lotus corniculatus****
Matricaria discoidea
Medicago lupulina
Odondites verna
*Papaver rhoeas***

Plantago lanceolata
Plantago major
*Potentilla anserina***
*Potentilla reptans***
*Ranunculus repens***
*Reseda lutetiana***
*Rhus typhina***
Rubus fruticosus agg. **
Rumex conglomeratus
*Rumex obtusifolius***
Salix cinerea
Senecio jacobaea
Senecio vulgaris
Sonchus oleraceus
*Stachys sylvatica***
*Stellaria graminea****
Taraxacum officinale
*Torilis japonica***
Trifolium pratensis
Trifolium repens
Tussilago farfara
*Ulex europaeus***
Urtica dioica
*Veronica chamaedrys***
Vicia cracca
Vicia sepium
*Yellow Brassica***

ED6 Set-aside

Agrostis stolonifera
Chenopodium sp. **
*Cirsium arvense***
Cirsium sp.
*Cirsium vulgare***
*Dactylis glomerata***
Galium aparine
*Heracleum sphondylium***
Lolium perenne
*Lythrum salicaria***
*Papaver rhoeas***
Rumex conglomeratus
*Rumex crispus***
*Sonchus oleraceus***

Taraxacum officinale

*Urtica dioica***

BC1 Arable crops

*Acer pseudoplatanus***

*Anagallis arvensis***

*Avena fatua***

Beta vulgaris

*Calystegia sepium***

*Capsella bursa-pastoris***

*Cerastium fontanum***

*Cirsium vulgare***

*Crataegus monogyna***

Euphrasia sp. **

*Galium aparine***

*Holcus lanatus***

Hordeum vulgare

*Lamium purpureum***

*Lapsana communis***

*Lolium perenne***

*Matricaria discoidea***

*Miscanthus giganteus***

*Myosotis arvensis***

*Papaver rhoeas***

*Plantago major***

Poa sp. **

*Polygonum aviculare***

*Polygonum persicaria***

*Ranunculus repens***

Rosa sp. **

*Rumex crispus***

*Rumex obtusifolius***

*Senecio vulgaris***

*Sherardia arvensis***

*Sonchus oleraceus***

Triticum sp.

*Urtica dioica***

*veronica chamaedrys***

*Vicia sativa***

*Viola arvensis***

Zea mays

BC2 Horticultural land

Allium cepa

Brassica oleracea

Daucus carota subsp. *sativus*

Malus domestica

Solanum tuberosum

BC4 Flower beds and borders

Allium schoenoprasum

Malus domestica

Brassica oleracea

Chrysanthemum rubellum sp.

Dianthus sp.

Digitalis purpurea

Geranium sp.

Juniperus squamata sp.

Kniphofia sp.

Allium ampeloprasum var. *porrum*

Lactuca sativa

Lupinus sp.

Allium cepa

Paeonia sp.

Papaver orientalis

Solanum tuberosum

Rosmarinus officinalis

Stachys byzantina

x Cupressus macrocarpa

BL1A Stone walls

*Antirrhinum majus***

*Arrhenatherum elatius***

*Arum maculatum***

*Asplenium ruta-muraria**

*Asplenium trichomanes**

*Blechnum spicant***

*Brachypodium sylvaticum**

Bryophytes

Calystegia sepium

Cardamine flexuosa

*Cerastium fontanum***

*Dactylis glomerata***

Epilobium sp.

*Festuca rubra**

Galium aparine

*Geranium robertianum**

Hedera helix

*Leucanthemum vulgare***
 Lichens*
*Lolium perenne***
*Parietaria diffusa**
*Phyllitis scolopendrium**
*Potentilla sterilis**
Rubus fruticosus agg. **
*Sambucus nigra***
*Sonchus oleraceus***
*Taraxacum officinale**

BL1B Other stonework

Bryophytes**
*Festuca rubra***
*Hedera helix**
 Lichens**
*Lonicera periclymenum***
*Poa annua**
Rubus fruticosus agg. *
*Sambucus nigra**
*Senecio jacobaea***

BL2 Earth banks

Achillea millefolium
*Agrostis stolonifera****
*Anthoxanthum odoratum****
Anthriscus sylvestris
Arrhenatherum elatius
*Athyrium filix-femina****
*Bellis perennis***
*Blechnum spicant****
Brachypodium sylvaticum
Calystegia sepium
Carex sp. **
Centaurea nigra
*Cerastium fontanum***
Cirsium arvensis
*Cirsium dissectum****
*Cirsium vulgare***
Corylus avellana
Crataegus monogyna
*Dactylorhiza maculata****
Dactylis glomerata
*Daucus carota****

*Digitalis purpurea****
*Dryopteris affinis****
*Dryopteris dilatata****
*Dryopteris filix-mas****
Elymus repens
*Epilobium parviflorum****
Epilobium sp. **
Equisetum arvense
*Equisetum fluviatile****
*Euphorbia peplus***
*Festuca rubra***
Filipendula ulmaria
*Fragaria vesca****
Fraxinus excelsior
Galium aparine
*Galium verum***
*Geranium robertianum***
Glechoma hederacea
Hedera helix
Heracleum sphondylium
*Holcus lanatus****
*Hypericum pulchrum****
*Hypochoeris radicata***
*Juncus effusus****
*Juncus inflexus****
*Lapsana communis****
Lathyrus pratensis
*Leontodon autumnalis****
*Ligustrum vulgare***
Lonicera periclymenum
*Luzula multiflora****
*Myosotis arvensis***
Phyllitis scolopendrium
*Plantago lanceolata***
*Plantago major***
Poa trivialis
*Polygala vulgaris****
*Polystichum setiferum****
Potentilla anserina
*Potentilla erecta****
Potentilla reptans
*Potentilla sterilis***
*Primula vulgaris****
*Prunella vulgaris****

Prunus spinosa
Pteridium aquilinum
*Ranunculus repens***
Rosa canina
*Rosa arvensis****
Rubus fruticosus agg.
*Rumex acetosa***
*Salix cinerea****
*Sambucus nigra***
*Senecio jacobaea***
*Sonchus oleraceus***
*Stellaria graminea****
*Succisa pratensis****
*Taxus baccata****
*Taraxacum officinale***
*Trifolium pratense****
*Trifolium repens***
*Ulex europaeus****
*Ulmus procera***
*Urtica dioica***
*Vaccinium myrtillus****
*Veronica chamaedrys***
Vicia cracca
Vicia sepium

BL3 Buildings and artificial surfaces

Asplenium scolopendrium
*Bellis perennis***
*Buddleia davidii***
Fraxinus excelsior
*Lolium perenne***
*Poa annua***
Rubus fruticosus agg.
Sambucus nigra
*Senecio jacobaea***
*Senecio vulgaris***

BL3D Land being developed

No species recorded

BL3 1 Large urban gardens

No species recorded

BL3 2 Medium urban gardens

No species recorded

BL3 3 Small urban gardens

No species recorded

APPENDIX 9. TARGET NOTES

Townland, grid-square and target note numbers for different habitats in County Laois Parish Habitat Survey during 2005, 2006, 2007 and 2008.

Limestone/marl lakes (FL3)

Townland	Grid square	Target note number
Ballinlough	S5399	N1
Bellegrove	N5905	N3
Bellegrove	N5905	N4
Bellegrove	N5905	N5
Kilbride	N5209	N4

Eroding/Upland rivers (FW1)

Townland	Grid square	Target note number
Ballylehane Upper	S6084	N1
Doonane	S5880	N1
Doonane	S5880	N2
Doonane	S5878	N5
Wolfhill	S5984	N1

Depositing lowland rivers (FW2)

Townland	Grid square	Target note number
Ballickmoyler	S6381	N1
Ballickmoyler	S6580	N1
Ballynakill/Ashfield	S6382	N1
Coolanowle	S6485	N1
Courtwood	N6002	N1
Courtwood	N6102	N2
Garryvacum	N5506	N1
Kilcruise	S6184	N3
Killeshin	S6777	N1
Killeshin	S6777	N2
Vicarstown (Dodd)	N6001	N2

Canals (FW3)

Townland	Grid square	Target note number
Bracklone	N5511	N3
Kilbride	N5210	N2

Drainage ditches (FW4)

Townland	Grid square	Target note number
Ballymorris	N5211	N4
Cappakeel	N5604	N5
Coolnacurragh	S3378	N4
Coolroe	N5903	N2
Cooltederry	N5412	N5
Cooltederry	N5311	N2
Doolough	N5409	N4
Droughill	N5413	N3
Garrymaddock	N5703	N5
Morett	N5404	N7
Rahenahown North	N5802	N2
Rosnamullane	N5901	N1
Tinnaragh	S3282	N1

Dry calcareous and neutral grassland (GS1)

An asterisk after townland name indicates that it is worth considering as a priority grassland

Townland	Grid square	Target note number
Carrigeen	N5500	N11
Carrigeen	N5500	N12
Carrigeen	N5500	N16
Clogrennan	S7073	N5
Coolnacarrick	S5296	N1
Dairyhill	S3483	N1
Garrendenny	S6075	N1
Garryduff	S5282	N3
Garrymaddock	N5702	N13
Grange Upper	S5396	N2
Kilbride	N5209	N6
Kilbride*	N5209	N7

Townland	Grid square	Target note number
Kilcruise	S6184	N1
Kilcruise	S6284	N1
Middlemount or Ballyvoghlaun	S3278	N2
Park or Dunamase	N5298	N12
Park or Dunamase	N5398	N2

Dry meadows and grassy verges (GS2)

Townland	Grid square	Target note number
Ashfield	S6581	N3
Ballymorris	N5311	N1
Bellegrove	N5806	N4
Bracklone	N5511	N1
Bracklone	N5611	N1
Bracklone	N5611	N3
Clogrennan	S7073	N3
Clogrennan	S6873	N1
Coolnacarrick	S5296	N1
Courtwood	N6302	N1
Crossneen, Ballyhide, Clogrennan	S7074	N2
Droughill	N5413	N4
Kilbride	N5210	N6
Kilbride	N5209	N4
Killone	N5402	N3
Raheen	N5300	N7
Raheenahown North	N5902	N2
Rathcrea	N5801	N9
Tinnasragh	S6481	N1
Tirhogar	N5510	N1
Vicarstown (Dodd)	N6301	N1

Dry-humid acid grassland (GS3)

Townland	Grid square	Target note number
Ardateggle	S6476	N2
Cappakeel	N5604	N2
Garrymaddock	N5702	N7
Hophall	S5095	N10
Monavea	S6276	N1
Monavea	S6375	N1
Morett	N5404	N9
Morett	N5404	N1
Rossmore	S6675	N1
Rossmore	S6673	N3

Wet grassland (GS4)

Townland	Grid square	Target note number
Ashfield	S6482	N1
Ballycarroll	S5199	N2
Ballycarroll	S5199	N7
Ballycarroll	S5198	N5
Ballycarroll	S5198	N6
Ballymorris	N5211	N1
Ballymorris	N5411	N1
Ballymorris	N5210	N3
Bellegrove	N5905	N7
Bellegrove	N5905	N6
Coolacurragh	S3378	N2
Coolacurragh	S3378	N3
Cooltederry	N5311	N1
Curragh	S3481	N2
Dairyhill	S3582	N1
Doolough	N5409	N3
Garrendenny	S6076	N1
Garryduff	S3182	N14
Garrymaddock	N5702	N9
Garrymaddock	N5702	N14
Garrymaddock	N5703	N4

Townland	Grid square	Target note number
Garryvacum	N5507	N7
Gortahile	S6174	N3
Gortahile	S6274	N2
Hophall	S5095	N1
Hophall	S5095	N2
Hophall	S5095	N6
Lough	N5408	N2
Middlemount or Ballyvoghlaun	S3278	N3
Morett	N5403	N3
Morett	N5403	N3
Oldleagh	S6681	N1
Park or Dunamase	S5198	N2
Park or Dunamase	S5198	N7
Rahandrick Upper	S3181	N1
Raheenahown North	N5902	N3
Rathcrea	N5901	N4
Rossmore	S6775	N1
Rossmore	S6675	N2
Shanvaghey	S3380	N3
Tonafarna	N5802	N3
Turra	S6179	N1
Vicarstown (Dodd)	N6201	N1

Marsh (GM1)

Townland	Grid square	Target note number
Aghnahily Bog	S5198	N3
Cooletederry	N5412	N4
Gortahile	S6174	N2
Park or Dunamase	S5198	N1
Tintore & Ballycolla	S3581	N1

Dry siliceous heath (HH1)

Townland	Grid square	Target note number
Ardateggle	S6476	N1
Ballylehane Upper	S6083	N1
Clogrennan	S6773	N1
Gortahile	S6374	N1
Rossmore	S6674	N1

Wet heath (HH3)

Townland	Grid square	Target note number
Ballyduff		
Ballylehane Upper	S5983	N1
Garrymaddock	N5702	N11
Morett	N5403	N6
Morett	N5404	N3
Morett	N5404	N6
Rossmore	S6673	N2

Raised bog (PB1)

Townland	Grid square	Target note number
Garryvacum	N5507	N10
Rossmore	S6674	N2

Cutover bog (PB4)

Townland	Grid square	Target note number
Aghnahily Bog	S5198	N1
Aghnahily Bog	S5198	N3
Aghnahily Bog	S5198	N4
Aghnahily Bog	S5198	N5
Dysart	S5197	N1
Garryvacum	N5507	N8

Rich fen and flush (PF1)

Townland	Grid square	Target note number
Morett	N5406	N6

Poor fen and flush (PF2)

Townland	Grid square	Target note number
Garryvacum	N5507	N11

Oak-ash-hazel woodland (WN2)

Townland	Grid square	Target note number
Ardateggle, Monavea	S6277	N1
Ballickmoyler	S6381	N2
Ballymaddock	S5498	N2
Ballymorris	N5310	N2
Ballythomas	N5500	N1
Carrageen	N5500	N15
Carrageen	N5400	N2
Chapelhill	S3381	N1
Coolanknowle, Maidenhead, Ballynagall, Ashfield	S6483, S6583, S6582	N1
Cooperhill Demense	S6679	N1
Courtwood	N6102	N1
Courtwood	N6302	N2
Dysart	S5197	N7
Garrymaddock	N5702	N4
Garrymaddock	N5702	N6
Grange Upper	S5396	N1
Hophall	S5195	N5
Kilbride	N5210	N3
Kilcruise	S6385	N2
Killeshin	S6777	N4
Killone	N5500	N2
Kilmurray	N5501	N2
Kilmurray	N5501	N4
Kilmurray	N5501	N7
Kilmurray	N5500	N2
Kilteale	S5498	N3
Lamberton Demesne	S4193	N1
Morett	N5402	N2
Morett	N5403	N4

Townland	Grid square	Target note number
Morett	N5404	N3
Morett	N5403	N4
Park or Dunamase	S5198	N6
Park or Dunamase	S5298	N6
Park or Dunamase	S5298	N15
Park or Dunamase	S5298	N16
Park or Dunamase	S5297	N2
Park Upper	S5498	N3
Raheen	N5300	N2
Raheen	N5499	N1
Rossmore	S6774	N1

Scrub (WS1)

Townland	Grid square	Target note number
Aghnahily	S5597	N5
Aghnahily	S5397	N8
Aghnahily Bog	S5198	N1
Aghnahily Bog	S5198	N2
Aghnahily Bog	S5198	N6
Aghnahily Bog	S5198	N8
Ballinlough	S5499	N1
Ballinlough	S5499	N2
Ballycarroll	S5398	N6
Ballycarroll	S5099	N1
Ballycarroll	S5299	N2
Ballycarroll	S5299	N8
Ballycarroll	S5298	N2
Ballycarroll	S5398	N5
Ballycarroll	S5397	N1
Ballycarroll	S5397	N2
Ballycarroll	S5397	N3
Ballylethane Upper	S5983	N2
Ballymaddock	N5400	N2
Ballymaddock	N5400	N3
Ballymaddock	S5499	N1

Townland	Grid square	Target note number
Ballymaddock	S5499	N2
Ballymaddock	S5499	N4
Ballymaddock	S5499	N7
Ballymaddock	S5499	N5
Ballymaddock	S5598	N1
Ballymaddock	S5598	N5
Ballythomas	N5600	N3
Ballythomas	N5400	N4
Bracklone	N5512	N1
Bracklone	N5512	N2
Cappakeel	N5604	N3
Cappakeel	N5604	N4
Carrigeen	N5500	N11
Carrigeen	N5600	N6
Clogrennan	S6973	N1
Cloonaloo	S6678	N1
Cloonaloo	S6678	N2
Coolnacarrick	S5296	N1
Coolnacarrick	S5296	N2
Coolnacarrick	S5296	N3
Coolnacarrick	S5296	N4
Coolnacarrick	S5295	N1
Coolnacarrick	S5295	N2
Coolnacarrick	S5295	N3
Cooltederry	N5411	N2
Cooltederry	N5411	N4
Courtwood	N6002	N3
Dairyhill	S3483	N1
Doolough	N5408	N2
Dysart	S5197	N5
Dysart	S5297	N1
Dysart	S5098	N1
Dysart	S5196	N1
Dysart	S5296	N3
Dysart	S5098	N1

Townland	Grid square	Target note number
Dysart	S5196	N2
Dysart	S5196	N6
Dysart	S5196	N7
Dysart	S5296	N1
Dysart	S5296	N3
Garryduff	S3182	N4
Garryduff	S3182	N5
Garryduff	S3182	N10
Garrymaddock	N5702	N3
Garrymaddock	N5702	N5
Garrymaddock	N5703	N1
Garryvacum	N5608	N1
Garryvacum	N5608	N2
Garryvacum	N5507	N2
Garryvacum	5507	N6
Gortahile	S6373	N1
Grange Upper	S5397	N2
Hophall	S5195	N1
Hophall	S5195	N2
Hophall	S5095	N3
Hophall	S5095	N4
Kilbreedy	S3080	N1
Kilbreedy	S3080	N2
Kilbride	N5210	N6
Kilbride	N5210	N8
Kilbride	N5209	N5
Kilbride	N5209	N9
Killone	N5502	N2
Killone	N5502	N6
Killone	N5400	N1
Killone	N5402	N2
Kilmurray	N5501	N1
Kilmurray	N5501	N10
Kilmurray	N5601	N3
Kilmurray	N5602	N2

Townland	Grid square	Target note number
Kilteale	S5498	N4
Kilteale	S5498	N5
Lamberton Demesne	S5194	N1
Lamberton Demesne	S5094	N2
Lamberton Demesne	S5093	N1
Lamberton Demesne	S5093	N2
Loughakeo	S5296	N5
Middlemount	S3079	N1
Middlemount or Ballyvoghlaun	S3278	N1
Monavea	S6376	N1
Morett	N5202	N4
Morett	N5205	N3
Morett	N5402	N1
Morett	N5403	N5
Morett	N5404	N5
Morett	N5404	N6
Morett	N5404	N5
Morett	N5404	N8
Oldglass	S3279	N1
Park Lower	S5597	N1
Park Lower	S5597	N4
Park or Dunamase	S5198	N1
Park or Dunamase	S5298	N5
Park or Dunamase	S5298	N9
Park or Dunamase	S5298	N10
Park or Dunamase	S5298	N11
Park or Dunamase	S5298	N13
Park Upper	S5498	N1
Park Upper	S5598	N1
Powelstown	S5294	N3
Rahandrick Upper	S3181	N2
Raheen	N5300	N7
Raheen	N5399	N5
Raheen	N5400	N1

Townland	Grid square	Target note number
Raheen	N5400	N3
Raheen	N5400	N11
Raheen	N5400	N2
Raheenanisky	S5395	N4
Rathcrea	N5901	N2
Rathcrea	N5901	N3
Rathillig	S6682	N1
Shanvaghey	S3181	N1
Slatt Upper	S58824	N3
Tinneragh		N2
Tirhogar	N5509	N2
Tonafarna	N5801	N1
Tonafarna	N5902	N6
Tonafarna	N5802	N4
Turra	S6279	N1

Hedgerows (WL1)

Townland	Grid square	Target note number
Ballinlough	N5401	N1
Ballinlough	N5400	N1
Ballycarroll	S5398	N8
Ballycarroll	S5299	N1
Ballycarroll	S5398	N2
Ballycarroll	S5398	N8
Ballyduff (ed. Kilmurry)	N5601	N4
Ballymaddock	S5499	N3
Ballymaddock	S5499	N6
Ballymaddock	S5599	N2
Ballymaddock	S5599	N4
Ballymaddock	S5599	N8
Ballymaddock	S5498	N3
Ballymorris	N5509	N1
Ballythomas	N5500	N4
Ballythomas	N5500	N5
Ballythomas	N5600	N2

Townland	Grid square	Target note number
Bracklone	N5611	N4
Carrageen	N5500	N1
Clogrennan, Crossneen	S7073, S7074	N1
Coolanowle, Maidenhead, Ballynagall, Ashfield	S6483, S6583, S6582	N2
Coolbarry	S3183	N1
Coolbarry	S3183	N4
Coolbarry	S3183	N5
Coolbarry	S3283	N2
Coolbarry	S3283	N4
Cooltederry	N5411	N6
Dairyhill	S3483	N1
Doolough	N5409	N2
Doonane	S5980	N1
Doonane	S5980	N3
Droughill	N5513	General
Farranville	S3082	N1
Fisherstown	N6205	N2
Garryduff	S3183	N2
Garryduff	S3182	N1
Garryduff	S3182	N2
Garryduff	S3182	N6
Garryduff	S3282	N6
Graigue	S7176	N2
Grange Upper	S5496	N1
Grange Upper	S5496	N5
Kilbrackan	N6106	N1
Kilbrackan	N6106	N1
Kilbride	N5210	N1
Killone	N5602	N1
Killone	N5501	N4
Kilteale	S5498	N6
Morett	N5403	N7
Morett	N5404	N5
Park Lower	S5597	N5

Townland	Grid square	Target note number
Park or Dunamase	S5297	N3
Park Upper	S5597	N1
Park Upper	S5497	N3
Raheen	N5300	N1
Raheenahown South	N5801	N1
Raheenanisky	S5395	N2
Raheenanisky	S5395	N3
Rathcrea	N5902	N1
Rathcrea	N5801	N3
Rathleash	N5211	N2
Rathronshin	N5906	N2
Rosnamullane	N6001	N1
Rossmore	S6774	N2
Tinneragh	S3282	N3
Tirhogar	N5610	N3
Vicarstown (Dodd)	N6301	N2

Exposed siliceous rock (ER1)

Townland	Grid square	Target note number
Farrans	S6082	N2

Exposed calcareous rock (ER2)

Townland	Grid square	Target note number
Ballycarroll	S5399	N1
Farrans	S6081	N1
Farrans	S6081	N2
Killone	N5502	N5
Kilmurry	N5501	N5

Flower beds and borders (BC3)

Townland	Grid square	Target note number
Ballymorris	N5310	N7

Earth banks (BL2)

Townland	Grid square	Target note number
Ballylehane Upper	S683	N2
Farrans	S6482	N2
Kilcruise	S6183	N1
Part of Clogrennan	S6473	N1
Rossmore	S6673	N1
Slatt Upper	S5981	N2

APPENDIX 10. BIOGEO-DIVERSITY OF THE CASTLECOMER PLATEAU IN SOUTHEAST CO. LAOIS

INTRODUCTION

Mary Tubridy and Associates has prepared this report for a geodiversity survey of the portion of the Castlecomer Plateau which encroaches on southeast County Laois as part as a study on the biodiversity of the area. This is being prepared for relevant Planning Authority (Laois County Council).

The information contained within this section is concerned with a description of the geological character of the site as ascertained from a desk study of relevant information.

The geological material existing within the site has been generated by the deposition of debris over millions of years, and the related erosion of that material. The majority of the geological material underlying the area around the site, both the glacial mineral subsoil and the bedrock, are concealed below ground, with only a minute percentage of the area consisting of material outcropping at surface. Here the nature, extent and complexity of the geological material is detailed, from the bedrock upwards and through the mineral subsoil to the topsoil.

Hydrogeological aspects of this geodiversity will also be assessed.

GENERAL TOPOGRAPHY OF THE CASTLECOMER PLATEAU

The study area itself is predominantly rural, with the large urban area of Carlow Town at its eastern end, and the smaller urban settlements of Killeshin, Newtown, Ballickmoyler, Kilcruise, Wolfhill, Bilbao, Swan and Arles being the lesser built-up foci. The irregularly-shaped area covers just under 127 square kilometres.

Topographically, the Barrow Valley lies to the east, and the mid Laois lowlands to the north. The area is underlain by a bedrock sequence which dates from the Palaeozoic Era, and is Lower Carboniferous to Upper Carboniferous in age (Table 1). The areas macro-topography is clearly influenced by the dominant bedrock lithologies and structures. Almost all of the study area is underlain by shale and sandstone (broadly the higher, western 'Plateau' area) with the lower, eastern extreme underlain by limestones. Overall, the bedrock surface is exposed quite often in the plateau area, with bedrock at or within 1m of the surface estimated at covering just over 15% of the land surface there (after Meehan, 2003); bedrock crops out less commonly in the eastern portion, being at or close to the surface over only c. 3% of this region.

East and northeast of the area the (generally) lowlying limestone bedrock has been heavily eroded over several hundred million years, forming extensive flat basinal terrain in the Barrow Valley and to the north in the Irish Midlands. The study area is situated predominantly within the topographically higher Upper Carboniferous rocks which were less susceptible to erosion over the millennia.



Figure 1 Location of the study area in southeast Laois, illustrating surrounding topography and surface water stream and river features. NHAs, SACs and SPAs are also shown, shaded yellow (OS Licence EN 0057908).

The elevation of the land surface in the plateau area rises to c. 333m on the summit of Gortahile Hill, in the southwestern corner of the study area, and crosses a nadir along the Barrow River northeast of Carlow, at c. 49m OD. The slopes on the top of the plateau and in the lowland area west of Carlow Town have general gradients in around 1:20 to 1:200, which increases towards the scarp on the eastern flank of the plateau to greater than 1:8. This marked scarp which occurs on the eastern edge of the plateau has a gradient of 1:4.5 in places.

The main N78 and N80 roads cross the northern and eastern portions of the area respectively, with the R430 and R431 roads bisecting the area in its central portion. Several third class roads branch off these main arteries on both of their sides.



Plate 1: View of the study area from Old Leighlin in County Carlow. See the high scarp separating the flat, shale plateau summit from the gently undulating limestone lowland.

GEODIVERSITY OF THE BEDROCK GEOLOGY

The bedrock geology underlying the area is discussed in the GSI publications “Geology of Kildare-Wicklow” (1994) and “Geology of Carlow-Wexford” (1994). The 1:100,000 scale bedrock geology maps of the area (Sheets 16 and 19) indicate that the study area is underlain entirely by rocks deposited during the Carboniferous Period (354 to 290 million years ago), mostly in or at the edges of tropical seas. The rocks were deposited as soft coral reefs, sands, silts and muds which later lithified (hardened) in the millions of years since. These rocks are pure bedded limestones on the lowland and shales, sandstones and siltstones on the uplands.

The pure bedded limestones to the east comprise two formations: the Ballyadams Formation (BM) and the Clogrenan Formation (CL). These outcrop east and north of Arles and in Crossneen townland just southwest of Carlow town, and were deposited in a very shallow tropical sea in the Carlow-Laois-Kilkenny during the Lower Carboniferous Period (354 to 310 million years ago). The Clogrenan Formation is more argillaceous (muddy) and contains chert bands. Both formations are rich in fossils, particularly brachiopods. The Lower Carboniferous rocks are depicted as shades of light blue in the eastern portion of the study area in Figure 2.

The shales and sandstones are of Upper Carboniferous (310 to 290 million years ago) age and comprise seven formations: the Luggacurren Shale Formation (LS), the Killeshin Siltstone Formation (KS), the Bregaun

Flagstone Formation (BE), the Moyadd Coal Formation (MC), the Clay Gall Sandstone Formation (CG), the Coolbaun Formation (CQ), and the Swan Sandstone Member (CQs). These are depicted as various shades of greys and light yellow in Figure 2.

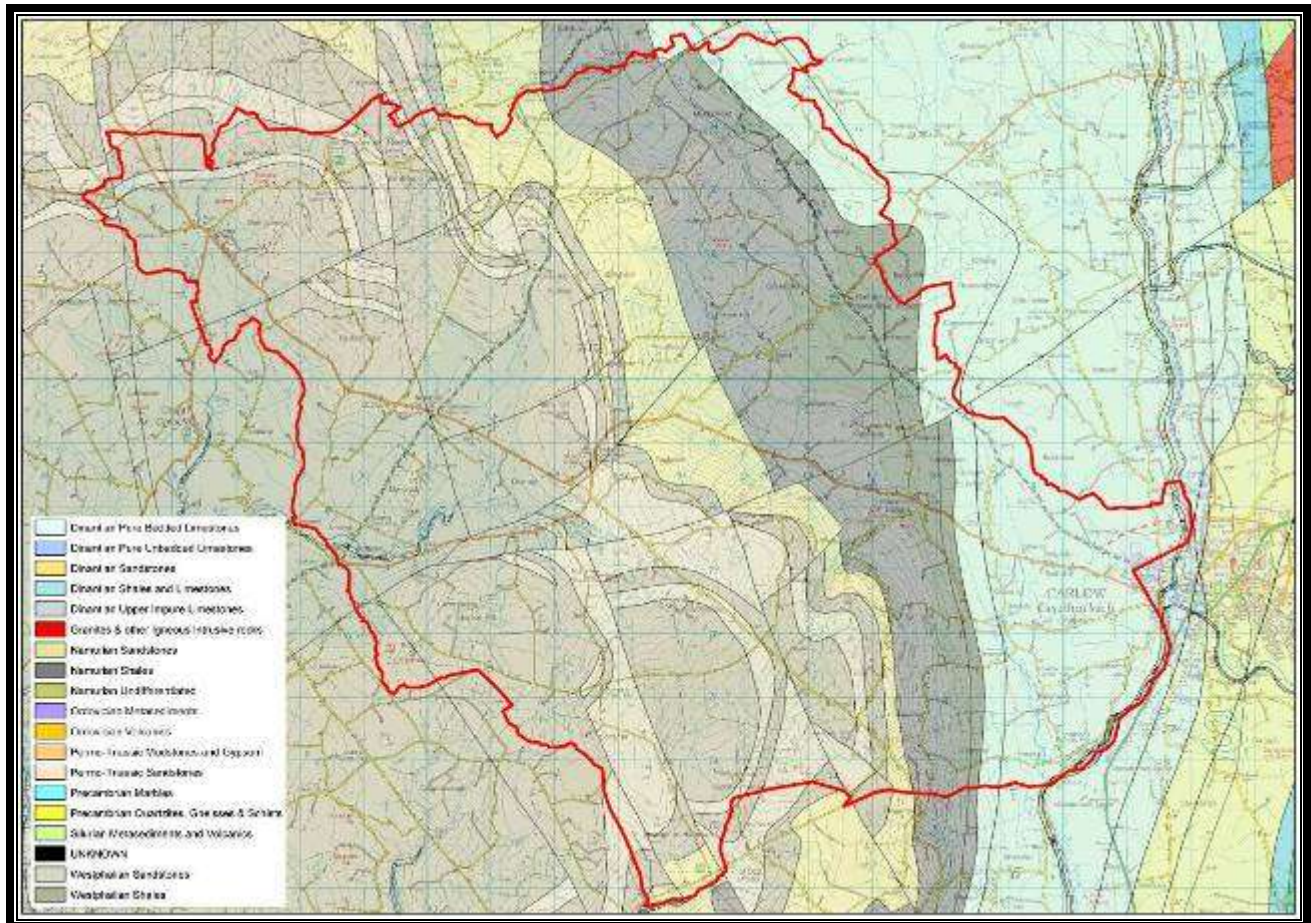


Figure 2: Bedrock geology map of the study area. The contrast between the lowland (blue) limestones and the higher (in the majority grey) shales and sandstones is clearly seen.

The Upper Carboniferous Period can be subdivided into the Namurian and the Westphalian stages. The earlier, Namurian stage marked a change from shallow tropical seas in this area, 310 million years ago, to a quieter, deep water environment. This was probably due to tectonic (earth movement) uplift.

The Namurian stage included deposition of muds within the deep water (forming the shales), and deltas at river mouths (forming sandstones and siltstones). Within the plateau area the rocks of the Luggacurren Formation (LS), the Killeshin Siltstone Formation (KS) and the Bregaun Flagstone Formation (BE) are of Namurian age. These rocks are dominated by shales and mudstones and are rich in bivalve (mollusc) and goniatite (ammonite) fossils. About 15%-20% of the Bregaun Flagstone Formation comprises sandstones and siltstones.

The Westphalian stage included the deposition of the coals for which the plateau is famous. At that time the water level continued to drop and the buried land got ever-closer to the surface, so swamp conditions prevailed. The climate was still tropical and wet so when trees fell into the swamp they were buried to

form a peaty deposit. Following deep burial and millions of years of lithification (hardening), these deposits turned into coal.

The entire Westphalian rock sequence is about 300m thick and comprises the Moyadd Coal Formation (MC), the Clay Gall Sandstone Formation (CG), the Coolbaun Formation (CQ), and the Swan Sandstone Member (CQs). The Moyadd Coal Formation is the earliest layer and comprises the major coal-bearing units, where two major seams are recognised (the Rockafoil or Kingsfoot Coal, and the Skehana or Marine Band Seam). This is overlain by the Clay Gall Sandstone Formation which includes 'clay galls', or sandstones enclosing pebbles of shale. At the top of this 30m-50m thick unit a third major coal horizon occurs ('Ward's Seam'). This is succeeded by 15m-45m of the Coolbaun Formation shales, which are again overlain by 5m-20m of fine grained sandstone which is termed the Swan Sandstone Member.

The top of the Westphalian sequence includes the 'Double Fireclay', a layer underlying six other coal seams. These include the lowermost Jarrow Coal and the Old Three Foot Coal seam (see Box 1 below). The Jarrow Coal seam is famous in paleontological circles for its amphibian fossils, recovered in the nineteenth century.

BOX 1: THE COAL SEAMS

There are several coal seams in the area, three of which were of sufficient thickness to be of economic value.

The highest of these is "The Three Foot Seam", which lies between 15m and 35m below ground level surface and lies in a wide band from Doonane to Coolbawn and extending from Clogh to the foot of the Coolbawn hills. Owing to the Coolbawn Fault the seam also occurs above the Coolbawn hills, but does not extend very far to the east. This 1m thick seam was of very high quality anthracite and being so shallow, was easily worked.

The second seam is "The Jarrow", c. 70m below "The Three Foot Seam". A horseshoe shaped belt occurs between Doonane, Moneenroe and Coolbawn where the coal is much thicker and of better quality than over the area on each side. In this "channel" the coal was sometimes 1.3m thick, whereas the outlying coal is only some 0.25m thick and uneconomic unless excavated as open-cast.

The third seam is 90m below "The Jarrow", where "The Skehana Seam" offers high quality coal. This is the best quality anthracite found in Europe, but is only of relatively small lateral extent.

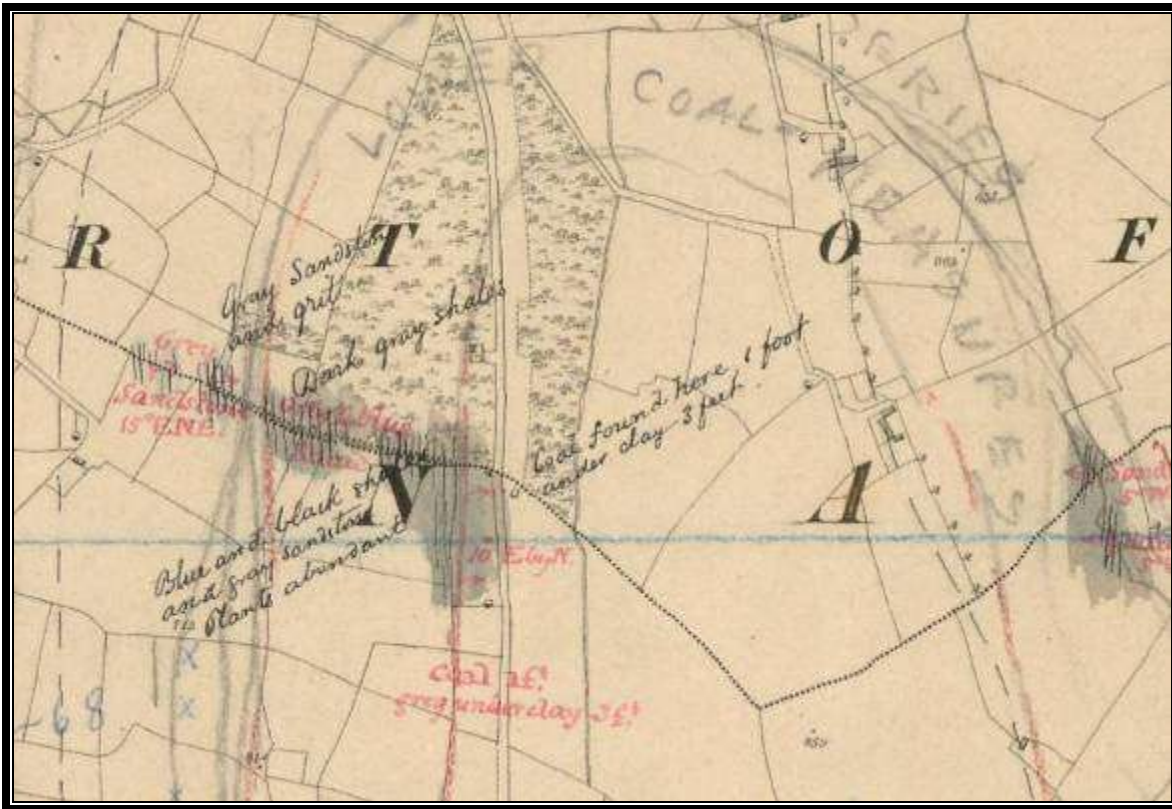


Figure 3: Detail of original Geological Survey of Ireland 6" sheet of part of the Skehana locality on the Castlecomer plateau. The outcropping coal has been noted, and the potential boundary of the seam drawn in pencil on the map.

Following the deposition of the limestone, the shales and sandstones, and the coal, age followed age with some periods dry and hot, others hot and moist, some cold, some very cold when thick ice and glaciers moved slowly over the land. At other times the whole land sunk beneath the ocean, limestone was formed under the seas to reappear when once more the land rose. Gradually, the rocks cooled and buckled, mountains pushed up, volcanoes burst forth and lava poured down. As countless ages passed, the vegetation of the swamps was covered up and compressed by millions of tons of mud and sand which formed into shales and sandstones. In the case of anthracite the pressures were so great that practically all the gases were pressed out.

Sometimes during this time an entire area of rocks split, one part moving downwards or upwards, and these movements gave rise to faults. The faults meant a 're-stacking' of the rocks, and a fault of 100m depth at Coolbawn means that the seams of coal which lay beneath the flat land between Crettyard and Coolbawn originally, after they were deposited, were pushed up and are now found on the top of the Coolbawn hills.



Plate 2: A disused shale quarry at Lacken, Old Leighlin, County Carlow, just outside the study area.

The entire Castlecomer Plateau is termed on a regional basis as the Leinster Coalfield. It forms an elevated basin elongated in a north-south direction due to east-west compression. Evidence suggests that a much greater thickness of Westphalian sediments occurred both in the Castlecomer area and throughout Ireland, but were later eroded. The majority of the coal in the Castlecomer Plateau is of anthracite grade, owing to deeper burial under overlying rocks resulting in heating by the Earth's own core to much higher temperatures over the last few million years deep below the surface than, for instance, the bituminous coal of northern England. Anthracite is of a higher calorific value than this bituminous coal, but is much harder to burn.

Four sites within the study area are proposed Geological Heritage Sites under the IGH Programme of the Geological Survey of Ireland.

- The first of these is at the old mine/pit workings at Rossmore (NGR 266583 174350), where anthracite is exposed and is of National Importance with respect to **three** themes within IGH: Mineralogy, Namurian Stratigraphy and Economic Geology, and which is proposed as a Natural Heritage Area (NHA).
- The second is Flemings Fireclay Quarries at Swan (NGR 256799 182164), which is also proposed as an NHA, and is the site at which Richard Griffith coined the term 'fireclay' in 1814, which has been used since in the geological literature.

- The third site is at Killeshin Glen (NGR 266770 277430), where a stream section exposes excellent examples of fossil goniatites and may be granted NHA status.
- The fourth site, at Moyadd Stream, is an excellent example of the typical lithologies of the basal Coal Measures, with many of the beds fossiliferous. This site is also of possible NHA status and is located at NGR 256590 183260.

The bedrock sequence of the area therefore comprises some Lower Carboniferous rocks under the lowland at the east, but is dominated by rocks of Upper Carboniferous age on the plateau itself. These comprise Namurian sandstones and shales, as well as Westphalian sandstones, shales and coals. The rocks have been extensively faulted, and the anthracite seams in the area are some of the best in the world. Many of the rocks are highly fossiliferous. Four sites are important in a national sense with respect to Irish Geological Heritage.

BOX 2: BELLS HEAP

Bells Heap (also called Bells Monument or McClean Tip Head) was a large heap of slack, dirt and coal 110m high which covered 3½ acres. It was an iconic symbol of the suffering and hardship of the mines, and consisted of the rocks, slates, gum and other detritus which was extracted from the mines, drawn in trams and dumped on top of the heap.

As miners shovelled waste into trams down the mines, much good coal would be also discarded. For example, if there was a portion of coal that had many stones within, this would be dumped as it was too expensive to separate out. A rail track connected the mine to the heap. When the trams reached the top the tram tipped over and emptied out the slack, and then returned to the mine. As the heap got higher extra track was added.

Many poorer people from the locality, often women, made a living from "picking the heap", climbing the heap each day to search for good nuggets of coal. They filled their sacks and either used the coal in their own fires or sold them to supplement their incomes.

When the mines closed it was decided to use the material from the heap to make cement. Bells Heap was taken gradually, lorry load by lorry load, to the Mungret cement factory in Limerick. Lorries drew the material for 15 years at a rate of 5 lorry loads a day. Today, about a quarter of the original heap remains.

GEODIVERSITY OF THE SUBSOIL (QUATERNARY, OR ICE AGE) GEOLOGY

General information concerning the Subsoil (Quaternary) Geology is contained in the Geological Survey of Ireland (GSI) publication “Geology of Kildare-Wicklow” (1994). During the last Ice Age in Ireland (73,000 years BP – 10,000 years BP), ice flowed across the area from northwest to southeast. Glacial deposits in the area on the Castlecomer Plateau generally consist of tills (boulder clays), with some areas of bedrock outcrop and subcrop also occurring. On the limestone lowland in the eastern extreme of the study area, the till is comprised chiefly of limestone, and some glaciofluvial sands and gravels occur. Blanket peat has formed in certain areas since glaciation, and narrow strips of alluvial sediment flank some of the streams in the area also.

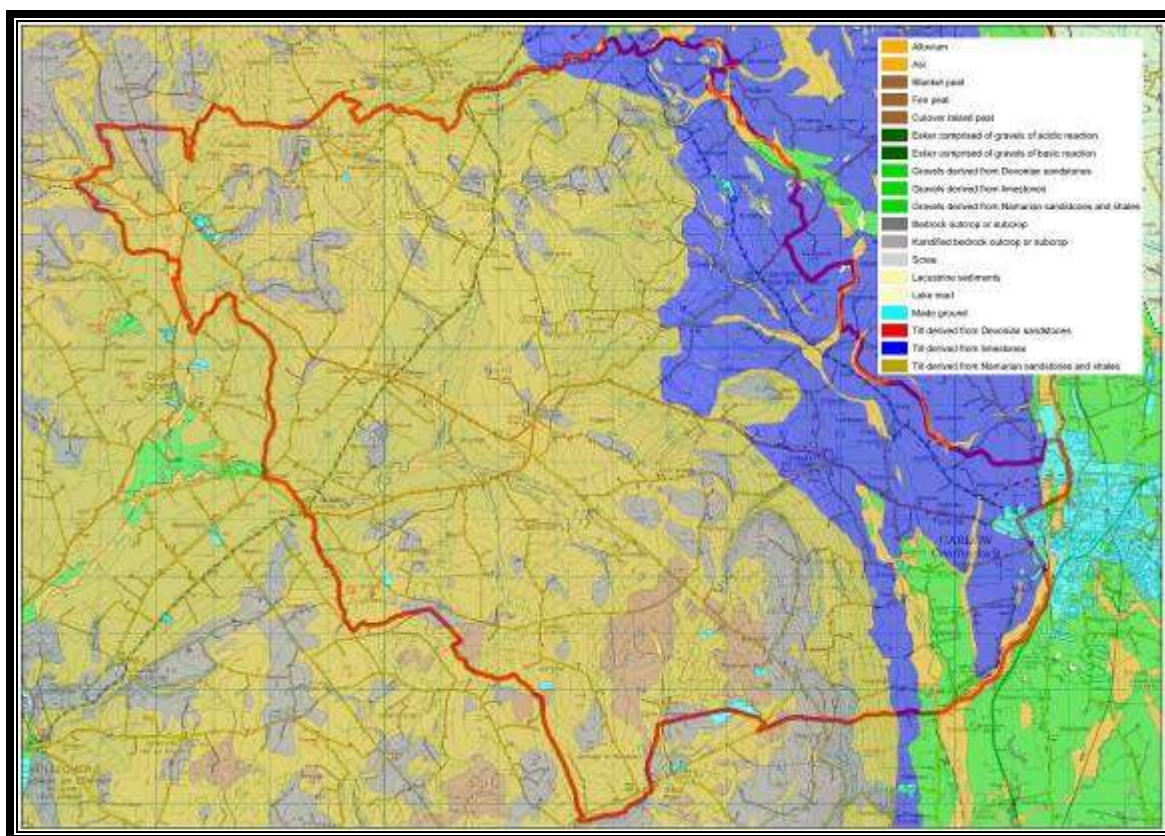


Figure 4: Subsoils geology map of the study area. Till dominated by Namurian rocks dominates the region, with till derived from limestone on the lowlands east of the plateau. The cyan areas within the study area pick out many of the old slag heaps of discarded mined debris.

The subsoil material forming the material under the majority of the plateau is a till, deposited at the base of the ice during this time. During the advancement of the glaciers, the weight and pressure of the ice broke the shale and sandstone bedrock upon which the glaciers moved and ground it down to particle sizes ranging from boulders to clay. In this till, clay is dominant owing to the dominance of soft, easily-erodible shale in the bedrock. This material was smeared by the advancing ice on top of the pre-existing bedrock,

leaving the mixture of debris material comprised of till. This material is therefore unsorted, cohesive and consolidated reflecting its crushing, smearing depositional process at the base of the ice.

On the lowland east of the plateau, ice has crushed the limestone bedrock there into till derived from limestone. The ice sheets found this rock more difficult to break mechanically than the shale, and the limestone tills are therefore dominated by crushed silt material. Clay is less dominant, and the subsoils are therefore better drained in the limestone areas.

The powerful glacial activity has therefore moulded and sculpted the macro-scale landscape character in this area. Ice planed and moved across the shale/sandstone and limestone bedrock, as well as transporting thousands of tonnes of material onto this bedrock. This debris was left on top of the bedrock surface when the ice melted.

Glaciofluvial sands and gravels occur in the lowland area flanking the Barrow River channel, occurring in hummocks and in low terraces flanking the river. These sands and gravels were deposited by meltwater flowing off the ice sheet as it retreated across this area at the end of the last glaciation, and are well sorted and well bedded deposits. These sand and gravel subsoils are dominated by limestone, hosted within the ice sheet and carried from local bedrock. They are generally expressed a well drained, hummocky terrain, and host well drained soils as a result. Sand pits were cut into these historically for local supplies of aggregate.

Along the channels of some of the streams on the plateau, and many of the streams on the limestone lowland, bands of alluvial (floodplain) sediment occur, usually no more than 200m wide. These areas are liable to floods during wet periods. As well as this, two distinct areas of blanket peat bog occur at Ardteagle and Rossmore in the southern portion of the study area, where the land is exceptionally poorly drained.

The final 'subsoil' type in the area is bedrock outcrop and subcrop (within 1m of the surface), which occurs on much of the individual hill summits on top of the plateau.

Subsoils therefore comprise moderately deep glacial tills across the majority of the area, with some glaciofluvial sands and gravels in the lowland area and narrow alluvial floodplain sediments at the bases of stream and river channels. Peat occurs on the top of the plateau and bedrock outcrop/subcrop is found on the crests of the highest hills. The majority of the tills comprised of local shale, sandstone and limestone material, with little erratics found in either of the main till types.

GEODIVERSITY OF THE SOIL

According to the An Foras Taluintais Soil Survey of County Laois (Conry, 1987) the study area has a complex soils geology. The soils on the plateau are dominated by poorly drained gley soils, with well drained soils only occurring only in isolated pockets on the summits and shoulders of the highest hills.

The majority of the plateau is underlain by poorly drained, impermeable surface water gley soils of the Abbeyfeale non-peaty phase. These soils have a very high percentage of fine clay and silt material, and are mottled throughout and completely saturated. Some small areas of Abbeyfeale peaty phase and

Abbeyfeale undulating phase occur: these soils are of even worse drainage status than the Abbeyfeale non-peaty phase, owing to their being more peaty or in lower lying areas on the plateau. All of these surface water gley soils are characterised by drainage ditches in fields and rush-dominated pasture.

On some ridge summits and shoulders on the plateau, well drained brown earth soils of the Ridge Series, the Ridge Steep Phase and the Ridge Stony Phase occur. The soils are relatively shallow and rest directly on bedrock subcrop.

In the southern portion of the plateau, close to the county boundary around Gortahile and Rossmore, cutaway blanket peats of the Aughty Cutover Series occur.

Grey brown podzolics are well drained soils which have a heavy, clayey 'B' horizon, where clay has leached through the surface layers over the millennia since the ice age. They are deep, alkaline soils, well suited to agriculture but sometimes require a shallow drainage network. In the limestone lowland in the eastern extreme of the study area, two distinct series of grey brown podzolic soils occur. The first is of the Knockbeg Series, which occurs on the till in the area, with the second being grey brown podzolics of the Knockbeg Stony Phase, which occur on the glaciofluvial sands and gravels.

In lower portions of the landscape on the limestone lowland, where groundwater is relatively close to the surface, poorly drained groundwater gley soils of the Howardstown Series occur. These are flanked by narrow areas of the Raheenduff Imperfectly Drained Series.

The poorly drained, impermeable soils on the plateau rest on and within heavy CLAY tills derived from shale, which again rest on a predominantly poor, impermeable aquifer of shale and sandstone. From this, the rates of infiltration on the plateau itself are very low. The majority of the rainfall which falls on the plateau runs off to surface drains and streams, which means there is a high surface water drainage density on the plateau itself. This means that virtually every field is flanked by a drain or stream watercourse.

The soil sequence in the plateau area can therefore be summarised as being dominated by poorly drained gleys, with well drained acid brown earths only occurring on the ridge crests and flanks. A distinct area of peat occurs around Rossmore and Gortahile. This sequence promotes a high proportion of runoff and very little infiltration, which means a high surface water drainage density is a characteristic of the plateau. On the limestone lowland to the east, well drained grey brown podzolics occur, which are often stony in the sand and gravel areas. The only poorly drained soils here are groundwater gleys in low portions of the landscape where the water table rises relatively close to the surface, particularly in winter.

HYDROGEOLOGICAL GEODIVERSITY - AQUIFER CLASSIFICATION

Groundwater is defined as water that moves through and is stored within sub-terrain geological strata. The aquifer potential of a bedrock unit is determined by the groundwater productivity, and the productivity is determined based on hydraulic characteristics compiled from borehole data throughout the country.

An aquifer map was published by the GSI as part of the initial characterisation of the Southeast River Basin District for the EU Water Framework Directive. The rocks of the Luggacurren Formation (LS), the Moyadd Coal Formation (MC) and the Coolbaun Formation (CQ) are all classified as Poor Aquifers (PU), where

groundwater flow is through fractures and fissures in the bedrock unit and groundwater yields available from the limestone and shale rocks within the succession are generally unproductive.

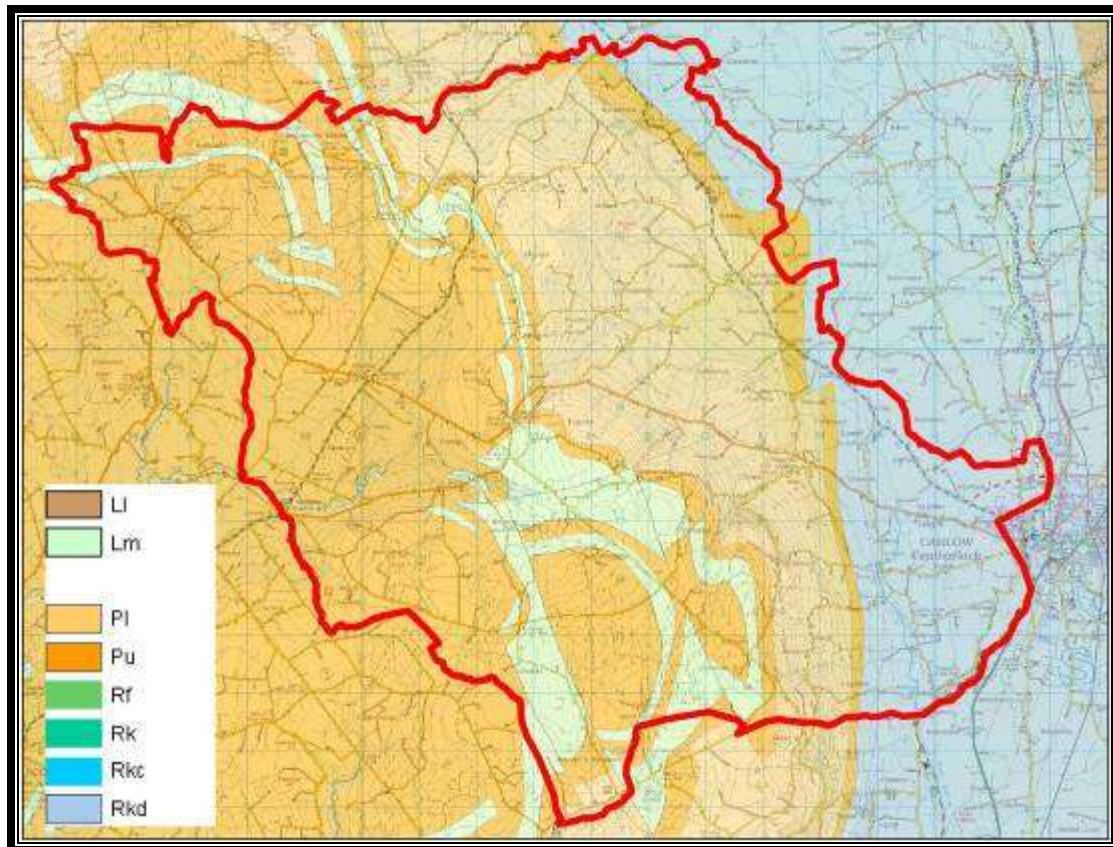


Figure 5: Aquifer map of the study area. The bedrock on the plateau is classified in the majority as poor aquifers (PI or Pu, in various shades of orange), with some strips of locally important aquifers (Lm, in light green) also present. On the lowland east of the plateau, where limestone forms the bedrock, the aquifers are regionally important (Rkd, in light blue).

The rocks of the Killeshin Siltstone Formation (KN) and the Bregaun Flagstone Formation (BE) are also poorly permeable and productive, but sometimes host enough water for small domestic supplies or group schemes. The aquifer map shows these rocks as a Poor Aquifer (PI), where groundwater yields available from the shaly rocks within the succession are generally unproductive except in local zones.

With respect to the rocks of the Swan Sandstone Member (CQSs) and the Clay Gall Sandstone Formation (CG), the rocks have the capability of supplying locally important abstractions (e.g. smaller public water supplies, group schemes with 100-400 m³/day). Groundwater flow in these rocks occurs predominantly through fractures, fissures and joints. The aquifer map shows these rocks as a Locally Important, productive bedrock aquifer (Lm), where groundwater yields available from the rocks within the succession are generally moderately productive.

It should be noted that the area east of the plateau, comprising rocks of the Ballyadams Formation (BM) and the Clogrenan Formation (CL) is classified as a regionally important karstified aquifer, capable of

supplying regionally important abstractions (e.g. large public water supplies), or 'excellent' yields (>400 m³/d). Groundwater flow in this area is predominantly occurs through fractures, fissures and joints.

In summary, the bedrock in the area is categorised as three different classes of aquifer, regionally important aquifers occurring in the limestone bedrock, and locally important to poor aquifers on the plateau itself. The majority of the plateau is of poor aquifer status.

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APPENDIX 11. HISTORY OF MINING ON THE PLATEAU

The earliest reference to Castlecomer coal concerns Glenmagoo, where ‘a furnace, iron mine and ‘coal place’ was worked by Richard Blacknall in 1631. Around 1640, when mining of the Three Foot seam started, iron was also produced. This was in the form of heavy spherical lumps of iron pyrites which are sometimes found associated with coal, particularly in the Jarrow seam. These iron balls were then smelted and the iron extracted, and some old gates and railings around Castlecomer made from Castlecomer iron still stand. The vicinity of these works was historically known as “glangool”, or ‘Coal Valley’. There were reputed to have been iron works here up to 1730. Later, Firoda colliery was opened on a commercial scale in 1796.

The Three Foot seam was mined in these early years using ‘Bell Pit’ methods. Involved two shafts being sunk about fifty yards apart, which were joined by an underground passage in order to allow free circulation of air. When this was done the miners went down and began to dig out the coal on each side of the connecting passage. All of the coal could not be taken out as the roof would have collapsed, so pillars of coal were left as supports.

At the time explosives had not been developed, so the coal was dug out and broken up with wedges and hammers. In Britain miners generally extracted c. 60% of the coal from these old pits and later in the twentieth century open casting was used to mine the remaining 40%. In Castlecomer, however, the miners removed up to 85% of coal, and open casting was then found to be uneconomical when it was attempted. It is estimated that some 11 million tons were taken out of the Three Foot seam using Bell Mining methods before this seam was exhausted. The Jarrow seam was discovered around 1740.

By 1800 there were six pits working, with c. 10-12 men in each pit working to a maximum depth of about 16m. The men sat on straw while working. In the 1820's a man called Isaac Bradley had a lease of 120 acres for mining in Lower Firoda, and he worked the coal until c. 1850 but then abandoned the working owing to financial difficulties. In the late 1880s Captain R.H. Prior-Wandesforde inherited the family estate in the area. The Wandesfordes owned, and except for brief periods of leasing, ran the mines. The tenants of Upper and Lower Firoda then purchased the rights in 1885, under the Ashbourne Act which gave them full mineral rights. They set about exploiting their coal seams and a small company started mining but finished after a few years.

In 1913, a man called Parkinson got a lease on the mines on condition that he worked them. Just before the outbreak of the first World War another seam was discovered at Skehana. This was first worked by Castlecomer Collieries at a pit in West Skehana and then at the Deerpark, which opened in 1924. This coal proved to be of a high quality and compared with the best anthracite found anywhere in the world, being practically free of sulphur, and of good heating power. An aerial ropeway was constructed, running above the country between the various Jarrow pits and the new Skehana pit.

In 1914 World War I brought with it a Minister of Mines Veto which stopped the proposed mining. By 1930 there were five major pits in the Castlecomer coalfield: The Jarrow; The Deerpark; The Rock Bog; The Monteen; and The Vera, named after the Wandesfordes eldest daughter.

In 1924 an inclined shaft or “Drift” was sunk to the Skehana seam in the Deerpark and became known as the “Deerpark Pit”. A few years before, a pit had been sunk to the same seam to the west of the Skehana road but proved a failure owing to a complex set of geological faults, and was then closed.

The Deerpark was worked from 1925 until 1969. Its deepest point was over 200m below ground level and some 11 miles of underground roadways were constructed.

At first and for many years the pit generated its own electric current by steam generators, but later, when the ESB made electricity available, all electric current was imported from the National Grid: three power lines bringing 30,000 volts to the pit which was then transformed down for use in the various machinery in the pit. Since the end of World War II all mining was by machine: electric coal cutters, underground conveyers, haulages and pumps. Around 60,000 gallons of groundwater were pumped from the mines each hour.

The coal was sorted, cleaned and sized on the surface at an installation known as “The Screens”. There were also up-to-date miners baths. In 1917 a branch railway line was brought from Kilkenny but after World War II this was discontinued as lorry transport had become a more economic proposition. The railway connection was closed in 1962. At peak production in the 1950’s, trains carried 300 tons a day to a depot at Kilkenny station close to the present Chadwicks store. Each train carried c. 100 tons, on from 10 to 15 carriages.

In the 1960s it was decided to re-open the old shaft on the lands of Mr. Martin Purcell, which are situated in Lower Firoda (Glenmagoo) near the junction of Lower Firoda, Upper Firoda and Byrengrove.

By 1969 the mine was completely uneconomic, the loss per week being some £2000. For some time, the Government had subsidised the business and every effort was made and expert overseas opinion sought but eventually the pit was forced to close.

A museum about the mines and the history of mining was opened in 2007 in Castlecomer town.

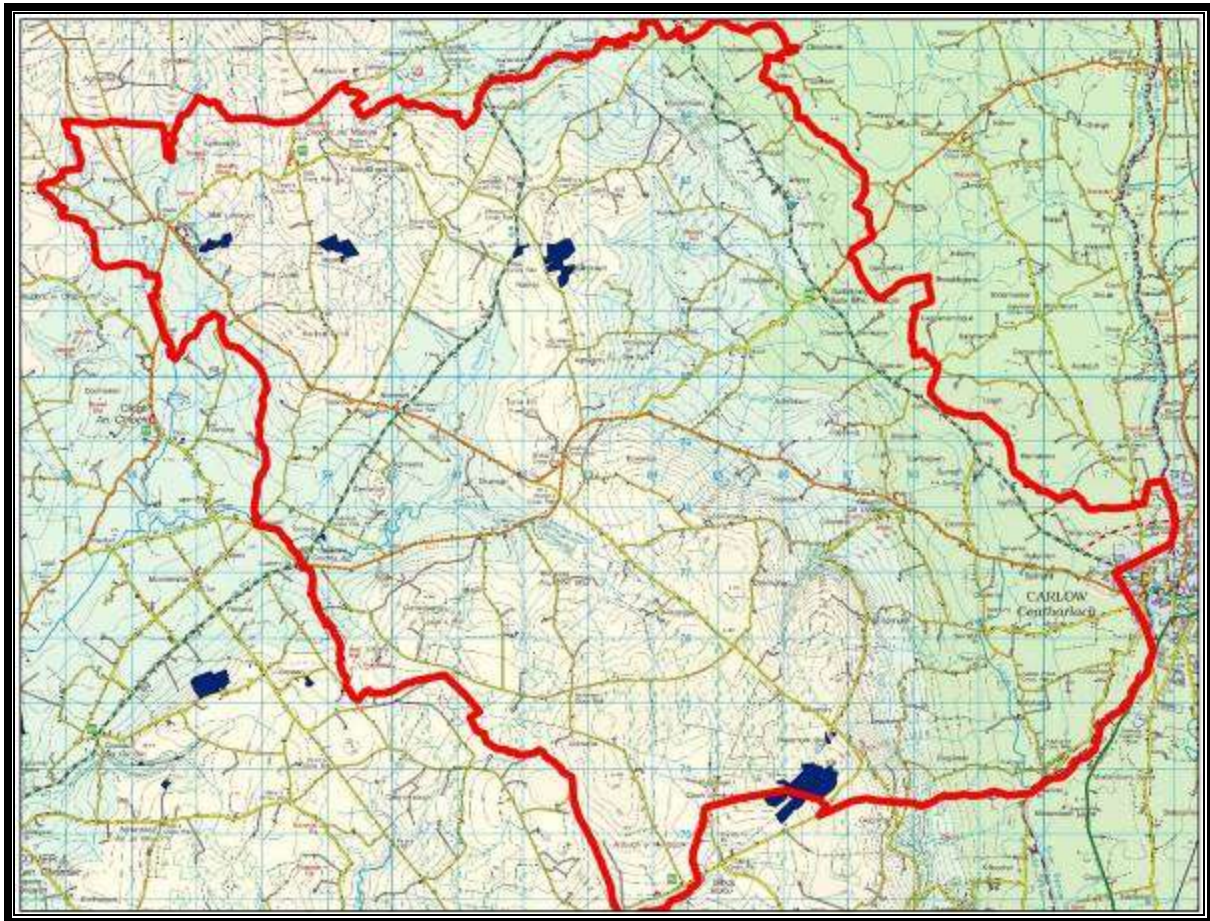


Figure 6: Map showing total area of all surface pits within the study area, from Geological Survey of Ireland records. Underground mines and individual shafts are not shown.