Appendix 2B:
Rathcoole Lands Ecology Assessment

Ecological Assessment

Of lands at Rathcoole, Co. Dublin

FINAL REPORT

31st November 2021

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Ecological Assessment

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1. INTRODUCTION

The lands at Rathcoole, identified on **Figure 1.1** below, are immediately adjoining the southern extent of Rathcoole village, and are zoned for residential development (RES-N) along the western side and for open space (OS) to the east. An Urban Framework Plan has been prepared by Brady Shipman Martin, on behalf of and in collaboration with South Dublin County Council, for the potential development of the residential lands. The initial studies included a Preliminary Ecological Appraisal Report, however, the establishment of a more detail and comprehensive ecological appraisal of the lands was recommended in advance of proceeding to a more detailed masterplan.

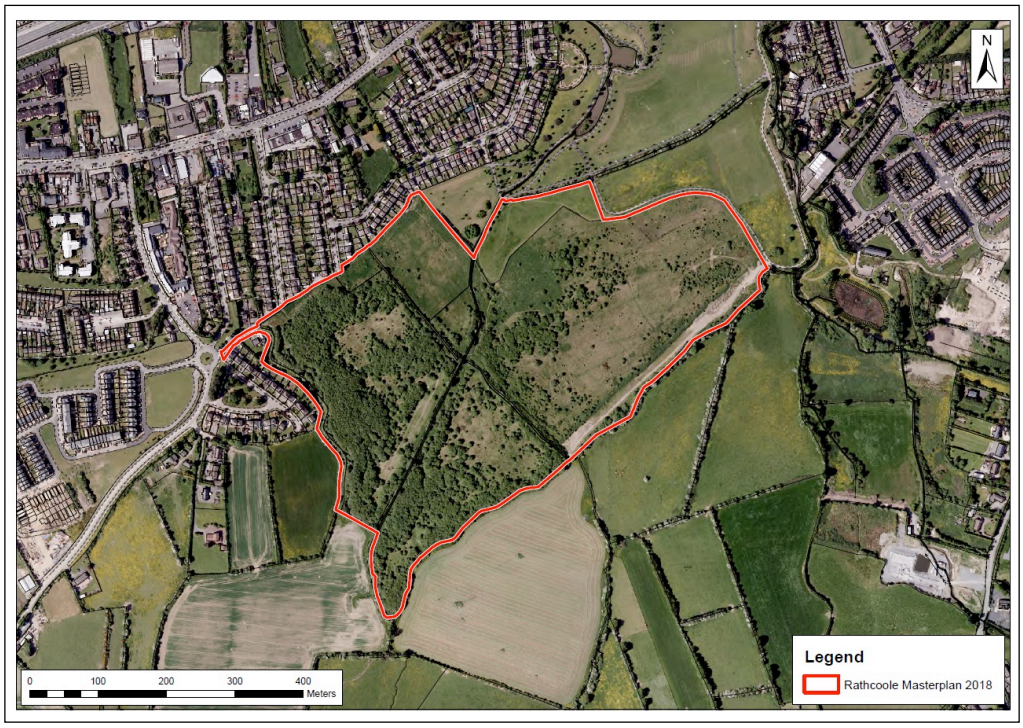

Figure 1.1 Site location (outlined in red) in Rathcoole, Co. Dublin.

This report was commissioned by Brady Shipman Martin on behalf of South Dublin County Council, in order to provide a full understanding of all ecological receptors that may be present on the lands.

1.1 Background

This report has been prepared by Faith Wilson BSc (Hons) CEnv MCIEEM (an independent ecological consultant and licensed bat specialist of Faith Wilson Ecological Consultant) and Dr Joanne Denyer PhD BSc (Hons) MCIEEM (a botanical specialist and ecologist of Denyer Ecology). Faith and Jo were appointed by Brady Shipman Martin to prepare an ecological assessment of the lands at Rathcoole, Co. Dublin.
The scope of works requested included:

- Full habitat and botanical survey and evaluation of the site – including potential Annex 1 habitats and alien invasive plant species (such as Japanese knotweed, giant hogweed and Himalayan balsam);
- An "appropriate level" of bat survey;
- Breeding bird surveys;
- Hedgerow classification;
- Large mammal survey (this includes badger and otter, as well as signs and direct observations of other mammals);
- Amphibian (common frog and smooth newt) survey.

Relevant Expertise of the Survey Team

Faith Wilson BSc CEnv MCIEEM
Faith Wilson is an experienced multi-disciplinary ecologist with over twenty five years experience specialising in habitat, botanical and zoological surveys (including bat, otter, badger, amphibian, cetacean and bird surveys) and environmental impact assessment.

She has carried out a diverse range of work including habitat and mammal surveys, impact assessment and mitigation on large infra-structural projects such as 110kV power lines, national road schemes, cycling routes, gas pipelines and wind farms and more specialised targeted surveys for legally protected and threatened species such as rare plants and a wide variety of fauna including marsh fritillary, bats, otters, badgers, cetaceans and aquatic species.

She has worked on a large number of wetland/peatland surveys across Ireland including the National Raised Bog Habitat Restoration Plan and the National Survey of Blanket Bog Natural Heritage Areas for National Parks and Wildlife Service, countywide surveys of fens, marshes, reedbeds, transition mires, springs, wet heath, wet woodland, blanket bog and raised bogs in Counties Sligo, Meath, Kildare, Louth, Wicklow, Monaghan and Westmeath.

She has worked on national surveys of grassland habitats, developing the first survey and monitoring criteria for the Annex I priority grassland habitats Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (*6210) and Species-rich Nardus grasslands on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe) (*6230) for National Parks and Wildlife Service.

She was engaged by National Parks and Wildlife Service to conduct surveys across County Wicklow and nationally for rare and legally protected plants. She has also conducted detailed surveys and habitat condition assessments for orchids both nationally and within Dublin City. She prepared the first conservation status assessment reports for the upland Annex I habitats (siliceous rocky slope and scree, calcareous rocky slope and scree and alpine heath) for NPWS as part of our national reporting obligations under Article 17 of the EU Habitats Directive.

She has prepared detailed management plans for native woodland sites across the country including the KERRY LIFE project, which aims to restore the conservation status of two freshwater pearl mussel river catchments in Co. Kerry. She has been an accredited ecologist on the Native Woodland Scheme panel and has delivered

ecological training for the Native Woodland Scheme for the Forest Service and Woodlands of Ireland.

She is also a NPWS licensed bat specialist and member of the Heritage Council Bat Expert Panel.

Dr Joanne Denyer BSc DPhil MCIEEM

Dr Joanne Denyer is a highly experienced botanist and bryologist with over 18 years' experience of ecological survey and research. She is experienced in the identification of all plant groups, including difficult groups such as aquatic macrophytes, charophytes and bryophytes.

Dr Denyer specialises in wetland and grassland habitats. She completed a DPhil in **grassland** research (2005) and has subsequently undertaken detailed survey, assessment and monitoring of grasslands across Ireland and the UK. She was part of the survey team for the NPWS Irish Semi-Natural Grasslands Survey (2010-2011) and is highly experienced in the identification and survey of Annex I grassland habitats including 'Lowland hay meadows' [6510].

Her wetland experience includes detailed botanical survey and assessment of **wet woodlands**, including the Annex I priority habitat '*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*' [91E0]. She has worked on projects involving wet woodland for road schemes and flood defence projects and has acted as an expert witness on wet woodland at Oral Hearing.

She is also a national expert on the Annex I habitat priority '***Petrifying springs** with tufa formation' [7220]. Her work on this habitat includes detailed survey, assessment and monitoring, Ecological Impact Assessment and acting as an expert witness on calcareous springs at Oral Hearing. She provides expert advice on this habitat to County Councils and National Parks and Wildlife Service (NPWS). She is currently working with NPWS to update national guidance on the survey and assessment of this habitat.

1.2 Relevant Legislation

1.2.1 Nature Conservation Designations

International Conservation Designations

The lands at Rathcoole are not designated for any nature conservation purposes under international conservation legislation. There are six Natura 2000 designated sites within a 15km radius of the site. These are as follows:

- Glenasmole Valley SAC (Site Code: 001209)
- Red Bog, Kildare SAC (Site Code: 000397)
- Rye Water Valley/Carton SAC (Site Code: 001398)
- Wicklow Mountains SAC (Site Code: 002122)
- Wicklow Mountains SPA (Site Code: 004040)
- Poulaphouca Reservoir SPA (Site Code: 004063)

These are shown below on **Figure 1.2.1**.

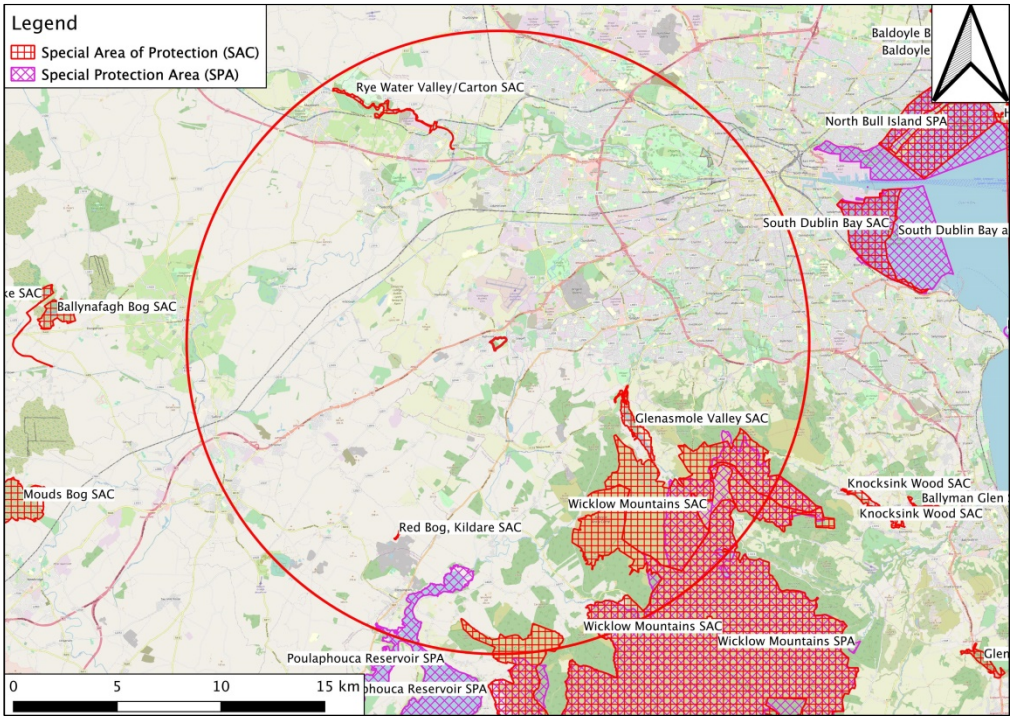

Figure 1.2.1. Nature Conservation Designations within a 15km radius of Rathcoole.

Special Areas of Conservation (SACs) are statutory designations under EU Habitats Directive (92/43/EEC) that seek to maintain or enhance the favourable conservation status of the habitats or species for which the SACs have been designated. SAC is a statutory designation, which has a legal basis under the EU Habitats Directive (92/43/EEC) as transposed into Irish law through the European Communities (Natural Habitats) Regulations, 1997, which were amended in 1998, 2005 and 2011. The European Communities (Birds and Natural Habitats) Regulations 2011 consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities)

Regulations 2010, as well as addressing transposition failures identified in the Court of Justice of the European Union (CJEU) judgements.

A Special Protection Area (SPA) is a statutory designation, which has a legal basis under the EU Birds Directive (79/409/EEC). The primary objective of SPAs is to maintain or enhance the favourable conservation status of the birds for which the SPAs have been designated.

National Conservation Designations

Proposed NHAs are habitats or sites of interest to wildlife that have been identified by NPWS. These sites become NHAs once they have been formally advertised and land owners have been notified of their designation. NHAs are protected under the Wildlife (Amendment) Act, 2000, from the date they are formally proposed. NHA is a statutory designation according to the Wildlife (Amended) Act, 2000 and requires consultation with NPWS if any development impacts on a pNHA.

All of the Natura 2000 sites listed above (with the exception of the Wicklow Mountains SAC/SPA) are also designated as pNHAs. There are 12 pNHAs in total within a 15km radius of the lands at Rathcoole as shown below on **Figure 1.2.2**. The other pNHAs include:

- Dodder Valley pNHA (Site Code: 00991)
- Grand Canal pNHA (Site Code: 002104)
- Kilteel Wood pNHA (Site Code: 001394)
- Liffey at Osberstown pNHA (Site Code: 001395)
- Liffey Valley pNHA (Site Code: 000128)
- Liffey Valley Meander Belt pNHA (Site Code: 000393)
- Lugmore Glen pNHA (Site Code: 001212)
- Royal Canal pNHA (Site Code: 002103)
- Slade of Saggart and Crooksling Glen pNHA (Site Code: 000211)

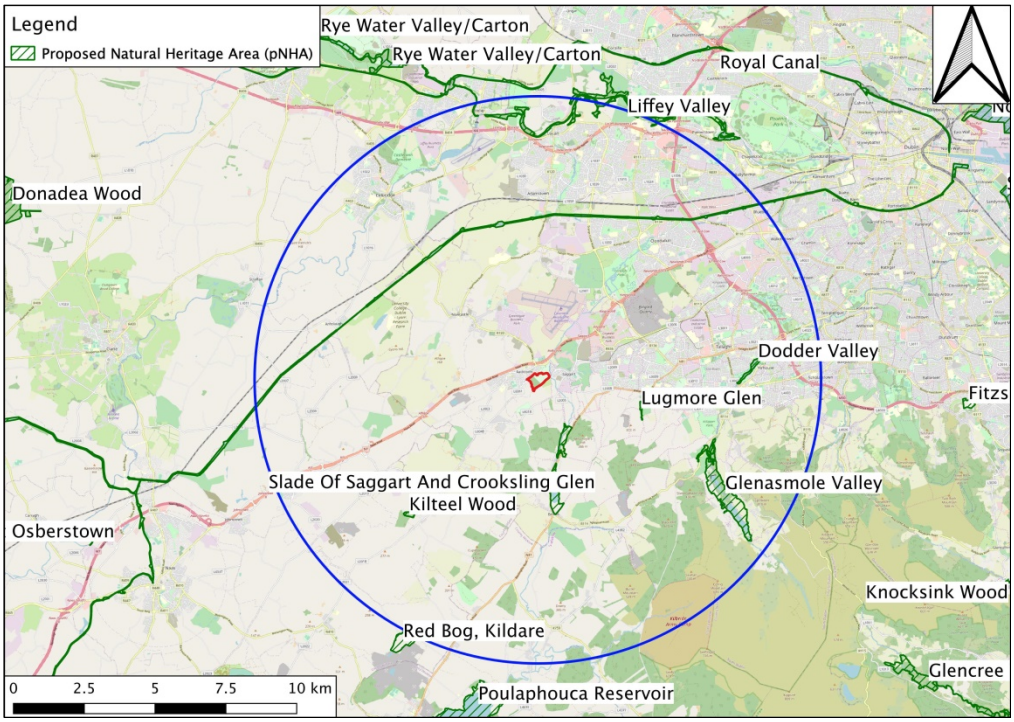

Figure 1.2.2. Sites of national conservation importance near Rathcoole.

NHAs are considered to be of national importance, while SACs and SPAs are of international importance for nature conservation.

The lands at Rathcoole are not designated for any nature conservation purposes under national conservation legislation.

1.2.2 Bats

Eleven species of bats have been recorded in Ireland and all are protected under both national and international law.

Wildlife Act 1976

In the Republic, under Schedule 5 of the Wildlife Act 1976, all bats and their roosts are protected by law. It is unlawful to disturb either without the appropriate licence. The Act was amended in 2000.

Bern and Bonn Convention

Ireland has also ratified two international conventions, which afford protection to bats amongst other fauna. These are known as the 'Bern' and 'Bonn' Conventions. The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), exists to conserve all species and their habitats, including bats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries, which covers certain species of bat.

EU Habitats Directive

All bat species are given strict protection under Annex IV of the EU Habitats Directive, whilst the lesser horseshoe bat (*Rhinolophus hipposideros*) and greater horseshoe bat (*Rhinolophus ferrumequinum*) are given further protection under Annex II of the EU Habitats Directive. Both are listed as a species of community interest that is in need of strict protection and for which E.U. nations must designate Special Areas of Conservation (SACs). The latter is only known from a single site and no breeding populations have been recorded to date. The former are a species of the western seaboard of Ireland and have not yet been recorded on the east coast.

The principal pressures on Irish bat species have been identified as follows:

- urbanized areas (e.g. light pollution);
- bridge/viaduct repairs;
- pesticides usage;
- removal of hedges, scrub, forestry;
- water pollution;
- other pollution and human impacts (e.g. renovation of dwellings with roosts);
- infillings of ditches, dykes, ponds, pools and marshes;
- management of aquatic and bank vegetation for drainage purposes;
- abandonment of pastoral systems;
- speleology and vandalism;
- communication routes: roads; and
- inappropriate forestry management.

1.2.3 Badgers

Badgers (*Meles meles*) are common and widespread in Ireland, and are found in all lowland habitats where the soil is dry and not subject to flooding (Hayden and Harrington, 2000). Badgers are social animals that live in complex underground tunnel systems called setts. Badger territories may vary in size from about 60-200 ha (Smal, 1995).

Badgers and their setts legally are protected under the provisions of the Wildlife Act, 1976, and the Wildlife Amendment Act, 2000. It is an offence to intentionally kill or injure a protected species or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. It is standard best practice to ensure that mitigation measures are taken to limit impacts on badgers and badger populations during developments.

1.2.4 Otter

The otter (*Lutra lutra*) is protected under both national and international wildlife legislation, where it is listed under the Wildlife Act 1976 (amended 2000) and Annex II and IV of the EU Habitats Directive respectively, and is listed as a Near Threatened species in the 2009 Irish Red Data List for Mammals.

1.2.5 Invasive Species

The Birds and Habitats Regulations (2011) which were signed on 21st September 2011 by the then Minister for Arts, Heritage and the Gaeltacht Jimmy Deenihan, included new legislation on invasive and non-native species in Sections 49 and 50. Since then the EU Regulation on Invasive Alien Species (EU Regulation 1143/2014) also came into force on the 3rd August 2016.

The plant and animal species to which the Birds and Habitats Regulations (2011) apply are presented in Schedule Three. Part 1 details the plants species, while Part 3 outlines those animal or plant vector materials. These are presented in **Appendix F.** A detailed survey for such species was conducted.

Other Invasive Species
The main guidance document that has been prepared dealing with invasive species/noxious weeds on sites is the NRA *'Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads'* which was published in 2010. This document details other non-native species of note. A detailed survey for such species was conducted.

1.2.6 Fisheries and Water Quality

According to the EPA Envision Map Viewer the lands at Rathcoole are located within the Liffey and Dublin Bay catchment within Hydrometric Area 09. Tributaries of the River Camac, which is a salmonid watercourse flow through the study area.

1.3 Survey Constraints

The site surveys were delayed in terms of commencement on account of Covid 19 restrictions.

The surveys were conducted outside the optimum time for conducting badger and other large mammal surveys, which is December–March (as the likelihood of detecting both setts and signs of badger/large mammal activity increases during the winter months as vegetation cover decreases). In addition dense blackthorn scrub prevented access to some parts of the site.

The bat activity surveys of the site were completed during the active bat season.

The delays in commencement also impacted on the breeding bird surveys as originally planned so the methodology was changed from that initially proposed (an early (conducted between 1st April – 15th May) and a late visit (15th May – 30th June) as per Countryside Bird Survey) to one of general breeding observations using the British Trust for Ornithology breeding criteria.

The habitat assessment and botanical surveys were completed during the flowering period for plants.

2. METHODOLOGY

2.1 Project Description

A masterplan is currently under development for the lands at Rathcoole by South Dublin County Council. A detailed ecological survey of the lands was commissioned to inform same.

2.2 Desk Study

A desk study was carried out to collate the available information on the ecological environment potentially impacted by the proposed development. The National Parks and Wildlife Service (NPWS) of the Department of Housing, Local Government and Heritage (DHLGH) database of designated conservation areas and NPWS records of rare and protected plant species were checked with regard to the location of the lands at Rathcoole.

Information on protected species of fauna and flora listed for protection under Annex II of the EU Habitats Directive (92/43/EEC), Annex I of the Birds Directive (79/409/EEC) and the Wildlife (Amendment) Act (2000) was also sought from NPWS and published sources. Recent, high resolution, colour aerial photographs were also used to identify and map potential habitats.

A review of previous studies and surveys conducted of the lands was also completed. These included:

- Lands at Rathcoole - Urban Design Framework (Brady Shipman Martin, 2019). Unpublished report prepared for South Dublin County Council;
- Lands at Rathcoole - Urban Design Framework: Appropriate Assessment Screening (Brady Shipman Martin, 2019). Unpublished report prepared for South Dublin County Council
- Lands at Rathcoole – a Preliminary Ecological Appraisal Report (PEAR). Brady Shipman Martin (2020). Unpublished report prepared for South Dublin County Council.
- Tree Review for the Rathcoole Urban Design Framework, Co. Dublin. Brady Shipman Martin (2019). Unpublished report prepared for South Dublin County Council.
- Ronan Mac Diarmada & Associates - Landscape Architects & Consultants (Undated). Rathcoole Woodland - Review of Existing Woodland.

Consultations were also made with local residents and ecologists who are familiar with the site.

The Preliminary Ecological Appraisal Report, prepared by Brady Shipman Martin, was based on initial desk survey and field-based research. That report concluded the following (summarised):

- *While it is not expected that development would have any significant effects on designated sites such as SACs or SPAs, there is the potential for significant impacts on biodiversity within the site itself.*

- *As noted throughout the report these findings are preliminary and are subject to change. In addition to the surveys recommended in this report, any future development will require its own Ecological Impact Assessment (EcIA). Any development at this site will result in the loss of at least some of the habitats present and disturbance to the habitats and species that remain.*

- *In order to minimise the potential impacts, and to maximise the biodiversity value of both the retained habitats and the proposed development itself, a comprehensive suite of additional biodiversity surveys has been commissioned by South Dublin County Council.*

- *Once completed, the 2020 summer surveys will enable a full and clear evaluation of the ecological value of this site. This baseline and evaluation will inform the detailed design of any proposed development at the site and will inform any review of the masterplan that has been prepared for the site. It will also allow an impartial appraisal to be made of the potential impacts on biodiversity of any proposed development.*

- *Finally, the baseline surveys will inform the mitigation design of any proposed development at the site. They will serve to inform the landscape design of any future development and they will also be crucial to any biodiversity enhancement measures proposed.*

2.3 Ecological Evaluation

The ecological importance of the habitats within the survey area was assessed using the criteria listed in the *Guidelines for Assessment of Ecological Impacts of National Roads Schemes* (NRA, 2009) and the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2019).

Criteria used to evaluate habitats and sites include site designation, presence of rare and/ or protected species, local rarity, habitat functional role, naturalness, habitat diversity, size of habitat or species population and rich assemblages of plants and animals. The importance of an ecological feature is considered within a defined geographical context. Under this ecological evaluation scheme habitats are rated as being of either:

- International ecological importance
- National ecological importance
- County ecological importance
- Local (higher value) ecological importance
- Local (lower value) ecological importance

2.4 Field Surveys

The site was first visited jointly by the survey team (Faith Wilson and Joanne Denyer) on 29 May 2020 with repeat visits undertaken from late May to end August 2020. Survey dates are shown in **Table 2.1**.

See also Appendix C(b) which contains results of three further relevés carried out in April 2021.

Table 2.1. Survey Dates

Date	Surveyor(s)	Survey type
29 May 2020	Faith Wilson & Joanne Denyer	Walk-over survey; habitat mapping
8 June 2020	Joanne Denyer	Detailed wet woodland survey; general botanical survey
11 June 2020	Faith Wilson	Walk over survey – birds and mammals
2 July 2020	Joanne Denyer	Detailed grassland survey; invasive species survey; hedgerow survey
16 July 2020	Faith Wilson	Walk over survey – birds and mammals Bat survey
22 July 2020		Walk over survey – fauna
24 August 2020	Faith Wilson	Walk over survey – fauna Bat survey

2.4.1 Habitat & Botanical Survey

The habitats present were recorded and described to Level 3 of *A guide to habitats in Ireland* (Fossitt, 2000). This is the standard classification for general baseline botanical survey. Within each habitat dominant and abundant plant species, indicator species and/or species of conservation interest were recorded.

Where an area of habitat was considered to have affinity to a habitat listed under Annex I of the EU Habitats Directive, more detailed vegetation survey and classification is required. This is a higher level of classification than Fossitt (2000) and one Annex I habitat may be represented by more than one Fossitt habitat and vice versa. For potential Annex I habitats, detailed relevé survey was undertaken and the habitat classified according to the Irish Vegetation Classification (www.biodiversityireland.ie/ivc) for grassland and woodland and Lyons and Kelly (2017) for Petrifying springs.

The detailed relevé survey followed methodology in relevant national guidelines:

- Wet woodland: *Results of monitoring survey of old sessile oak woods and alluvial forests* (O'Neill, et al., 2013) and *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments* (NPWS, 2019).
- Grassland: *The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats* (Martin et al., 2018).
- Calcareous springs: *Monitoring Guidelines for the Assessment of Petrifying Springs in Ireland* (Lyons & Kelly, 2016).

Note that these guidelines are designed for the national monitoring of Annex I habitat condition and extent, and there may be some differences in applying methodology between national monitoring surveys and baseline ecological assessment (as in this study).

For instance, in the National Survey of Native Woodlands (NSNW), there are three levels of assessment (O'Neill et al., 2013): Individual plot level; four-plot level and polygon level. At the individual plot level, information is collected on positive and negative indicator species, canopy cover and height, cover of different vegetation layers within the woodland and grazing pressure. Ten criteria are assessed and to pass the condition assessment, at least 8 criteria

must pass. The proportion of positive indicator and target species is the data required to demonstrate whether or not an area of woodland comprises an Annex I (priority) habitat type. The four-plot and polygon level assessments are used to further assess the condition of the habitat (e.g. the amount of dead wood and regeneration present in the woodland).

Whilst useful for future monitoring, this level of assessment is not required for baseline ecological assessment. During the NSNW surveys, the surveyor actually assesses whether or not a polygon contains Annex I woodland before undertaking any plots. This is based on the presence/ lack of target species in the canopy and/ or field layer (or both) (O'Neill et al., 2013), which do not require a detailed plot to assess.

In the Rathcoole surveys, approximately eight hectares of wet woodland were mapped which is the maximum size of one polygon for the survey of the Annex I priority habitat 'Alluvial woodland' (91E0) (O'Neill et al., 2013). Two plots were undertaken in this polygon, both of which passed the criteria for Annex I priority habitat 'Alluvial woodland' (91E0).

As in the national survey guidelines (O'Neill et al., 2013) it was possible to assess the whole polygon as the priority habitat during the general botanical of the woodland by assessing the presence and proportion canopy and field layer target species present. There was therefore no requirement to undertake any additional plots to map the polygon.

Ecologically Sensitive Areas (ESA) e.g. sections of hedgerows, adjoining wetland areas, sections with high species richness but not sufficient to warrant separate classification under Fossitt were individually mapped and described.

Hedgerows within the site were classified using the latest hedgerow survey guidelines: *Hedgerow Appraisal System - Best Practice Guidance on Hedgerow Survey, Data Collation and Appraisal* (Foulkes et al., 2013). The survey focused on rating the significance of the hedgerows currently present on site.

A check was made for the presence of any invasive species as described above.

The presence of four red data book vascular plant species (Wyse Jackson *et al* (2016)) including Hairy Violet *Viola hirta*, Narrow-leaved Helleborine *Cephalanthera longifolia*, Red Hemp-nettle *Galeopsis angustifolia* and Bog Orchid *Hammarbya paludosa* is known from the 10km square (O02) in which the study area is located. Detailed surveys were conducted for these species within the study area.

Vascular plant nomenclature follows that of the *New Flora of the British Isles,* 4th Edition (Stace, 2019). The bryophyte nomenclature adopted by Blockeel *et al.* (2014a & b) is used; this is based on *the Checklist of British and Irish bryophytes* (Hill *et al*., 2008) with minor modifications to reflect recent taxonomic changes.

2.4.2 Mammal Surveys

Bat Survey
The bat survey consisted of three elements. This included a desktop review and consultation with Bat Conservation Ireland, an inspection of trees within the site for their potential to support roosting bats and a bat activity survey of the site, which was carried out over several nights.

Trees within the site were assessed for their potential use by bats using the following standard criteria, which were created by bat specialists from Bat Conservation Ireland for use in the assessments of tree roosts on large infrastructural projects and are summarised in NRA (2006):

- Presence or absence of bat droppings (these can be hard to find amongst leaf litter or may be washed away following periods of wet weather),
- Bat droppings may also be seen as a black streak beneath holes, cracks, branches, etc.,
- Presence or absence of smooth edges with dark marks at potential entrances to roosts,
- Presence or absence of urine stains at potential entrances to roosts,
- Presence of natural cracks and rot holes in the trunk or boughs of the tree,
- Hollow trees,
- Presence or absence of creepers such as ivy or honeysuckle on trees (ivy clad trees are often used by bat species such as pipistrelles as roosts),
- Presence or absence of loose bark such as that of sycamore, or flaky bark on coniferous species such as cedars, cypress and Scot's pine,
- Presence or absence of bracket fungi which may indicate a rotten or potentially hollow centre to the tree,
- Known bat roosts previously identified,
- Trees with storm or machinery damage or broken boughs,
- Clutter level - where the branches and trunk are easily accessible, this is considered a better tree for bat roosts,
- Adjoining habitat - if there are a variety of feeding opportunities for bats, this increases the potential of a tree as a bat roost,
- Adjoining potential roosts / known roosts. This raises the likelihood of a tree being of benefit as bats may move roosts if the roost becomes too hot or cold during roosting and a nearby alternative roost is highly desirable.

The aim of the tree roost survey was to determine the potential use of any mature trees in the site as roosting sites and based on the desktop research coupled with the results of the bat activity survey to identify what bat species are known/or likely to occur within the site. There are no built structures in which bats might roost within the site.

Badger Survey
A badger survey was conducted in the general environs of the site by searching for signs of badger activity. These include setts, old bedding

material, feeding signs, latrines, badger tracks or paw prints, badger paths and badger hair caught on vegetation or fences.

The survey was carried out by Faith Wilson, an experienced mammal specialist, in accordance with best practice as described in the 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA 2009) and 'Guidelines for the treatment of badgers prior to the construction of National Road Schemes' (NRA 2005).

Badger survey work is ideally undertaken during the winter months, when vegetation is low and the growing season is curtailed which allow badger signs and setts to be found – see **Section 1.3 Survey Constraints**.

Otter Survey

Otter surveys were carried out on the watercourses within the site in accordance with best practice as described in the **'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes'** (NRA 2009), **'Otter Breeding Sites. Conservation and Management. Conserving Natura 2000 Rivers Conservation Techniques Series No. 5, (Liles, 2003)'** and '**Guidelines for the treatment of otters prior to the construction of National Road Schemes'** (NRA 2006).

The study area was surveyed for signs indicative of the presence of otters, including:

- otter spraints;
- footprints;
- actual, possible or potential resting sites, (these include underground 'holts' e.g. beneath the roots of bankside trees; or above ground 'couches' e.g. in reedbeds);
- slides or other well-used access points to watercourses (though additional evidence would be required to positively confirm such as indicative of otter presence);
- feeding remains e.g. fish carcasses (though additional evidence would be required to positively confirm such as indicative of otter presence); and/or sightings, including otter Road Traffic Accidents (RTAs).

Otter survey work is ideally undertaken during the winter months, when vegetation is low and the growing season is curtailed which allow otter signs and holts to be found – see **Section 1.3 Survey Constraints**.

Other Mammals

Other general observations of mammals were conducted during the site surveys.

2.4.3 Breeding Birds

The breeding bird season had begun by the time the first site visit was made (29th May 2020) and general observations of birds using the site during other site visits for other disciplines were also made.

Breeding/nesting evidence was recorded using the standardised methods developed by the British Trust for Ornithology for the Bird Atlas Survey 2007 – 2011 to determine if a species is either a possible, probable or confirmed breeder. The standard BTO evidence used for each breeding category is presented below and presented along with descriptions of each breeding encounter recorded (breeding code presented in brackets).

Breeding codes:

NON-BREEDER
M Migrant
U S**u**mmering

POSSIBLE BREEDER
H Observed in suitable nesting **H**abitat
S Singing male

PROBABLE BREEDER
P Pair in suitable nesting habitat
T Permanent **T**erritory (many individuals on 1 day or 1 individual over 1+ wk)
D Courtship and **D**isplay
N Visiting probable **N**est site
A Agitated behaviour
I Brood patch of **I**ncubating bird
B Nest **B**uilding or excavating

CONFIRMED BREEDER
DD Distraction **D**isplay
UN Used **N**est or eggshells found from this season
FL Recently **FL**edged young or downy young
ON Adults entering or leaving nest-site indicating **O**ccupied **N**est
FF Adults carrying **F**aecal sac or **F**ood for young
NE Nest containing **E**ggs
NY Nest with **Y**oung seen or heard

3. RESULTS

3.1 Field Surveys – Habitats and Flora

3.1.1 Habitats

The lands at Rathcoole consist of wet woodland, wet and dry grassland, scrub, mature hedgerows, streams, ditches and small access paths. A habitat map of the property showing the habitats mapped to Fossitt level 3 is presented on **Figure 3.1.1** below.

This map is based on the 2020 habitat surveys, undertaken by a botanical specialist. Habitat maps from previous general walk-over surveys (e.g. the PEAR report, 2020) were not used as a basis for the 2020 detailed botanical surveys and habitat mapping. It is important to note that there are some key differences between the preliminary surveys and the 2020 detailed surveys. For instance, previous surveys have assessed the area of wet woodland as 'immature woodland' or 'maturing woodland', whilst in the 2020 detailed botanical surveys it has been mapped as WN6 wet willow-alder-ash woodland and assessed as the Annex I priority habitat '91E0'. This is because specialist botanical surveys are required to recognise and map this wetland habitat. The PEAR report (2020) recommended that further detailed survey work be undertaken (see **Section 2.2** of this report). These detailed surveys were undertaken by a botanist with expertise in wetland habitats, springs and grasslands; were undertaken in the main vascular plant growing season and are informed by more detailed survey data. Therefore the maps in the this report will have some differences to the preliminary habitat maps (which they supersede).

The area of each habitat type is shown in **Table 3.1**.

Table 3.1. Area of each mapped habitat type

Habitat code*	Habitat	Area (ha)/ Length m
WL1	Hedgerows	2492m
FW4	Drainage ditches	773m
FW1	Streams	1296m
FP1	Calcareous springs (point)	0.03ha**
FP1	Calcareous springs (line)	76m
FS1	Reed and large sedge swamps	0.1ha
GS2	Dry meadows and grassy verges	5.04ha
GS2-WS1 mosaic	Mosaic Dry meadow and grassy verges and scrub	6.78ha
GS4	Wet grassland	0.58ha
WN6	Wet-willow-alder-ash woodland	8.0ha
WS2	Immature woodland	2.4 ha

***Fossitt Level 3 code**

**** The size of the area covered by the springs varies seasonally and is likely to be greater in winter.**

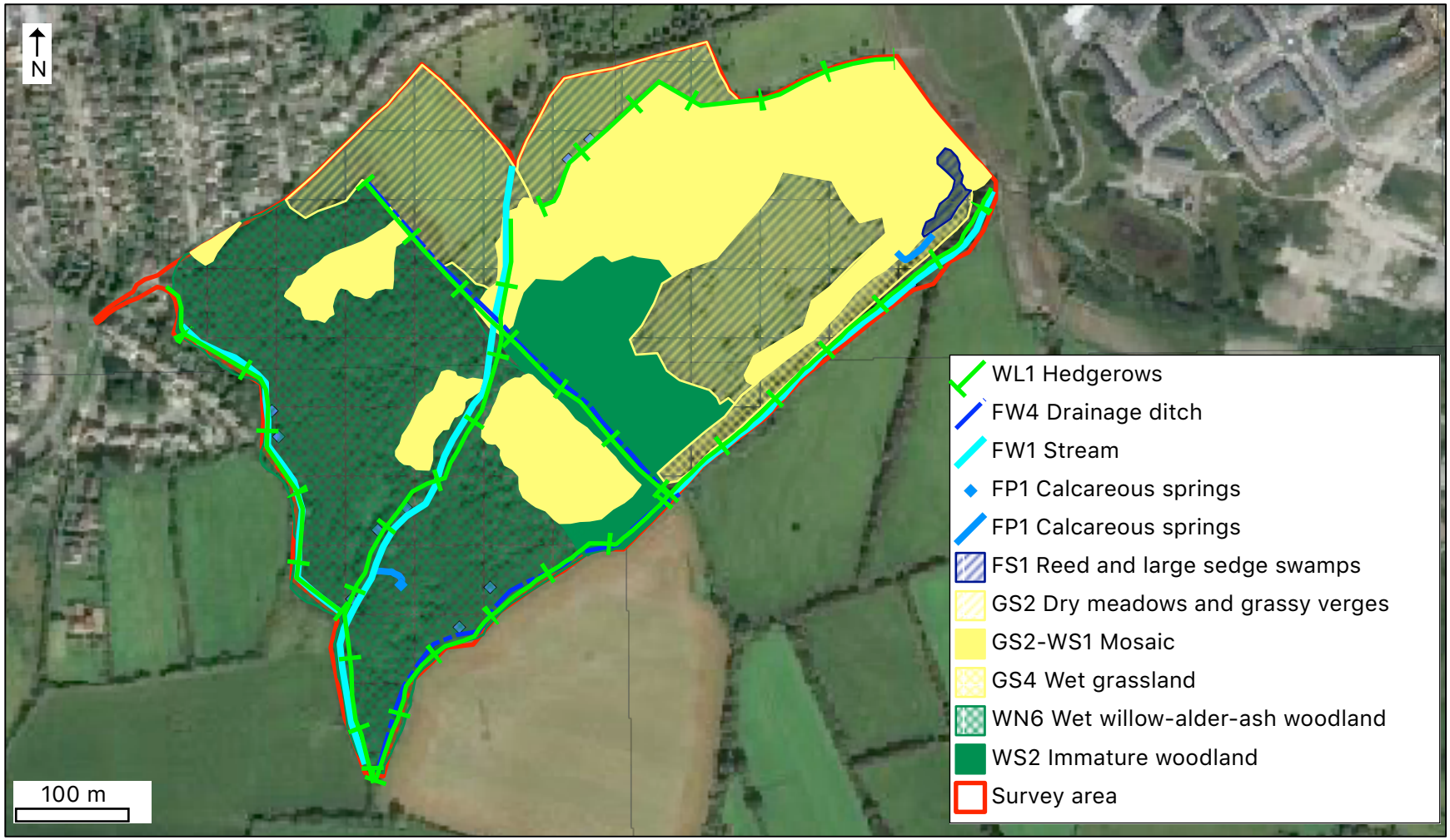

Figure 3.1.1 Habitat Map of the lands at Rathcoole.
© Bing maps reprinted with permission from Microsoft Corporation (Denyer Ecology licence).

The extent of those habitats present which correspond to, or have affinity to, a habitat type listed under Annex I of the EU Habitats Directive are presented on **Figure 3.1.2** below.

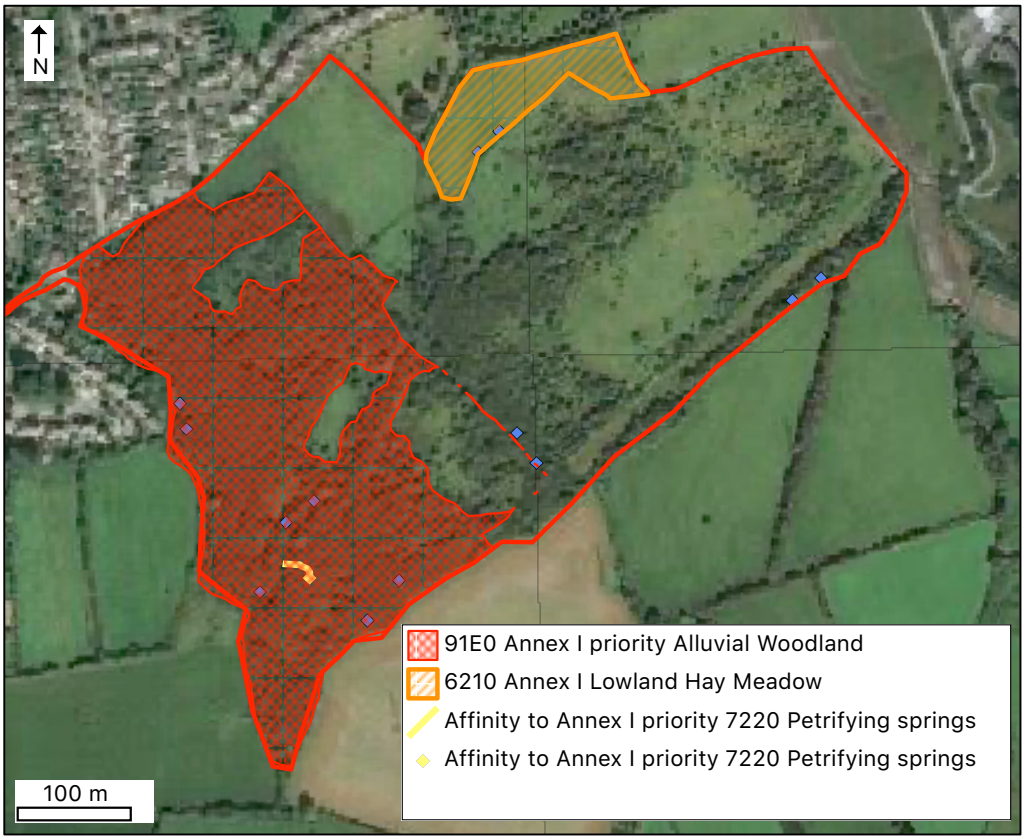

Figure 3.1.2 Map of habitats which are examples of/ have affinity to Annex I (priority) habitats

Eroding/ upland rivers (streams) FW1 and Drainage ditches (FW1/ FW4)

There are a number of small eroding streams and drainage ditches associated with hedgerows and the site boundary (**Figure 3.1.1**; **Plate 3.1.1**). The water is clear with a good flow in the streams and the substrate comprises small rocks and occasional gravel areas. These small watercourses are generally shaded by the adjacent hedgerow and woodland and have a limited/ absent aquatic flora within the stream. The bank flora is locally diverse with woodland species such as Lords-and-Ladies *Arum maculatum,* Hart's-tongue *Asplenium scolopendrium,* Opposite-leaved Golden-saxifrage *Chrysosplenium oppositifolium,* Wood-sedge *Carex sylvatica,* Herb-Robert *Geranium robertianum*, Atlantic Ivy *Hedera hibernica,* Soft Shield-fern *Polystichum setiferum* and Primrose *Primula vulgaris* and the bryophytes *Brachythecium rivulare, Eurhynchium striatum, Fissidens taxifolius, Leptodictyum riparioides, Oxyrrhynchium hians* and *Thamnobryum alopecurum.* The ecological value of the streams and drainage ditches is assessed with the hedgerow/ woodland of which they are an integral part.

Plate 3.1.1. Example of an eroding stream (FW1).

Calcareous springs (FP1)

There is a localised area of calcareous springs in the southern area of wet woodland (**Figures 3.1.1** and **3.1.2**; **Plate 3.1.2**). No springs were flowing in this area on the first and second visits in May and June, but the springs were flowing in July after a period of rain. There is at least one spring source which divides into channels and flushes an area c 5-10m wide. This forms a small pool above the stream bank to the north and discharges into the stream. The springs are highly tufa forming with 55% cover of tufa (oncoids and ooids and paludal tufa) in the relevé undertaken (see **Appendix A**).

During an additional site visit in October 2020, at least five spring origins were recorded, all with strong flow. These discharged over a flushed area to the stream to the north and also through the wet woodland to the east.

A detailed relevé was undertaken in a representative area of the main spring (**Appendix A**). This found that the calcareous springs have affinity to the Annex I priority habitat 'Petrifying springs' [7220] but do not have enough positive indicator species to be an example of this habitat. This is probably due to the seasonal nature of the springs and periods with no flow. The springs are assessed as being of county importance given the high tufa formation, affinity to Annex I priority habitat 7220, association with Annex I habitat 91E0 and unusual nature of this type of calcareous spring in Co. Dublin.

A second spring arises in the south-east of the site and flows north-east in a small channel into the reed and large sedge swamp area (**Figure 3.1.1**; **Plate 3.1.3**). The spring contained mainly wet grassland species such as Creeping Bent *Agrostis stolonifera*, Meadowsweet *Filipendula ulmaria* and Silverweed *Potentilla anserina* with the bryophytes *Calliergonella cuspidata* and *Cratoneuron filicinum*. This spring and associated channel did not have any tufa formation or Petrifying spring indicator species and is considered to be of Local (higher) ecological importance.

Plate 3.1.2. Area with calcareous springs within wet woodland

Plate 3.1.3. Calcareous spring channel in south-east of site

Reed and large sedge swamps (FS1)

In the south-eastern area of the site there is a small area of reed and large sedge swamp (**Figure 3.1.1**; **Plate 3.1.4**). This grades into Grey Willow *Salix cinerea* to the north and west. It is dominated by Reed Canary-grass *Phalaris arundinacea* with Creeping Bent, False Oat-grass *Arrhenatherum elatius,* Hedge Bindweed, *Calystegia sepium,* Rosebay Willowherb *Chamerion angustifolium,* Creeping Thistle *Cirsium arvense,* Great Willowherb *Epilobium hirsutum,* Yellow Iris *Iris pseudacorus,* Perennial Rye-grass *Lolium perenne,* Ribwort Plantain *Plantago lanceolata,* Meadow Buttercup *Ranunculus acris,* Wood Dock *Rumex sanguineus,* and Common Nettle *Urtica dioica.* As wetland habitat, this is considered to be of Local (higher) ecological importance.

Plate 3.1.4. Reed and large sedge swamp

Dry meadows and grassy verges (GS2)
Much of the grassland on the site is currently unmanaged and occurs in a mosaic with scrub. These areas are described below. However, there is one area (0.98ha) of managed species-rich dry meadow in the north-east of the site (**Figure 3.1.1** and **3.1.2**; **Plate 3.1.5**).

Species present in the grassland include the orchids: **Common Spotted-orchid *Dactylorhiza fuchsii* and **Pyramidal Orchid *Anacamptis pyramidalis*; the broadleaved herbs (forbs): *Common Knapweed *Centaurea nigra,* Common Mouse-ear *Cerastium fontanum,* *Smooth Hawk's-beard *Crepis capillaris,* *Meadowsweet *Hogweed *Heracleum sphondylium,* *Cat's-ear *Hypochaeris radicata,* *Meadow Vetchling *Lathyrus pratensis,* **Oxeye Daisy *Leucanthemum vulgare*, *Meadow Buttercup, Creeping Buttercup *Ranunculus repens,* *Ribwort Plantain, Dandelion *Taraxacum officinale* agg., Lesser Trefoil *Trifolium dubium,* White Clover *Trifolium repens,* *Red Clover *Trifolium pratense* and *Tufted Vetch *Vicia cracca*; grasses and sedges: Common Bent *Agrostis capillaris,* Glaucous sedge *Carex flacca,* Crested Dog's-tail *Cynosurus cristatus,* Cock's-foot *Dactylis glomerata,* Red Fescue *Festuca rubra*, Yorkshire-fog *Holcus lanatus*, Perennial Rye-grass and Smooth Meadow-grass *Poa pratensis* and the bryophytes *Calliergonella cuspidata* and *Rhytidiadelphus squarrosus*.

(**High-quality indicator species and *Positive indicator species for Lowland Hay Meadow [6510])

A detailed relevé was undertaken in this area (**Appendix B**). This found that the grassland corresponds to the Irish Vegetation Classification community GL3E *Festuca rubra – Rhinanthus minor* grassland (www.biodiversityireland.ie/ivc).

The relevé plot contained one high quality indicator species and nine positive indicator species typical for this Annex I habitat. It is considered to be an example of the Annex I habitat **'Lowland Hay Meadows' [6510]**. The plot

passed all of the condition assessment criteria and is therefore in good condition.

The Irish Semi-Natural Grassland Survey data (GIS data downloaded from NPWS website: https://www.npws.ie/maps-and-data/habitat-and-species-data) shows that the Annex I habitat **'Lowland Hay Meadow'** is currently only mapped at one other site in South Dublin (Glenasmole Reservoir). The area of **'Lowland Hay Meadow'** (0.98ha) in the north-east of the site at Rathcoole is therefore considered to be of County ecological importance.

Plate 3.1.5. Species-rich dry meadow in the north of the site (Annex I habitat 'Lowland Hay Meadow')

Dry meadows and grassy verges - Scrub mosaic (GS2-WS1)
Much of the non-wooded area of the site comprises a mosaic of dry meadow and scrub (**Figure 3.1.1**; **Plate 3.1.6**).

The main grass species is the tussocky False Oat-grass, which reflects the lack of management of these grassland areas. Additional species include the grasses and sedges: Common Bent, Creeping Bent, Meadow Foxtail *Alopecurus pratensis,* Sweet Vernal-grass *Anthoxanthum odoratum,* Crested Dog's-tail, Cock's-foot, Red Fescue, Yorkshire-fog; broadleaved herbs: Rosebay Willowherb, Creeping Thistle *Cirsium arvense,* *Smooth Hawk's-beard, Hemp-agrimony *Eupatorium cannabinum*, *Hogweed, *Cat's-ear, Common Ragwort *Jacobaea vulgaris,* *Meadow Vetchling, *Meadow Buttercup, Creeping Buttercup, *Ribwort Plantain, Common Sorrel *Rumex acetosa,* Dandelion, White Clover, Common Valerian *Valeriana officinalis,* *Tufted Vetch and Bush Vetch *Vicia sepium*.

Species marked with * are those that are indicators of the Annex I habitat Lowland Hay Meadow. These are particularly frequent in locally species-rich areas (**Plate 3.1.7**), where False Oat-grass is not dominant and *Common Spotted-orchid, occasional Lady's Bedstraw *Galium verum* and Cowslip *Primula veris* are found. These areas comprise 6% of the overall dry meadow and scrub area.

The dry grassland-scrub mosaic also has small areas which grade into other habitat types (too small to map) including wetter areas, with species of wet grassland (GS4) locally abundant such as Marsh Thistle *Cirsium palustre,* Compact Rush *Juncus conglomeratus,* Silverweed *Potentilla anserina* (**Plate 3.1.8**). Other areas have a slight acidic influence with species of acid grassland (GS3) such as Tormentil *Potentilla erecta* and *Rhytidiadelphus loreus* and near to streams there are localised areas of tall-herb swamp (FS2) with tall wetland species dominant: Angelica *Angelica sylvestris,* Great Willowherb and Meadowsweet (**Plate 3.1.9**). These have affinity to the Annex I habitat **'Hydrophilous tall herb fen' [6340].**

Scrub/ woody species include Downy Birch *Betula pubescens,* Hazel *Corylus avellana,* Hawthorn *Crataegus monogyna,* Ash *Fraxinus excelsior,* Honeysuckle *Lonicera periclymenum,* Blackthorn *Prunus spinosa,* Pedunculate Oak *Quercus robur,* Bramble *Rubus fruticosus* agg., White Willow *Salix alba,* Goat Willow *Salix caprea,* Grey Willow and Crack-willow *Salix fragilis.*

The mosaic of species-poor and species-rich grassland with elements of wet grassland, acid grassland, tall-herb swamp and scrub and affinity to two Annex I habitat types means that this grassland-scrub mosaic is of Local (higher) ecological importance. In addition, these areas of grassland have the potential to have higher species-richness if correctly managed. The area of Annex I lowland hay meadow in the north of the site was previously part of the main grassland in the centre of the site. It has maintained its species richness through meadow management (presumably annual cutting and removal of cuttings). The dry meadow-scrub mosaic has lowland hay meadow indicator species present within it and it is likely that with management, more of the grassland on the site would have affinity to Annex I lowland hay meadow.

Plate 3.1.6. Mosaic of dry meadow and scrub in non-wooded areas

Plate 3.1.7. Locally species-rich dry meadow-scrub mosaic

Plate 3.1.8. Transitional dry meadow-wet grassland area

Plate 3.1.9. Small area of tall-herb swamp within dry grassland-scrub mosaic

Wet grassland (GS4)
On the south-eastern boundary of the site there is a linear area of species-rich wet grassland (**Figure 3.1.1**; **Plate 3.1.10**). This appears to have been disturbed in the last few years for the installation of a pipeline.

It is likely that the original soil was replaced (with the seedbank) as the vegetation in this area is species-rich. It is best categorised as wet grassland, but there are some areas which grade locally into dry calcareous and neutral grassland (GS1) (**Plate 3.1.11**).

There was some standing water present in the July survey and there is a calcareous spring (FP1) near to where the wet grassland grades into reed and large sedge swamp at the eastern end of the site (**Figure 3.1.1**).

The wet grassland is locally dominated by *Carex flacca* and the moss *Calliergonella cuspidata* with a range of wet and dry grassland species such as the grasses and sedges: Sweet Vernal-grass *Anthoxanthum odoratum,* Creeping Bent, False Oat-grass, Pendulous Sedge *Carex pendula,* Red Fescue, Yorkshire-fog, Soft-rush *Juncus effusus,* Hard Rush *Juncus inflexus* and Timothy *Phleum pratense*; broadleaved herbs: Lady's-mantle *Alchemilla* sp. (not flowering), Angelica, Daisy *Bellis perennis,* Common Centaury *Centaurium erythraea,* Common Mouse-ear *Cerastium fontanum,* Creping Thistle, Marsh Thistle, Spear Thistle, Smooth Hawk's-beard, Meadowsweet, Hogweed, Cat's-ear, Square-stalked St John's-wort *Hypericum tetrapterum,* Yellow Iris, Common Ragwort, Common Bird's-foot-trefoil *Lotus corniculatus,* Water-cress *Nasturtium officinale,* Ribwort Plantain, Cowslip, Silverweed, Self-heal *Prunella vulgaris,* Creeping Buttercup, Meadow Fescue *Schedonorus pratensis*, *Stellaria graminea* Lesser Stitchwort, Dandelion, Red Clover, White Clover, Colt's-foot *Tussilago farfara* Common Valerian and Bush Vetch. In addition to *Calliergonella cuspidata,* the moss *Cratoneuron filicinum* is frequent.

Over 150 flowering spikes of Common Spotted-orchid were recorded from this area in the July survey. This is a species-rich area of semi-natural wetland and is at least of Local (higher) ecological importance.

Plate 3.1.10. Species-rich wet grassland along the south-eastern boundary of the site

Plate 3.1.11. Local area of species-rich dry calcareous and neutral grassland along the south-eastern boundary of the site

Wet willow-alder-ash woodland (WN6)

Most of the western part of the site is dominated by wet willow-alder-ash woodland (**Figures 3.1.1** and **3.1.2**; **Plate 3.1.12**). This woodland is of relatively recent origin (as can be seen from past aerial photography) although the boundary hedgerows are older (see separate hedgerow assessment). The trees are 10-12m high and a woodland ground flora is established and therefore it is mapped as woodland. Previous surveys at this

site had mapped 'immature woodland' (WS2) in this area. Alluvial woodland can develop rapidly at a site and does not need to be old woodland. Specialist survey is required to identify and map this vegetation type, as it requires detailed botanical and bryological survey and expertise in wetland survey. The results of this detailed survey show that the site is of higher ecological value than previously evaluated from general walk-over surveys and desktop assessments.

The woodland is dominated by Grey willow, which suggest the water is at least periodically waterlogged and influenced by high water levels (not all areas are necessarily flooded). Note that the habitat category WN6 wet willow-alder-ash woodland is described as '*This broad category includes woodlands of permanently waterlogged sites.*' (Fossitt, 2000). The northern section of woodland at Rathcoole is not obviously waterlogged in the dry summer months. However, based on species composition and general description, the habitat mapping category (WN6) best fits the vegetation present at Rathcoole. The other willow dominated habitat category is WN5 Riparian woodland, which occurs alongside river margins and on low islands subject to frequent flooding, or where river levels fluctuate as a result of tidal movement (Fossitt, 2000). This would be less applicable to the Rathcoole woodland than WN6. Note that both of these habitat types can be examples of the Annex I priority type 'Alluvial woodland'.

The Rathcoole woodland would not fit any of the other Fossitt woodland habitat categories. Since the publication of the standard broad habitat mapping guidance (Fossitt, 2000), there has been extensive national detailed woodland mapping and survey (National Survey of Native Woodlands 2008 and later monitoring surveys in 2013) (Perrin et al, 2008; O'Neill et al., 2013).

The habitat categories in Fossitt (2000) are still used as a general habitat mapping tool, but may not always fit a habitat type exactly as the categories are not based solely on floristic data. Therefore in assessing the Annex I status of habitats, habitat specific criteria and vegetation classification data are used. See below (and **Appendix C**) for the results of the full assessment based on the Irish Vegetation Classification and Alluvial woodland positive and target indicator species.

It should be noted that in the Irish Vegetation Classification (IVC; Perrin, 2016), that the Annex I priority habitat 'Alluvial woodland' falls mainly within the WL3 *Alnus glutinosa – Filipendula ulmaria* group and that '*All vegetation communities in this group (WL3A-WL3F) have an affinity to the Annex I habitat'*. This group has high affinity with WN6 wet willow-alder-ash woodland.

It is likely that the groundwater table remains high all year at this site. On drier soils, *Salix cinerea* would not be dominant. The wetland species present in the ground flora also suggests local winter flooding and wetland indicator species occur throughout the wet woodland (e.g. Meadowsweet, Angelica, Cuckooflower *Cardamine pratensis,* Great Willowherb, Fool's-water-cress *Helosciadium nodiflorum,* Opposite-leaved Golden-saxifrage, Creeping Bent, Remote Sedge, Glaucous Sedge, Hairy Sedge *Carex hirta,* Soft-rush, Yellow Iris, Hard Rush, Reed Canary-grass, Silverweed, Creeping Buttercup and the

bryophytes *Cratoneuron filicinum, Pellia endiviifolia* and *Thamnobryum alopecurum*).

There are seasonal springs (see calcareous springs section) in the southern part of the woodland which clearly flood the local area, and streams on the western boundary and flowing through the centre of the area (**Figure 3.1.1**).

In addition to Grey Willow, woody species present include Sycamore *Acer pseudoplatanus,* Downy Birch, Hazel, Hawthorn, Ash, Atlantic Ivy, Blackthorn, Buckthorn *Rhamnus cathartica*, Dog-rose *Rosa canina,* Bramble, Goat Willow, Elder *Sambucus nigra*, Bittersweet *Solanum dulcamara,* Rowan *Sorbus aucuparia* and Wych Elm *Ulmus glabra*. Most tree species showed signs of regeneration.

Non-native species were occasional including Cherry Laurel *Prunus laurocerasus,* Crack-willow and Snowberry *Symphoricarpos albus.*

Herb-Robert dominates the ground flora in the northern part of the woodland, and Nettle *Urtica dioica* is frequent with wetland species in the southern part of the area, the local abundance of both species suggest suggesting some disturbance (possibly winter flooding) in these areas. Woodland ground flora species (in addition to the wetland species above), include the grasses and sedges: False-brome *Brachypodium sylvaticum,* Yorkshire-fog and Rough Meadow-grass *Poa trivialis*; ferns: Hart's-tongue, Male fern *Dryopteris filix-mas* and Soft Shield-fern *Polystichum setiferum*; and, broadleaved herbs: Lords-and-Ladies *Arum maculatum,* Enchanter's-nightshade *Circaea lutetiana,* Wood Avens *Geum urbanum,* Primrose, Wood Dock *Rumex sanguineus* and Bush Vetch *Vicia sepium.* Bryophytes are locally frequent on trees (epiphytes) but are rarer in the ground flora (this may be due to winter flooding). The epiphyte flora is well developed in the area of the calcareous springs. Bryophytes recorded include *Cryphaea heteromalla, Frullania dilatata, Hypnum cupressiforme, Metzgeria fruticulosa, M. furcata, Orthotrichum affine, O. diaphanum, O. pulchellum, Radula complanata, Ulota crispa* agg. and *U. phyllantha.* Non-epiphyte typical woodland bryophytes present include *Atrichum undulatum, Brachythecium rutabulum, Eurhynchium striatum, Kindbergia praelonga, Plagiomnium undulatum* and *Thuidium tamariscinum.*

The woodland has open dry grassland clearings and transitions to grassland at the edges. This increases the diversity of species found in the woodland with the presence of grassland species such as Meadow Foxtail, Sweet Vernal-grass, False Oat-grass, Cock's-foot, Perennial Rye-grass, Lesser Burdock *Arctium minus,* Creeping Thistle, Marsh Thistle, Spear Thistle, Common Mouse-ear *Cerastium fontanum,* Rosebay Willowherb, Smooth Hawk's-beard, American Willowherb *Epilobium ciliatum,* Field Horsetail *equisetum arvense,* Cleavers *Galium aparine,* Hogweed, Cat's-ear, Common Ragwort, Ribwort Plantain, Meadow Buttercup, Common Sorrel, Broad-leaved Dock *Rumex obtusifolius,* Smooth Sow-thistle *Sonchus oleraceus,* Dandelion, Germander Speedwell *Veronica chamaedrys* and Thyme-leaved Speedwell *V. serpyllifolia.*

Two detailed relevés were undertaken in the wet woodland (**Appendix C**). This found that the woodland corresponds to the Irish Vegetation

Classification community WL3D *Salix cinerea-Urtica dioica* woodland (www.biodiversityireland.ie/ivc).

Both relevé plots contained two target species and a total of seven positive indicator species and target species occupied *c.* 80% (R01) and *c.* 85% (R02) of the canopy. This shows clearly that they are examples of the Annex I priority habitat 'Alluvial woodland' [91E0]. Both relevés failed on the cover of shrubs and bryophytes. The shrub layer is sparse as this is relatively young woodland with high canopy cover which shades the shrub layer. Bryophyte cover may be low due to winter flooding, as there is no obvious grazing or trampling damage (this criteria is often failed in alluvial woodland monitoring plots due to high winter flooding). One plot had regeneration of non-native woody species. Whilst this affects the overall condition of the woodland, it does not affect the classification as Annex I priority woodland as the target species cover and number of indicator species criteria are passed for both plots.

When monitoring the condition of Annex I woodland habitats (for national reporting), assessment is undertaken at a four-plot level. In this case, the aim of the survey was to assess whether or not the woodland was an example of the Annex I priority habitat 'Alluvial woodland'. The two plots were located randomly, with the only location criteria being that they did not cross a main path. They were undertaken in the northern, drier area of the woodland. As the first two plots undertaken clearly passed the criteria for 'Alluvial woodland', further plots were not required. Additional plots in the southern wetter area would have passed with higher cover of indicator species. See also the methodology notes in **Section 2.4.1**.

The 2019 Article 17 report for this Annex I priority habitat (NPWS, 2019) states that '*The Interpretation Manual of EU habitats 2013 states that all types occur on heavy soils which are periodically inundated by the annual rise of river levels, but which are otherwise well-drained and aerated during low water*.'

It also states that '*The Irish Vegetation Classification* (IVC; Perrin, 2016) *primarily places 91E0 habitat within the WL3* Alnus glutinosa – Filipendula ulmaria *group. All vegetation communities in this group (WL3A-WL3F) have an affinity to the Annex I habitat.*'

All of the areas mapped as WN6 Wet willow-alder-ash woodland (**Figure 3.1.1**) are considered to be an example of the Annex I priority habitat type **Alluvial Woodland [91E0].** Alluvial woodland can develop rapidly at a site and does not need to be old woodland. Species composition is a key criteria in defining woodland as Annex I habitat.

In the latest national survey guidance (O'Neill et al., 2013) it states '*The presence of at least some of the typical species for the Annex I habitat (positive indicator species) should be regarded as a minimum requirement, as the species largely define the habitat. Failure of this criterion, even if other structural measures are favourable, may indicate that the woodland is not only not of Annex I quality, but may not be an example of the habitat at all.*' A reason for a woodland not supporting sufficient typical species for Alluvial woodland can be that they are too dry (O'Neill et al., 2013). As this criteria passed for all plots at

Rathcoole, it supports the assessment of the woodland as being an example of the Annex I priority habitat type 'Alluvial Woodland'.

It is also important to note that Willow, Alder and Ash do not all need to be present for a woodland to be the Annex I priority habitat Alluvial Woodland. The national monitoring guidance states '*Typical canopy species include* Salix *spp.,* Fraxinus excelsior *and* Alnus glutinosa***, one or more*** *of which should make up* ***the greater proportion*** *of the canopy'* (O'Neill et al., 2013). The presence of certain target tree species is mandatory within each plot, but only one of these needs to be present in each monitoring plot for the plot to pass the criteria as 91E0 (O'Neill et al., 2013).

The target species for 91E0 are: *Alnus glutinosa, Fraxinus excelsior, Salix cinerea* and other *Salix* species. Both plots at Rathcoole contained two target species (*Fraxinus excelsior* and *Salix cinerea*) in addition to meeting the threshold for positive indicator species (**Appendix C**). In addition the proportion of target species in the canopy needs to be greater than 50% (O'Neill et al., 2013) and this target was met in both Rathcoole woodland plots (85% in R1 and 80% in R2) (**Appendix C**). Therefore the dominance of Grey Willow in the canopy and absence of *Alnus glutinosa* from the monitoring plots is consistent with the definition of the Annex I priority habitat Alluvial Woodland.

The National Survey of Native Woodlands Survey data (GIS data downloaded from NPWS website: https://www.npws.ie/maps-and-data/habitat-and-species-data) shows that the Annex I priority habitat **'Alluvial Woodland'** is currently only mapped at one other site in South Dublin (Glenasmole Reservoir).

The Rathcoole Alluvial Woodland is the only known site within the hectad (10km x 10km square) O02 (National Survey of Native Woodlands; data accessed from NPWS website: https://www.npws.ie/maps-and-data/habitat-and-species-data). Hectad O02 was not included in the 2019 Article 17 reporting mapped national distribution of Annex I priority habitat 'Alluvial Woodland' (Habitats Directive - Article 17 GIS and Metadata; data accessed from NPWS website: https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17/2019/habitats/forests).

This is the scale at which the range of Annex I habitats are assessed at a national level for Article 17 reporting (e.g. NPWS, 2019) and therefore the Alluvial Woodland at Rathcoole increases the known distribution of this habitat at a national level. The area of 'Alluvial Woodland' at Rathcoole is therefore considered to be of County to National ecological importance.

See also Appendix C(b) which contains the results of three additional relevés carried out in April 2021.

Plate 3.1.12. Wet willow-alder-ash woodland in the west of the site

Immature woodland (WS2)

There is a small area of immature woodland in the centre of the site (**Figure 3.1.1**; **Plate 3.1.13**). This is locally dominated by Blackthorn in the southern section, transitioning to Grey Willow dominated areas to the north and east. The ground flora is mainly dominated by grassland species. As this is part of the overall mosaic of woodland, scrub and grassland habitats present on site, it is considered to be of Local (higher) ecological importance.

Plate 3.1.13. Immature woodland in the centre of the site

Hedgerows (WL1)

Mature hedgerows are present both as boundary features and also within the site (**Figures 3.1.1** and **3.1.3**; **Plate 3.1.14**). They grade into adjacent areas of woodland, but have been assessed separately as they contain hedgerow

features related to their origins, such as hedgebanks, ditches, watercourses and coppiced trees (mainly Hazel).

Detailed survey was undertaken of six hedgerows to assess their ecological value and condition (full results in **Appendix D**). The results of the hedgerow assessment (summary in **Table 3.1** and **Figure 3.1.3**) show that five hedgerows are considered to be 'Heritage Hedgerows' and of County ecological importance.

This is because they have features such as being non-linear, associated with a watercourse or parish boundary, the boundary is present on old OSI mapping, or they score highly in terms of species richness, hedgebank and ditch features and connectivity.

Plate 3.1.14. Hedgerow with tall hedge bank (c2m high) and ditch

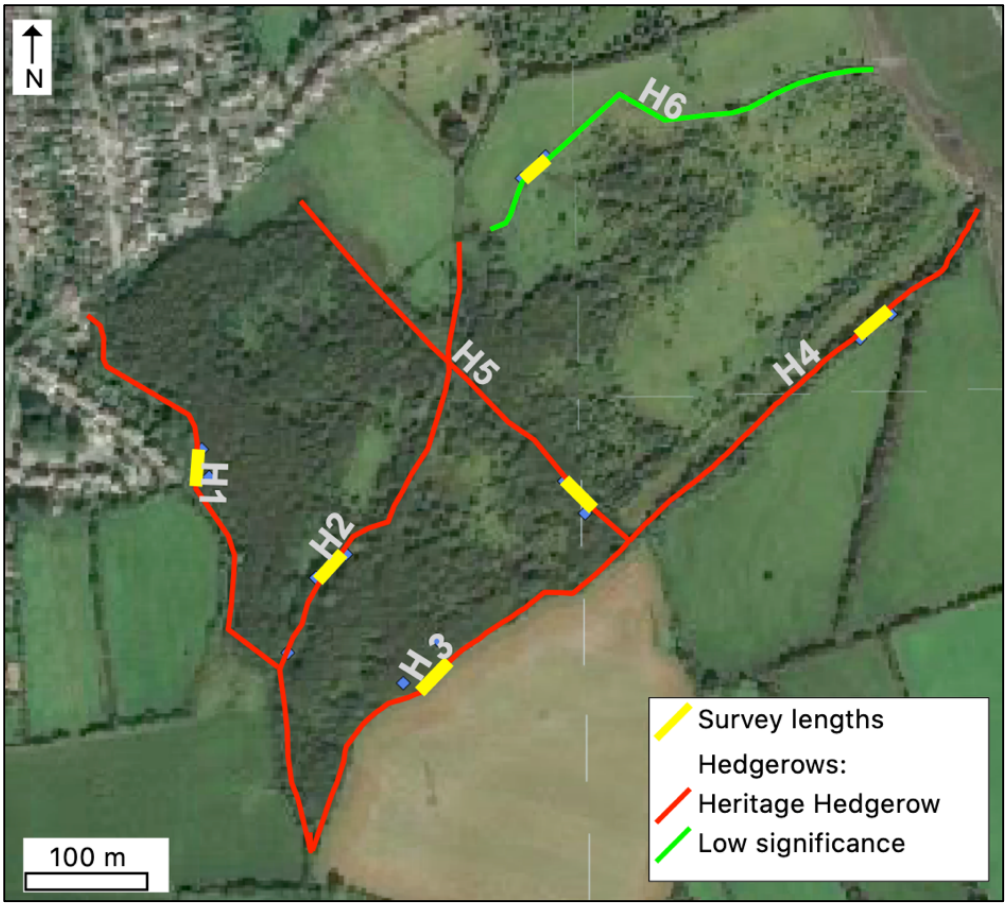

Figure 3.1.3 Hedgerow survey lengths and evaluation

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Table 3.2. Summary of hedgerow survey and evaluation

Hedge number	**Internal/ boundary[1]**	**Appraisal Score[2]**	**Hedgerow Significance**	**Condition Assessment[3]**
H1	Boundary	20	Highly significant (**Heritage Hedgerow**). Scores 4 in one category and has a cumulative score of >16 over the five categories.	Favourable Scores 23/24 overall
H2	Internal	21	Highly significant (**Heritage Hedgerow**). Scores 4 in one category and has a cumulative score of >16 over the five categories.	Favourable Scores 17/24 overall
H3	Boundary	21	Highly significant (**Heritage Hedgerow**). Scores 4 in one category and has a cumulative score of >16 over the five categories.	Favourable Scores 23/24 overall

Hedge number	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]
H4	Boundary	25	Highly significant (**Heritage Hedgerow**). Scores 4 in two categories and has a cumulative score of >16 over the five categories.	Favourable Scores 22/24 overall
H5	Internal	21	Highly significant (**Heritage Hedgerow**). Has a cumulative score of >16 over the five categories.	Favourable Scores 23/24 overall
H6	Internal	6	Low significance Has a cumulative score of <10 over the five categories.	Unfavourable Scores 10/24 overall. Unfavourable as it is dominated by a non-native species and has large gaps in the western section.

[1]Internal hedgerow or boundary hedgerow in relation to the survey area
[2]Maximum possible score = 40
[3]Maximum possible score = 24

3.1.2 Rare, Threatened, and Protected Flora

No rare or protected flora species were recorded during the botanical surveys. There are historic records of Narrow-leaved Helleborine *Cephalanthera longifolia*, Bog Orchid *Hammarbya paludosa*, Red Hemp-nettle *Galeopsis angustifolia* and Hairy Violet *Viola hirta* from the 10km square in which the development is proposed (O02).

Narrow-leaved Helleborine is known from Glenasmole (Doogue *et al*., 1998), approximately 7km south-east from the project site. It was not found during the surveys and is considered unlikely to occur on the site.

There is no suitable habitat for Bog Orchid, Red Hemp-nettle and Hairy Violet on the site and none of these species were found during the site visits.

3.1.3 Invasive Species

One invasive species listed under the Birds and Natural Habitat regulations 2011 was recorded within the study area. This was Japanese knotweed. The presence of Japanese knotweed has not affected the ecological valuation of any habitat at this site. Three other species non-native species noted in the NRA guidance were also recorded. These are as follows:

- Japanese Knotweed *Reynoutria japonica* was recorded during the site surveys in the south-east of the site at Grid reference O 03034 26537 (Irish Grid TM65) (*c*.10m$^{2;}$ **Figure 3.1.4**).
- Snowberry *Symphoricarpos albus* was recorded in one location along the watercourse and hedgerow in the centre of the site at Grid reference O 02647 26446 (Irish Grid TM65) (*c*.2m$^{2;}$ **Figure 3.1.4**).

- Cotoneaster *Cotoneaster* sp. were recorded in the wet woodland at Grid reference O 02447 26435 (Irish Grid TM65) (*c.* 4m$^{2;}$ **Figure 3.1.4**).
- Cherry Laurel *Prunus laurocerasus* is occasional in the wet woodland area (not mapped as is scattered throughout the northern area)

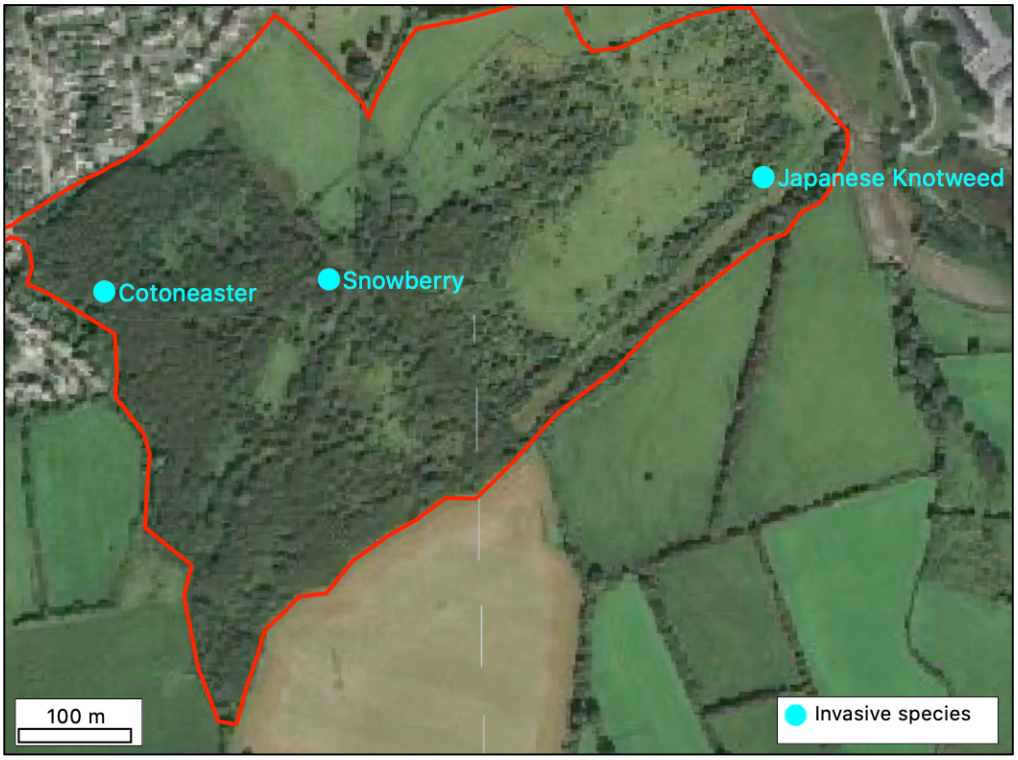


Figure 3.1.4 Location of invasive species
© Bing maps reprinted with permission from Microsoft Corporation (Denyer Ecology licence).

3.2 Field Surveys – Fauna

3.2.1 Mammals – non volant

The terrestrial fauna is rich, which is indicative of the diversity of habitats within the site, it's semi-rural nature and relatively undisturbed nature.

Badgers *Meles meles* are utilising the site and a series of latrines were recorded at various locations along the south western and south eastern boundaries of the site.

Consultation with local ecologists indicated that badgers had been recorded on trail cameras within the site. The zoologist (Alice Magee BSc) was contacted and confirmed that a Maginon WK 4 HDW had been erected at 14:00 on 18 July 2020 and collected at about 14:00 on 19 July 2020. The footage was taken at a latrine in the south corner of the woodland at 53°16'31.2"N 6°27'47.3"W (https://goo.gl/maps/bcnbnX1an3UYCQ1B6) (see **Figure 3.2.1** below). The images and activity recorded by Ms Magee on the trail camera was reviewed.

Figure 3.2.1. Trail camera location.

There are many rabbits *Oryctolagus cuniculus* present as evidenced by frequent burrows and droppings and a fox *Vulpes vulpes* was seen during the site visit.

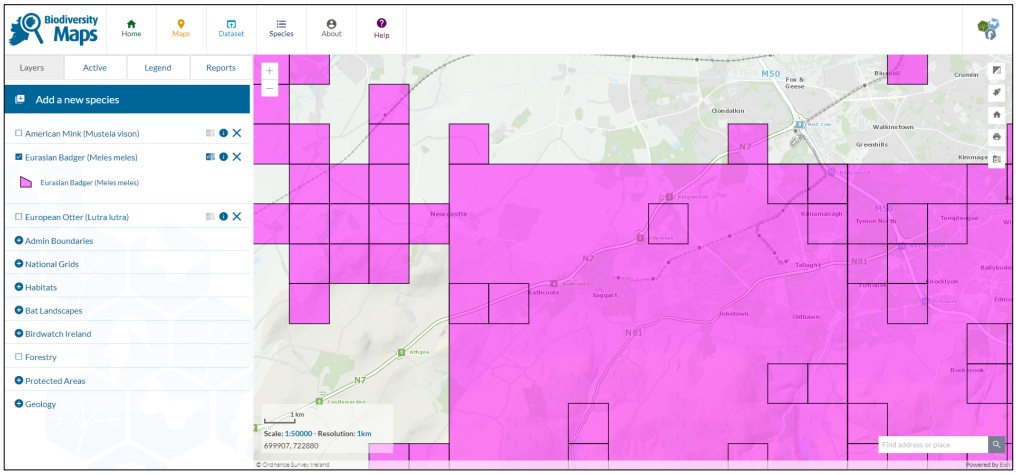


Figure 3.2.2. Badger records from the environs of Rathcoole (Source: NBDC maps).

Pygmy shrew *Sorex minutus* was heard during field surveys and is especially utilising the areas of long grass in the eastern portion of the site where suitable breeding and foraging habitat occurs. Pygmy shrew is known from the 10km square in which the site is located (see **Figure 3.2.3** below).

Other fauna that would be expected given the habitats present include hedgehog *Erinaceus europaeus*, Irish stoat *Mustela erminea hibernica* and long tailed field mouse *Apodemus sylvaticus*, while house mouse *Mus musculus domesticus* and brown rat *Rattus norvegicus* are almost certainly present given the adjoining housing.

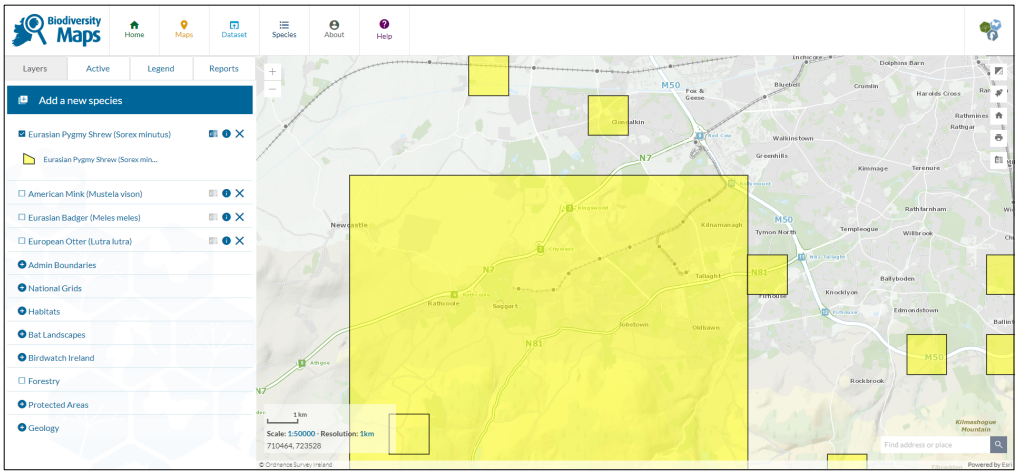


Figure 3.2.3. Pygmy shrew records from the environs of Rathcoole (Source: NBDC maps).

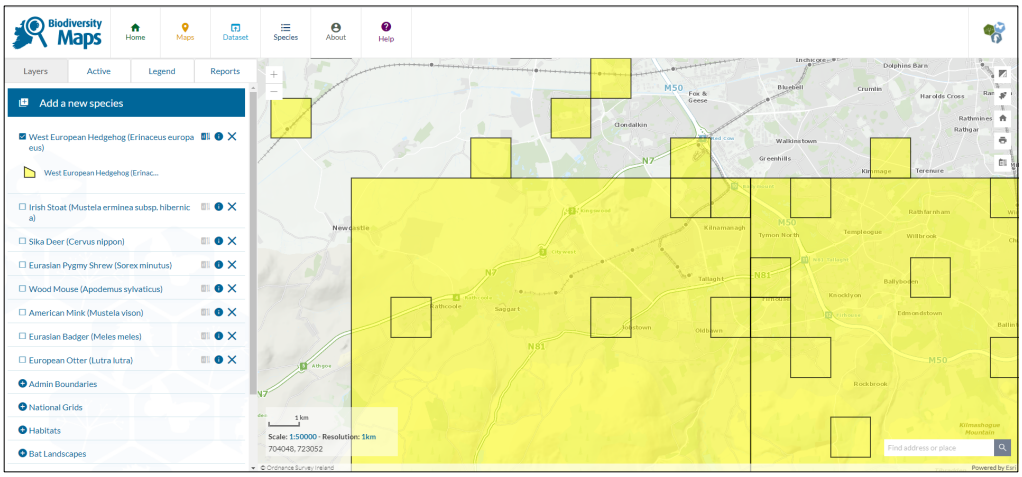


Figure 3.2.4. Hedgehog records from the environs of Rathcoole (Source: NBDC maps).

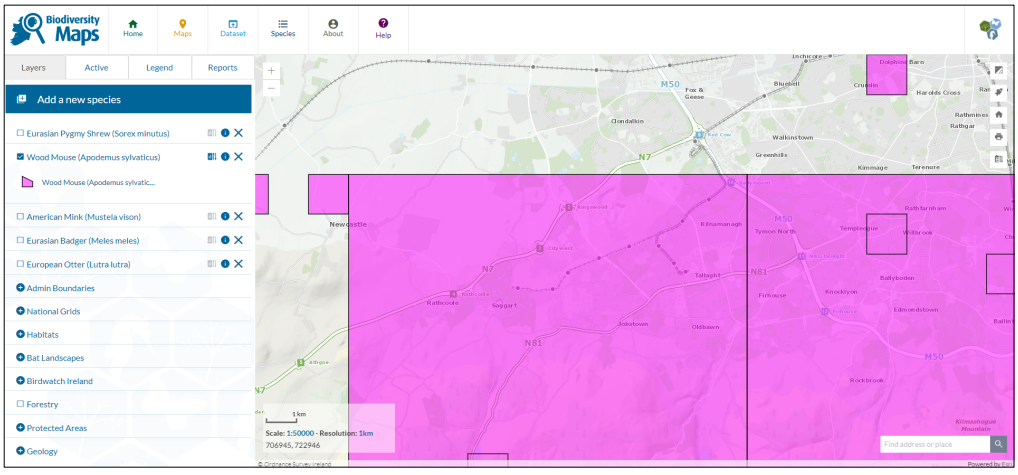


Figure 3.2.5. Wood mouse records from the environs of Rathcoole (Source: NBDC maps).

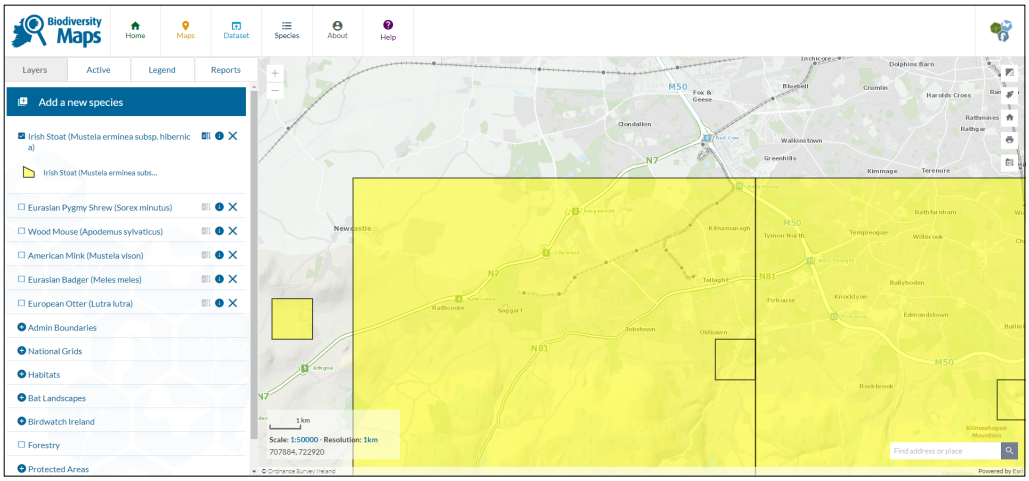


Figure 3.2.6. Irish stoat records from the environs of Rathcoole (Source: NBDC maps).

Deer (Sika or Sika/red hybrids) have been observed by local ecologist (Dr Deirdre Tierney) using the lands under the ownership of the Department of Education and their slots were noted at a number of locations in the woodlands.

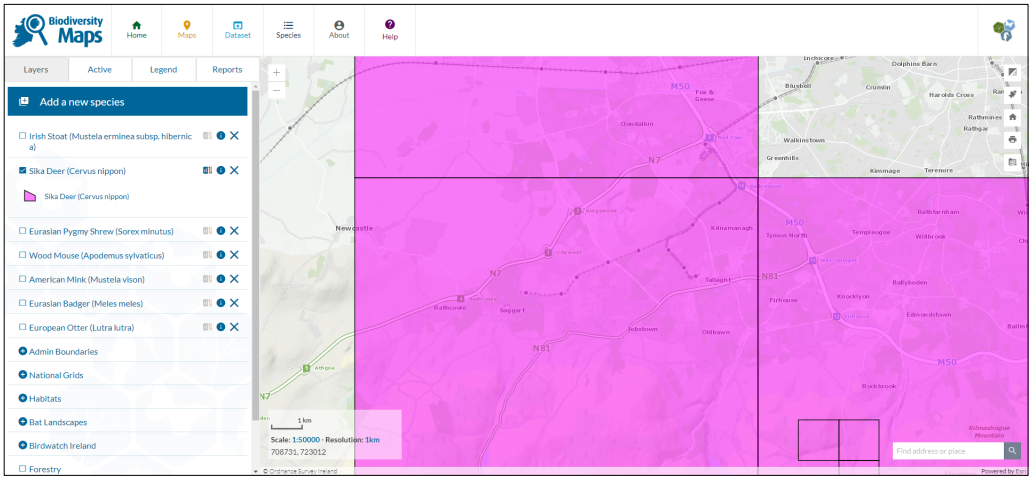


Figure 3.2.7. Sika deer records from the environs of Rathcoole (Source: NBDC maps).

There was no evidence of use by otters *Lutra lutra* of the watercourse within the site, however otter are known from the River Camac further downstream (F. Wilson, pers. obs.) so they would be expected.

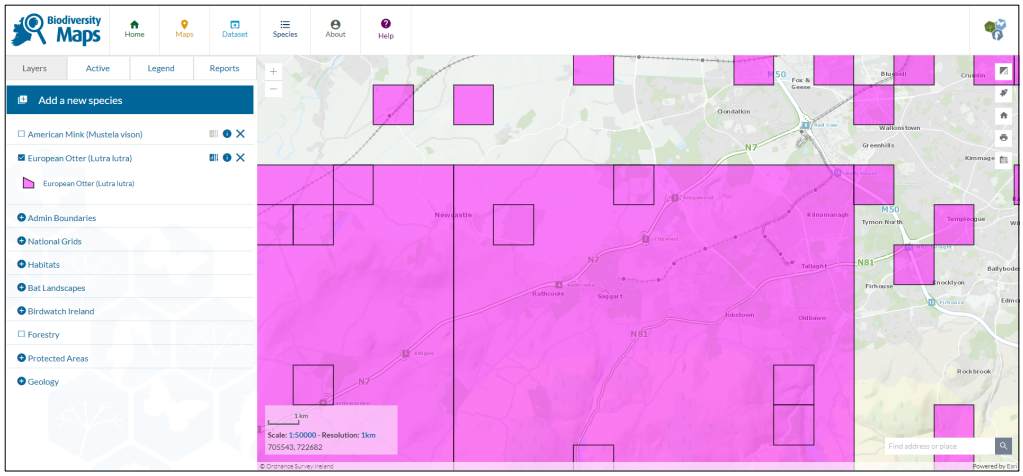


Figure 3.2.8. Otter records from the environs of Rathcoole (Source: NBDC maps).

Otter may occasionally travel overland and will cross farmland, bogs or upland areas, but generally confine their movements close to waterways, lakes or wetland habitats. Otters are carnivorous, feeding mainly on fish and crustaceans, including crayfish and crabs (in marine environments) but occasionally take other prey, such as waterfowl, frogs, and small mammals, the latter two occurring within the site.

Mink *Neovison vison* may also use the watercourse on occasion as they have been recorded downstream on the Camac River at Kingswood and within Corkagh Park.

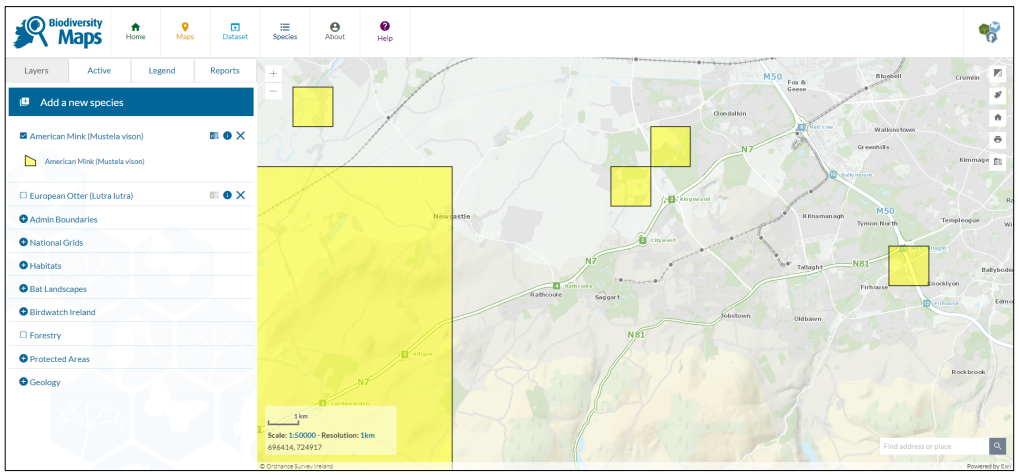


Figure 3.2.9. American mink records from the environs of Rathcoole (Source: NBDC maps).

3.2.2 Bats

The Bat Conservation Ireland Database of bat records was searched for records of bats from the area. These include records of roosts, ad hoc observations and the results of surveys such as the BATLAS 2010 project and the All Ireland Brown Long-eared Monitoring Project recorded within the 10km square in which the site is located (O02) and adjoining 10km squares include:

- Common pipistrelle (*Pipistrellus pipistrellus*),
- Soprano pipistrelle (*Pipistrellus pygmaeus*),
- Daubenton's bat (*Myotis daubentonii*),
- Leisler's bat (*Nyctalus leisleri*),
- Brown long-eared bat (*Plecotus auritus*),
- Several unidentified *Myotis* species, and
- an unidentified pipistrelle species (*Pipistrellus* sp.).

The desktop review identified several bat surveys, which had been conducted within the environs of the Rathcoole area within the last ten years.

These include a bat survey, which was conducted of lands adjoining the housing development of Rathmill Manor (west of the site) by bat specialist Brian Keeley in 2013. This survey confirmed the presence of three species of bats using those lands. These were common pipistrelle, soprano pipistrelle and Leisler's bat (Keeley, 2013).

A bat detector survey, which was conducted by Faith Wilson at Tootenhill (west of Rathmill Manor) on the 9th October 2018, recorded the same three species of bats using this site as that recorded by Keeley on adjoining lands in 2013. These were the common pipistrelle, the soprano pipistrelle and the Leisler's bat (Wilson, 2018).

There is a known brown long eared bat roost in a nearby church and other surveys conducted in Rathcoole village have recorded common pipistrelle, soprano pipistrelle and Leisler's bat (Bat Conservation Ireland, 2020).

Bat surveys conducted by Faith Wilson of the current study area in 2020 were completed on 16th July 2020 and 24th August 2020.

The July survey recorded five species of bats using the study area. Ireland has nine resident species of bats (one of which does not occur on the eastern seaboard) so this is a rich site for bats. These were:

- Common pipistrelle (*Pipistrellus pipistrellus*),
- Soprano pipistrelle (*Pipistrellus pygmaeus*),
- Leisler's bat (*Nyctalus leisleri*),
- Brown long-eared bat (*Plecotus auritus*),
- an unidentified *Myotis* species, and
- an unidentified pipistrelle species (*Pipistrellus* sp.).

The first bat recorded was Leisler's bat, which was recorded hunting over the area of hay meadow and area of open grassland and scrub before continuing west over the woodland. Five Leisler's bats were observed. These areas all provide rich foraging habitat for bats as they support large numbers of native invertebrates on which bats rely.

Common and soprano pipistrelle was recorded throughout the study area.

Brown long-eared bat was recorded in one location – in the sheltered area between the hedgerow and earthen berm along the water mains way leave. There was intense feeding activity noted of common and soprano pipistrelle

at the southern end of this area also. Several of the bat passes could not be identified to species level and hence are recorded as unidentified pipistrelle.

An unidentified *Myotis* species of bat (possibly whiskered or natterer's bat) was recorded in a small clearing in the woodland near the northern portion of the site.

A mating roost was identified in a large sycamore tree found on the hedgerow between the hay meadow and the adjoining parkland just to the north of the study area. The indicative location of this tree is shown on **Figure 3.2.10** below. Social calls of both Leisler's bat and soprano pipistrelle were recorded here. A long eared owl was also seen hunting over the site during the July bat survey.

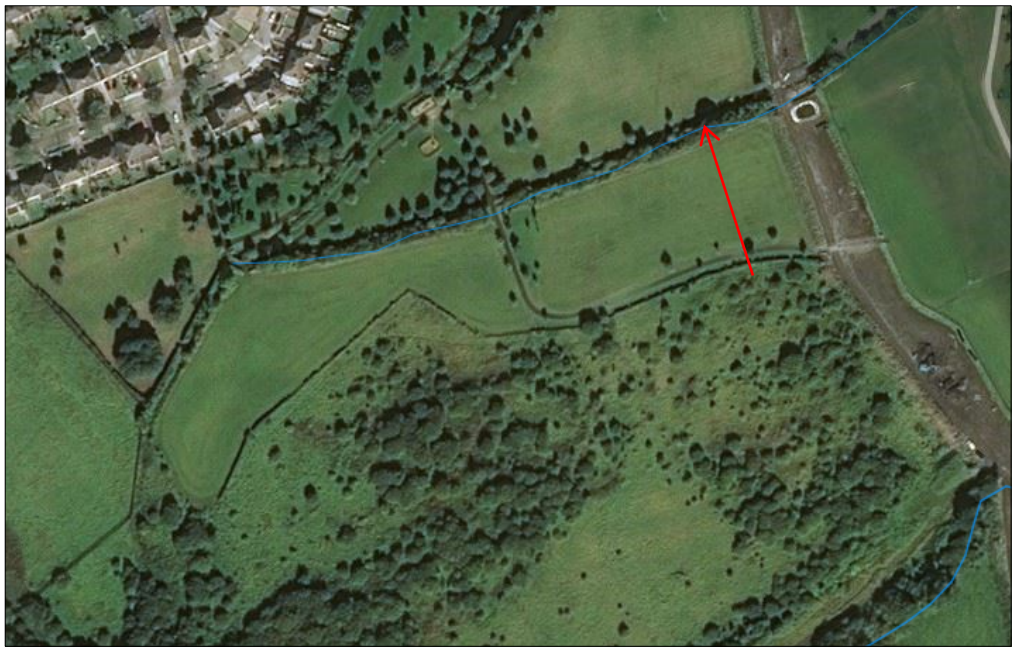


Figure 3.2.10. Mating roost.

The survey conducted in August recorded similar activity but increased levels of common and soprano pipistrelle were recorded over the wet woodland area than had been previously observed.

There was also extensive foraging of both pipistrelle bats and Leisler's bats along the wayleave of the water main and in the scrub/grassland habitats to the north of the earthen berm. These observations are shown on **Figure 3.2.11** below.

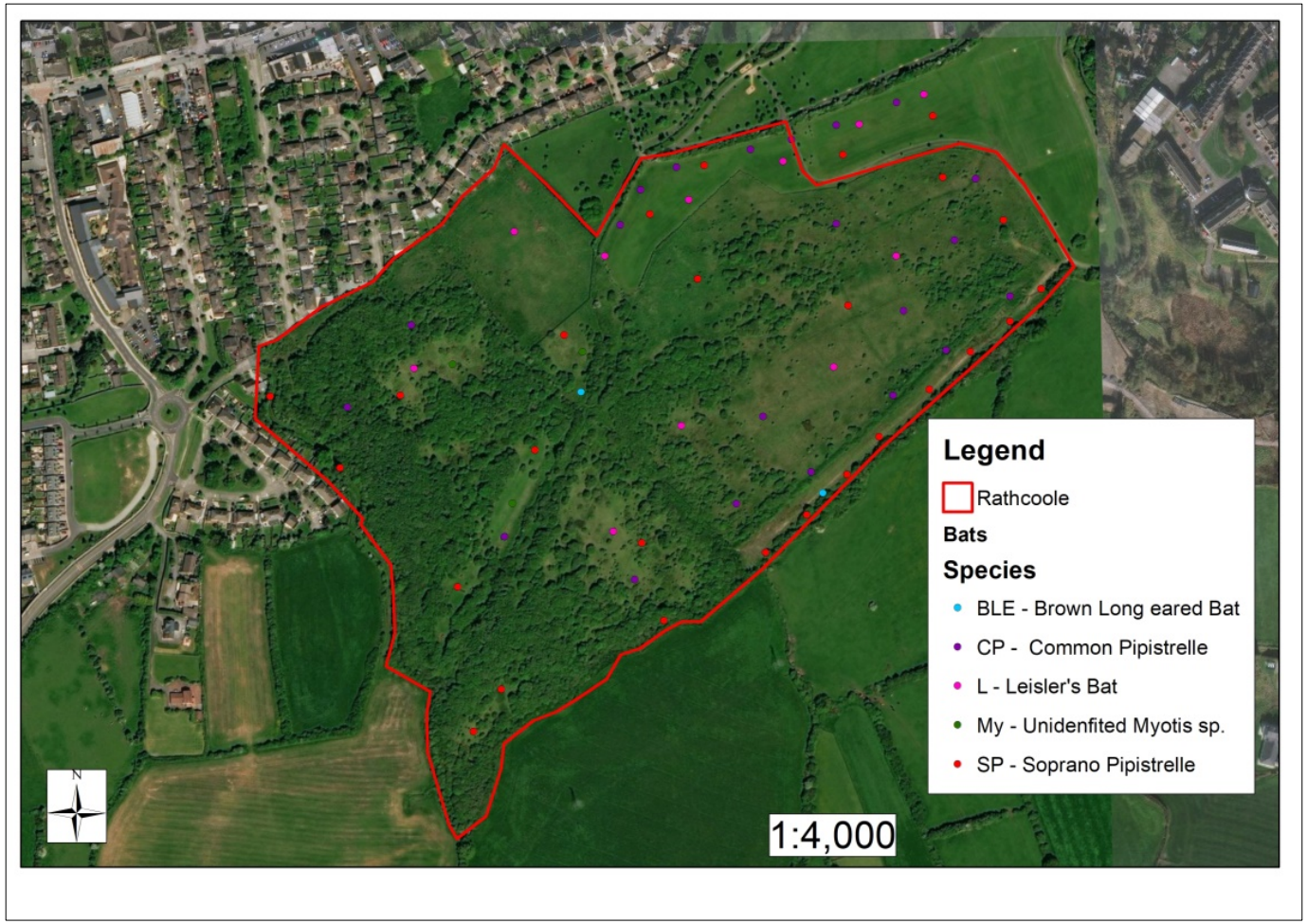


Figure 3.2.11. Bat activity recorded at Rathcoole.

3.2.3 Birds

The bird fauna recorded includes species associated with both urban and rural habitats as would be expected given the location of the study area on the edge of Rathcoole village.

Forty one species of birds were recorded during the site visits and all would be expected to breed either within the site or in the local area. These are presented below on **Table 3.2**.

Table 3.2. Species recorded or confirmed breeding in the study area in Rathcoole. Species of conservation concern (Red or Amber-listed) in Ireland (BoCCI, Colhoun & Cummins 2013) are identified.

Common Name	Scientific Name	BoCCI	Breeding Confirmed
Blackbird	*Turdus merula*		Y
Blackcap	*Sylvia atricapilla*		Y
Blue Tit	*Cyanistes caeruleus*		Y
Bullfinch	*Pyrrhula pyrrhula*		Y
Buzzard	*Buteo buteo*		Y
Chaffinch	*Fringilla coelebs*		Y
Chiffchaff	*Phylloscopus collybita*		Y
Coal Tit	*Parus ater*		Y
Collared Dove	*Streptopelia decaocto*		
Dunnock	*Prunella modularis*		Y
Feral Pigeon	*Columba livia*		
Goldcrest	*Regulus regulus*	A	Y
Goldfinch	*Carduelis carduelis*		Y
Great Tit	*Parus major*		Y
Greenfinch	*Chloris chloris*	A	Y
Grey Heron	*Ardea cinerea*		
Herring Gull	*Larus argentatus*	R	
Hooded Crow	*Corvus cornix*		Y
House Martin	*Delichon urbicum*	A	Y
House Sparrow	*Passer domesticus*	A	Y
Jackdaw	*Corvus monedula*		Y
Kestrel	*Falco tinnunculus*	A	
Linnet	*Carduelis cannabina*	A	Y
Long-eared Owl	*Asio otus*		
Long-tailed Tit	*Aegithalus caudatus*		
Magpie	*Pica pica*		Y
Mistle Thrush	*Turdus viscivorus*	A	Y
Pheasant	*Phasianus colchicus*		Y
Pied wagtail	*Motacilla alba yarrellii*		
Robin	*Erithacus rubecula*	A	Y

Common Name	Scientific Name	BoCCI	Breeding Confirmed
Rook	*Corvus frugilegus*		
Song Thrush	*Turdus philomelos*		Y
Sparrowhawk	*Accipiter nisus*	A	Y
Starling	*Sturnus vulgaris*	A	Y
Stock Dove	*Columba oenas*	A	
Swallow	*Hirundo rustica*	A	Y
Swift	*Apus apus*	A	Y
Treecreeper	*Certhia familiaris*		Y
Willow Warbler	*Phylloscopus trochilus*		Y
Woodpigeon	*Columba palumbus*		Y
Wren	*Troglodytes troglodytes*		Y

Kingfisher *Alcedo atthis* is a species listed under Annex I of the EU Birds Directive and is an amber listed bird species. Kingfisher was recorded downstream of Rathcoole on the River Camac during surveys conducted by the Irish Wildlife Trust (2013) and would be expected to use the entire watercourse for hunting and foraging purposes. There was no evidence of any nest sites on the watercourses within the study area and the banks here do not currently contain suitable habitat for nesting kingfisher.

3.2.4 Amphibians and Reptiles

The presence of amphibians such as the common frog *Rana temporaria* was confirmed during the surveys. Frogs are known to breed in the ponds in Rathcoole Park (see **Figure 3.2.12** below) and post breeding use areas of long grass and other vegetation for cover and foraging purposes.

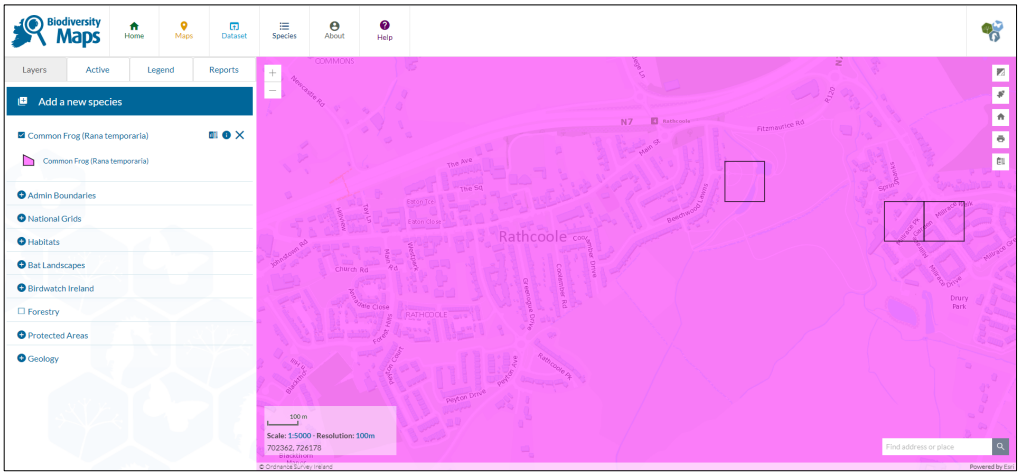


Figure 3.2.12 The common frog is recorded from the environs of Rathcoole (Source: NBDC).

The viviparous lizard *Zootoca vivipara* may also occur.

3.2.5 Butterflies

A rich diversity of butterfly species were recorded which reflects the diversity of plant species in the grassland, scrub and woodland habitats present and their current management. These included:

- Small white *Pieris rapae*
- Large white *Pieris brassicae*
- Green veined white *Pieris napi*
- Real's/cryptic wood white *Leptidea juvernica*
- Orange tip *Anthocharis cardamines*
- Holly blue *Celastrina argiolus*
- Common blue *Polyommatus icarus*
- Red admiral *Vanessa atalanta*
- Small tortoiseshell *Aglais urticae*
- Peacock *Inachis io*
- Speckled wood *Pararge aegeria*
- Meadow brown *Maniola jurtina*

3.2.6 Other Invertebrates

It is likely that the study area supports a rich diversity of moths and other invertebrates.

3.2.7 Fisheries

The lands at Rathcoole drain through two main watercourses. One flows south to north through the centre of the site and joins the ponds in Rathcoole Park – this watercourse is not mapped by the EPA. The other flows along the south eastern boundary of the site.

These watercourses are both tributary streams of the Camac River (IE_EA_09C020250). The Camac River rises on the slopes of Mount Seskin and enters the Brittas Ponds before flowing north between Rathcoole and Saggart villages and through the site.

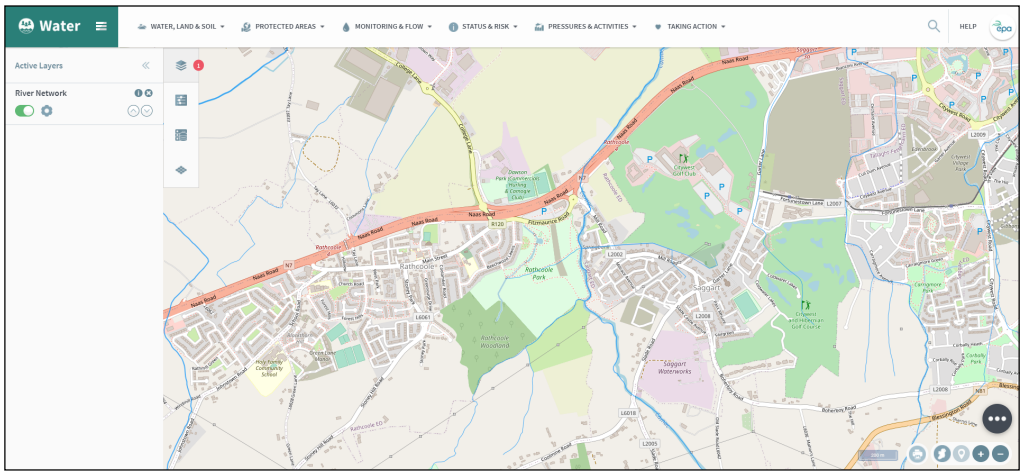


Figure 3.2.13. Watercourses within the site (Source: www.catchments.ie)

The Camac River then flows north passing under the N7 and is joined by other tributary streams, passing through Baldonnell Business Park,

Clondalkin, Walkinstown and Inchicore and Kilmainham villages eventually joining the River Liffey near Heuston Station.

The water quality of the Camac River is measured as Q3-4 at the Bridge 0.5km downstream of Brittas pond (NNE of Glenaranean), as Q3 at the Bridge 1 km SW (upstream) of Saggart and as Q4-5 at the Bridge 1 km NW of Saggart (upstream STW).

Overall the Camac and Liffey Rivers are both currently described as a waterbody at risk of not achieving 'good water status' under the Water Framework Directive during the reporting period 2010 – 2015 and is currently described as having 'moderate water status' during the reporting period 2013 – 2018.

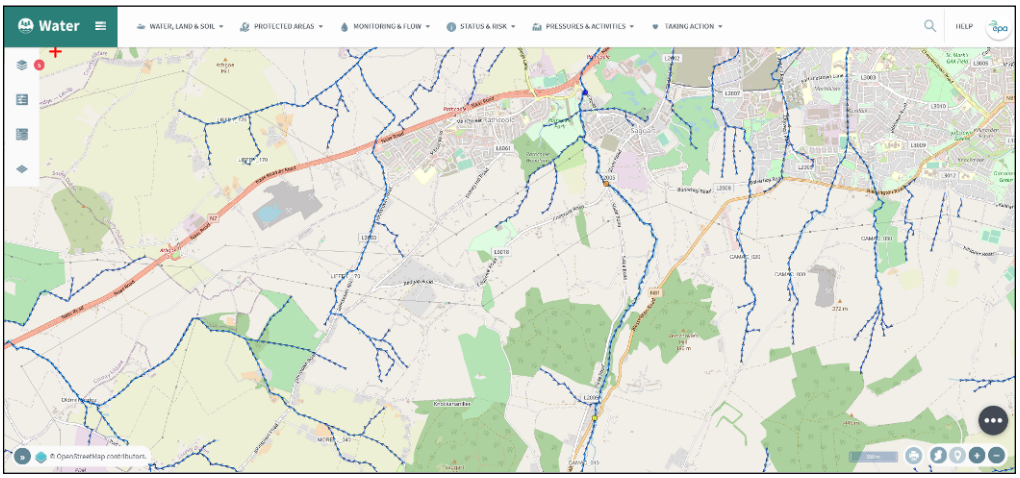


Figure 3.2.14. Water quality monitoring stations on the Camac River.

The Camac River is a known salmonid watercourse. Fish surveys were completed on this watercourse at two locations in 2011 by Inland Fisheries Ireland (Kelly *et al.* (2012)) as shown on **Figure 3.2.15** below.

A total of two fish species were recorded in the Camac River (Moneenalion) site. Three-spined stickleback was the most abundant species, followed by brown trout.

A total of four fish species were recorded in the Camac River (Riverside) site. Minnow was the most abundant species, followed by brown trout, three-spined stickleback and eels.

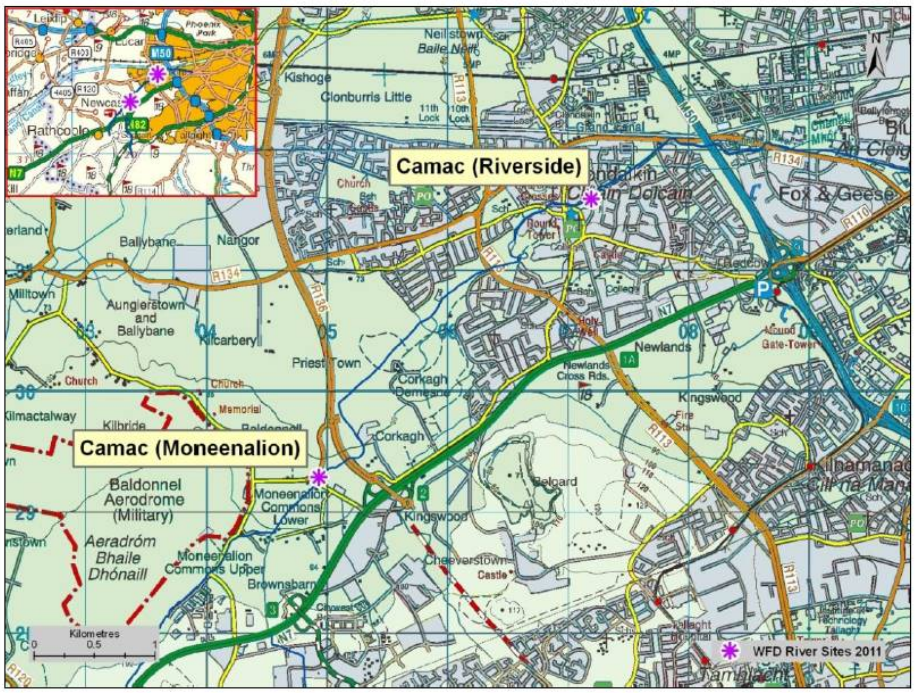


Fig. 4.13. Location of the Camac River, (Riverside and Moneenalion) surveillance monitoring sites

Figure 3.2.15. Fish monitoring sites on the River Camac in 2011 (Kelly, 2012 - Inland Fisheries Ireland).

Recent surveys of the River Camac (Sweeney, 2018) conducted for South Dublin County Council downstream of Rathcoole have confirmed that the river supports a very healthy population of white-clawed crayfish *Austropotamobius pallipes*.

This is a species listed under Annex II of the EU Habitats Directive and has been the subject of recent kills elsewhere in Ireland as a result of crayfish plague. The white-clawed crayfish (*Austropotamobius pallipes* (Lereboullet, 1858)) is the only native European crayfish and is listed in Annex II of the EU Habitats Directive (92/43/EEC) and is protected under the Wildlife Act 1976 and further amendments.

The distribution of crayfish in Ireland is limited to lowland (below 220m) lakes, rivers and streams with underlying carboniferous limestone (Reynolds 1998). Demers *et al.* (2005) do not indicate the presence of white-clawed crayfish in the Camac, but the National Biodiversity Data Centre (NBDC) website (www.biodiversityireland.ie) shows records of the species at three locations on this river. Detailed surveys conducted under licence from National Parks and Wildlife Service would need to be completed to confirm if this species is present within the site.

Any works on these lands will therefore need to be cognisant of the salmonid status of the River Camac, the presence of protected species and sensitivities regarding same.

4. DISCUSSION

A review of historic land use of the area was conducted to inform previous historic lands use and put the habitats present on the site into context. This included a review of the Ordnance Survey of Ireland mapping currently available online on http://map.geohive.ie/mapviewer.html.

The first edition OSI map (1837) shows the study area as shown on **Figure 4.1.1** below.

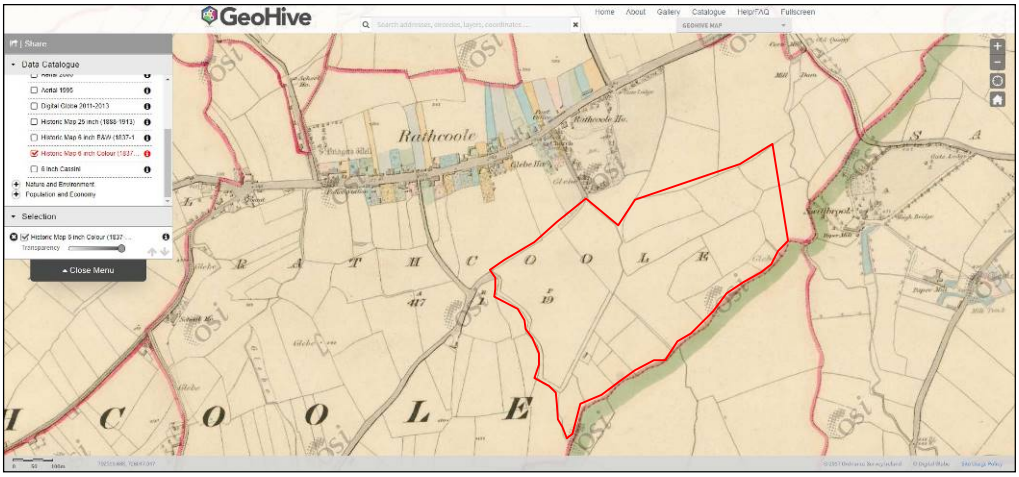


Figure 4.1.1. Study area shown on the first edition OSI map (1837).

The second edition OSI 6" map shows the study area as shown on **Figure 4.1.2** below.

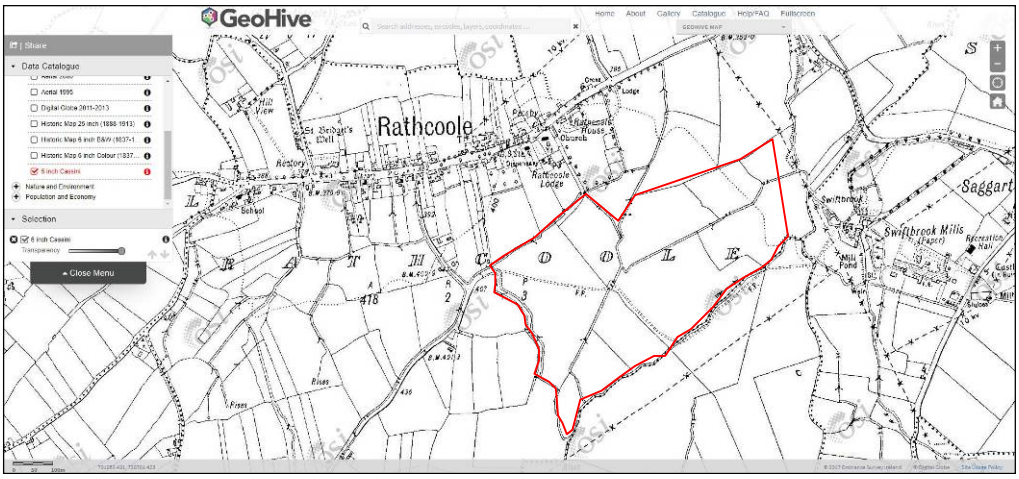
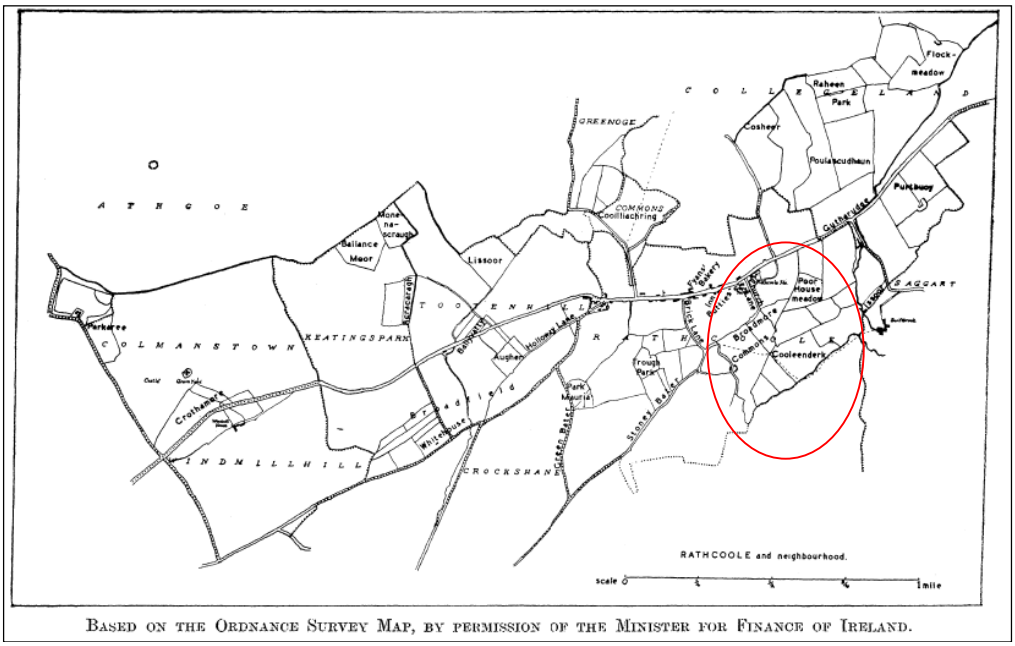


Figure 4.1.2. Study area shown on the second edition OSI 6" map.

A very detailed examination of older maps and other material in the National Library of Ireland was conducted by Liam Ua Bhroin (1943). A review of this survey was conducted to inform the current ecological conditions and habitats within the study area. This is presented in **Appendix E**. Many of the features and habitats highlighted by Ua Bhroin remain extant today and these are presented below. They reflect the contiguity of habitat over time, which is important from the perspective of biodiversity.

The study lands at Rathcoole were previously under commonage (Broadmore Commons) and surrounded by watercourses as presented in **Figure 4.1.3**.



BASED ON THE ORDNANCE SURVEY MAP, BY PERMISSION OF THE MINISTER FOR FINANCE OF IRELAND.

Figure 4.1.3. Broadmore Commons illustrated on the map prepared by Ua Bhroin (1943).

> **'Poor House Meadow** is shown on Map 9 as the name of the field at S 20cms., W 29cms. It adjoins the old commons land. Map 7[1] shows a field quite similar in position, shape and size, and a note at the bottom of it shows that a narrow strip within its eastern fence was the property of the Trustees of Mercer's Charities. Origin of Poor House Meadow - name still in use - is therefore clear'.

The location of **Poor House Meadow** corresponds to the location of the Annex I habitat 'Lowland hay meadows' within the study area and the presence of this habitat within this field today points to the importance of the longevity of grassland habitat in the area which given it's historic use as commonage is unlikely to have been fertilised or improved form an agricultural perspective.

[1]Map 7. A map named " Rathcoole surveyed, 1826."

5. ASSESSMENT OF SIGNIFICANCE

The site is of importance from the perspective of both flora and fauna. This ecological assessment of lands at Rathcoole, Co. Dublin has identified these lands as being of county importance in terms of the habitats, flora and fauna they currently support.

Flora and Habitats
The main interest in the site in terms of flora and habitats is summarised in **Table 5.1** and shown on **Figure 5.1.1**. This shows the areas which are of particular ecological importance as they either support Annex I (priority) habitat, have affinity to an Annex I habitat, are species-rich examples of a habitat type or are of heritage value (hedgerows).

Table 5.1. Summary of Habitats of High Ecological Importance at Rathcoole.

Habitat	Ecological importance	Reason for evaluation
Calcareous springs (FP1)	Local (higher) ecological importance	Wetland with affinity to Annex I habitat 'Petrifying springs' [7220]
Dry meadows and grassy verges (GS2)	County ecological importance	Species-rich and orchid-rich grassland which is an example of the Annex I habitat 'Lowland Hay Meadows' [6510]. Only 2nd site for this habitat in South Dublin.
Dry meadows and grassy verges (GS2)	Local (higher) ecological importance	Species-rich and orchid-rich areas of grassland (non-Annex)
Wet grassland (GS4)	Local (higher) ecological importance	Species-rich and orchid-rich wetland
Wet willow-alder-ash woodland (WN6)	County to national ecological importance	Example of Annex I priority habitat 'Alluvial woodland' [91E0]. Only 2nd site for this habitat in South Dublin and only site in 10km square O02.
Hedgerows (WL1)	County ecological importance	Highlighted hedgerows are considered 'Heritage Hedgerows'

The **South Dublin County Council Development Plan (2016-2022)** states that: '*A number of habitats and species listed in Annex I and Annex 2 of the Habitats Directive are known to occur at locations in the County which are situated outside of protected sites. Under the EU Habitats Directive, protection is afforded to these species and habitats where they occur*.' Protection of these habitats and avoidance of negative impacts from development are included in the Heritage, Conservation and Landscape (HCL) Policy 15 for Non-Designated Areas Objectives 1 and 2. For non-Annex I habitats, HCL15 Objective 3 is 'To

protect existing trees, hedgerows, and woodlands which are of amenity or biodiversity value….'.

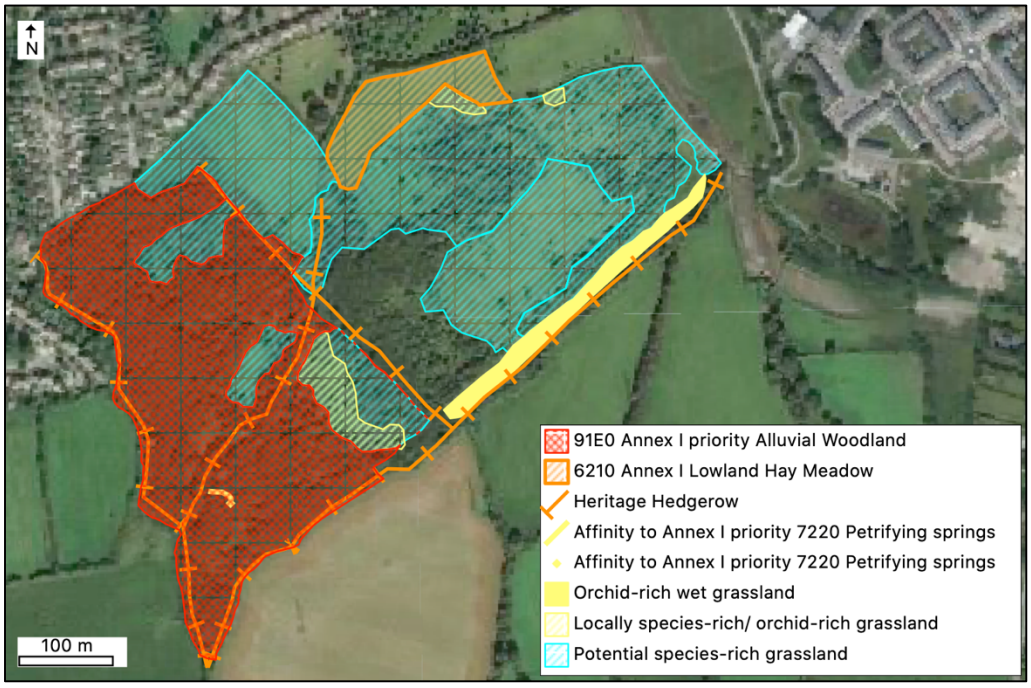


Figure 5.1.1. Habitats of national, county and high local ecological importance within the project area.

Red = county to national ecological importance
Amber = county ecological importance
Yellow = at least local (higher) ecological importance
Blue = local (higher) ecological importance or higher, with appropriate grassland management.

In addition to the Annex I habitats and non-Annex trees, hedgerows and woodlands, it is also important to note that much of the grassland on the site currently only has low to moderate species-richness through lack of management (blue hatched areas on **Figure 5.1.1**). These areas support a number of Annex I lowland hay meadow indicator species (see **Section 3.1.1**). With correct management, it is likely that much of the grassland on the site would have affinity to Annex I lowland hay meadow (potential County ecological importance).

Overall the site is currently considered to be of County ecological importance for its mosaic of Annex I (priority) habitats, species-rich semi-natural habitats, heritage value hedgerows, wetland habitats and mosaic of wooded and non-wooded semi-natural habitats which are rare in County Dublin.

Fauna

The lands are used by a diverse variety of fauna and provide a locally important habitat for badgers, deer, rabbits, foxes, five species of bats and a rich diversity of birds in terms of cover for hunting and foraging as well as breeding habitat. Common pipistrelle, Soprano pipistrelle, Leisler's bat, Brown long-eared bat and an unidentified *Myotis* sp. were recorded utilising the site for foraging purposes. No bat roosts were confirmed but a number of potential roosts in trees have been identified.

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APPENDIX A – Petrifying Spring Relevé Results

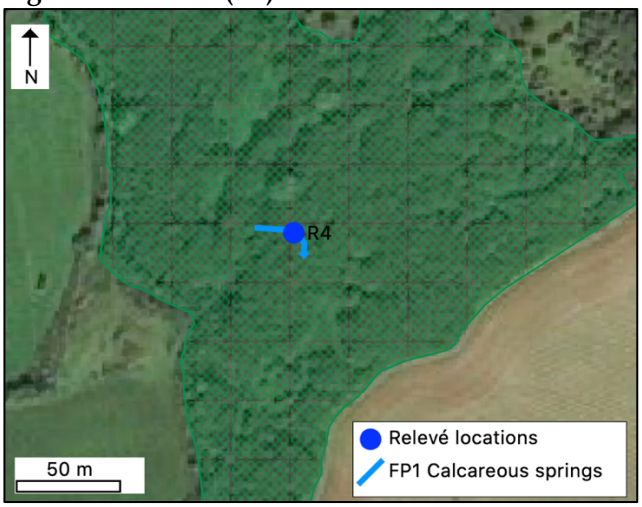
APPENDIX A – PETRIFYING SPRING RELEVÉ RESULTS

SITE AND SPRING DETAILS

Site Name. Rathcoole		**Date:** 02/07/2020
Relevé no. R4		**Grid Ref.** O 02576 26229
Recorder: Joanne Denyer		**Relevé type**: Detailed relevé and condition assessment
Spring type: Flush below springhead		**Annex I habitat:** *7220
Relevé dimensions: 2m x 2m		**Relevé area:** 4m²
Petrifying spring vegetation community: Group 3 Brachythecium rivulare-Platyhypnidium riparioides Tufaceous Streams and Flushes vegetation community (Lyons & Kelly, 2017).		
Slope: 0	**Altitude (m):** c 130m	**Aspect:** NW
pH: n/a	**EC:** n/a	**Temp.:** n/a

Relevé location

Figure 1.1. Relevé (R4) in the southern woodland area



Photograph 1.1. Relevé location (view to NW)

Photos

Photo 1.1. Relevé (view to west)

Photo 1.2. Tufa on moss (*Platyhypnidium riparioides*) in relevé

APPENDIX A – PETRIFYING SPRING RELEVÉ RESULTS

DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	75	Living field/ ground flora	70
Paludal (2)	5	Pool/ standing water	-	Bare tufa (active/ recent)	30
Stream crust	-	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	50	Damp	20	Leaf litter/ standing dead	-
Dam	-	Dry, not impacted by spring	5	Bare soil (gravel in stream)	-
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	45			Other:	-
TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous
Cover values: record to nearest 5%. If <5% then use 3%, 1% 0.5%, 0.1%

Shrub/ canopy layer

Species	Routed outside Canopy (%)	Routed inside Canopy (%)	Routed inside Height (m)
Salix cinerea	60	5	2
Salix caprea	10	-	-
	-	-	-
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	**TOTAL %:** 70	**TOTAL %:** 5	**TOTAL %:** 75
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			**c 7m**

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
Epilobium hirsutum	5	*Poa trivialis*	< 1	*Cratoneuron filicinum*	8	*Hedera hibernica*	3
Geranium robertianum	1			*Brachythecium rivulare*	5	*Rubus fruticosus* agg.	3
Helioscadium nodiflorum	20			*Pellia endiviifolia*	1	*Salix cinerea*	15
Jacobaea vulgaris	5			*Plagiomnium undulatum*	1		
				Platyhypnidium riparioides	3	**TOTAL WOODY <50cm**	**21**
						PTERIDOPHYTES	
						TOTAL PTERIDOPHYTES	**0**
						ALGAE	
						TOTAL ALGAE	**0**
TOTAL FORBS	**31**	**TOTAL GRAMINOIDS**	**< 1**	**TOTAL BRYOPHYTES**	**18**	**TOTAL COVER**	**70**

APPENDIX A – PETRIFYING SPRING RELEVÉ RESULTS

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	1 species recorded: *Pellia endiviifolia*	3 species AND no loss from baseline number of species	Result = 1 positive indicator species **FAIL**
Typical accompanying species (neutral indicators)	1 species recorded: *Poa trivialis*	n/a	For information only
Invasive species	None recorded	Absent	Result = Absent **PASS**
Negative herbaceous indicator species	2 species recorded: *Epilobium hirsutum* (frequent) *Helioscadium nodiflorum* (abundant)	Total cover should not be dominant or abundant	Result = 1 species abundant **FAIL**
Negative bryophyte indicator species	2 species recorded: *Brachythecium rivulare* (frequent) *Platyhypnidium riparioides* (occasional)	No one species dominant or abundant; if ≥2 species present) then fails if ≥2 are frequent or 1 is abundant	**Result =** Neither species abundant **PASS**
Negative woody indicator species	n/a	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a (no water flow)
Phosphate level	Not determined	No increase from baseline and not above 15 µg/l	n/a (no water flow)
Water flow	Not determined	No alteration of natural flow	Unknown **PASS**
Impacts of grazing			
Field layer height	30cm	Height between 10 and 50cm	**Result =** 30cm **PASS**
Trampling/dung	None observed in the spring complex	Impact should not be abundant/dominant	**Result =** Absent **PASS**
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species		Green - Favourable	**Result =** 2 fail **UNFAVOURABLE – INADEQUATE**
1 - 2 Fail		Amber - Unfavourable Inadequate	
>2 Fail		Red – Unfavourable Bad	
Future prospects: Negative activities			
H02 Pollution to groundwater (point sources and diffuse sources)		Moderate negative impact, originating outside of site	**UNFAVOURABLE - INADEQUATE**

Conservation Score

Criteria	Result	Score
Species diversity score	1 positive indicator species (=low diversity)	1
HQ Indicator Species	0	0
Tufa-forming capacity	Patchy paludal tufa	2
Other positive characteristics	Associated with Annex I priority Alluvial Woodland	1
Conservation Score		4
Rank		**Moderate**

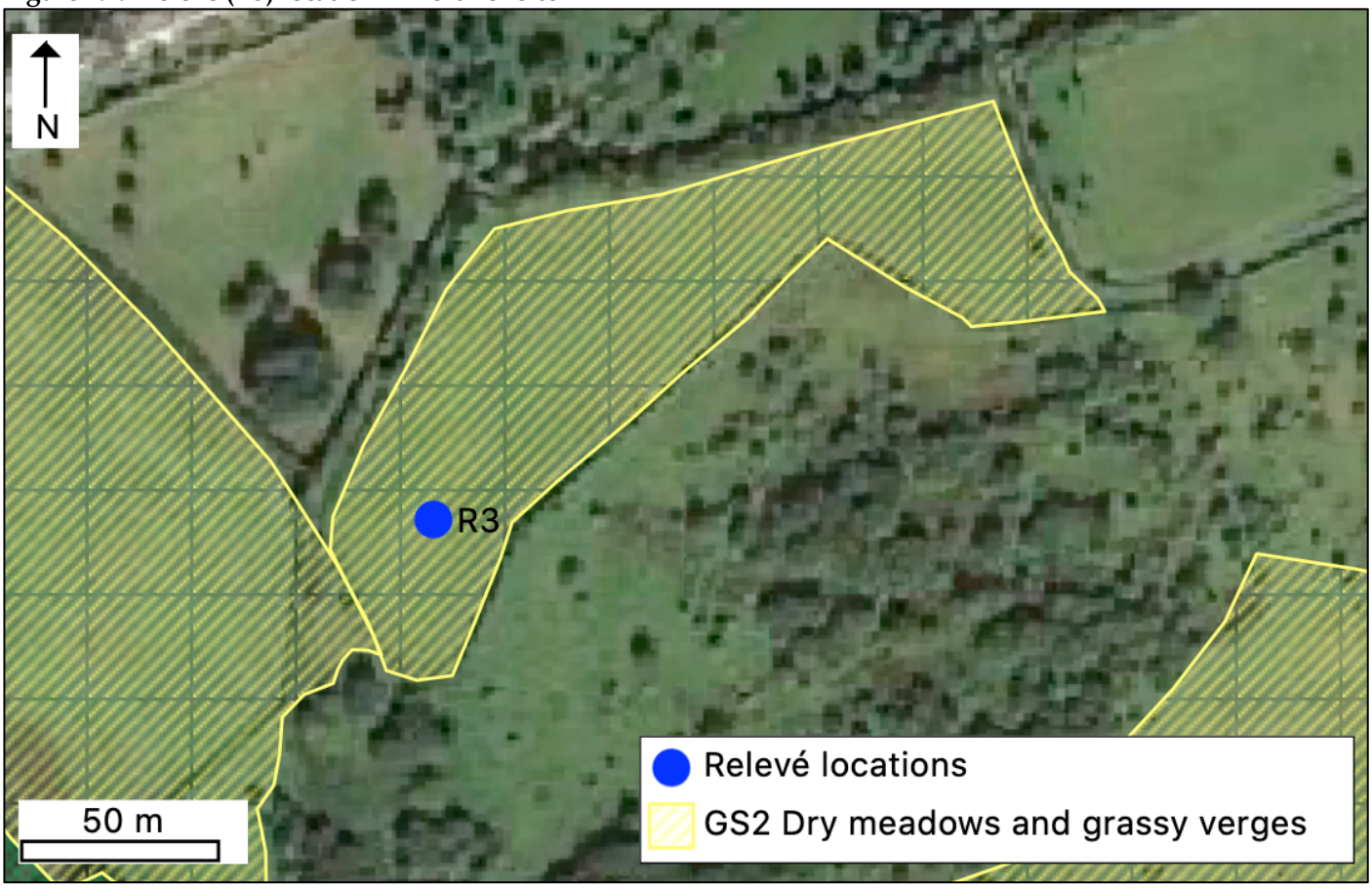
APPENDIX B – Lowland Hay Meadow Relevé Results

APPENDIX B – LOWLAND HAY MEADOW RELEVÉ RESULTS

Site Name. Rathcoole	**Date:** 02/07/2020
Relevé no. R3	**Grid Ref.** O 02710 26595
Recorder: Joanne Denyer	**Relevé type**: Detailed relevé and condition assessment
Irish Vegetation Classification community: GL3E	**Annex I habitat:** 6510

Relevé location

Figure 2.1. Relevé (R3) location in north of site



Photos

Photo 2.1. Relevé

Photo 2.2. View from relevé

Detailed relevé

Rathcoole botanical surveys 2020

APPENDIX B – LOWLAND HAY MEADOW RELEVÉ RESULTS

Species	DOMIN	Species	DOMIN
Centaurea nigra	4	*Agrostis capillaris*	1
Cerastium fontanum	3	*Carex flacca*	5
Crepis capillaris	1	*Cynosurus cristatus*	4
Dactylorhiza fuchsii	3	*Dactylis glomerata*	1
Hypochaeris radicata	5	*Festuca rubra*	4
Lathyrus pratensis	3	*Holcus lanatus*	3
Ranunculus acris	3	*Lolium perenne*	4
Ranunculus repens	5	*Poa pratensis*	2
Plantago lanceolata	4	*Calliergonella cuspidata*	4
Taraxacum officinalis agg.	5		
Trifolium dubium	3	Vascular plant species richness	22 species
Trifolium pratense	3	Bryophyte species richness	1 species
Trifolium repens	4	Total species richness	24 species
Vicia cracca	3	% Forb cover	70%
		% Graminoid cover	25%
		% Litter cover	<1%

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
High Quality positive indicator species	1 species recorded: *Dactylorhiza fuchsii* (orchid species)	≥1 species (plot)	Result = 1 **PASS**
Positive indicator species	9 species recorded: *Centaurea nigra, Crepis capillaris, Heracleum sphondylium, Hypochaeris radicata, Lathyrus pratensis, Plantago lanceolata, Ranunculus acris, Trifolium pratense, Vicia cracca*	≥7 species (plot)	Result = 9 **PASS**
Negative indicator species	*Dactylis glomerata, Lolium perenne, Trifolium repens*	≤10% collective cover (plot)	Result = 10% cover **PASS**
Woody species	None recorded	≤5% collective cover (plot)	Result = absent **PASS**
Forb-to-graminoid ratio	70%	40-90% (plot)	**PASS**
Litter cover	<1%	≤25% cover (plot)	**PASS**
Vegetation height (cm)	30cm	≥50% of sward between 10-50cm	**PASS**
Bare soil	Absent	≤10% cover (plot)	**PASS**
Grazing and disturbance	Absent	≤20m² showing signs of serious grazing or disturbance (Local vicinity)	**PASS**

APPENDIX C – Alluvial Woodland Relevé Results
and
APPENDIX C(b) - Additional Relevé Results

APPENDIX C – ALLUVIAL WOODLAND RELEVÉ RESULTS

Site Name. Rathcoole	**Date:** 08/05/2020
Relevé no. R1	**Grid Ref.** O 02447 26435
Recorder: Joanne Denyer	**Relevé type**: Detailed relevé and condition assessment
Irish Vegetation Classification community: WL3D	**Annex I habitat:** 91E0

Relevé location

Figure 3.1. Relevé (R1) location in north-west of site

Photos

Photo 3.1. View within plot

Photo 3.2. Ground flora

APPENDIX C – ALLUVIAL WOODLAND RELEVÉ RESULTS

Detailed relevé

Species	% Cover	Species	% Cover
Acer pseudoplatanus	1	*Polystichum setiferum*	1
Betula pubescens	8	*Agrostis stolonifera*	3
Cotoneaster sp.	1	*Carex flacca*	+
Crataegus monogyna	3	*Holcus lanatus*	1
Fraxinus excelsior	2	*Juncus effusus*	+
Salix cinerea	50	*Brachythecium rutabulum*	3
Hedera hibernica	60	*Kindbergia praelonga*	3
Rubus fruticosus agg.	30	*Plagiomnium undulatum*	3
Ulmus glabra	5		
Arum maculatum	1		
Angelica sylvestris	1		
Chamerion angustifolium	8		
Epilobium sp.	5		
Equisetum arvense	2	Vascular plant species richness	23 species
Galium aparine	5	Bryophyte species richness	3 species
Geranium robertianum	1	Total species richness	26 species
Heracleum sphondylium	1	Ground layer	3%
Taraxacum officinalis agg.	1	Field layer	95%
Urtica dioica	5	Shrub layer	5%
Vicia sepium	3	Canopy	90%

*Not flowering at time of survey; + = Located just outside of plot

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Positive indicator species	7 species recorded: *Fraxinus excelsior, Salix cinerea, Betula pubescens, Crataegus monogyna, Agrostis stolonifera, Angelica sylvestris* and *Urtica dioica*.	6 species plus at least 1 target species.	Result = 2 target species plus 5 additional positive indicator species. **PASS**
Negative indicator species	*Acer pseudoplatanus, Cotoneaster* sp.	≤10% cover	Result = 2% cover **PASS**
Negative species regeneration	Regeneration of *Acer pseudoplatanus*	Absent	Result = present **FAIL**
Median canopy height (m)	c10m	≥7m	**PASS**
Total canopy cover	90%	≥30% of plot	**PASS**
Proportion of target species in canopy	85%	≥50% of canopy	**PASS**
Native shrub layer cover	5%	10-50%	**FAIL**
Native dwarf shrub/ field layer cover	100%	≥20%	**PASS**
Native dwarf shrub/ field layer height (cm)	c50cm	≥20cm	**PASS**
Bryophyte cover	3%	≥4%	**FAIL**
Grazing pressure	No evidence of grazing at time of survey	No overgrazing	**PASS**
Regeneration and structure	Assessed multi-plot level.	Refer to full condition assessment	n/a

APPENDIX C – ALLUVIAL WOODLAND RELEVÉ RESULTS

Site Name. Rathcoole	**Date:** 08/05/2020
Relevé no. R2	**Grid Ref.** O 02513 26373
Recorder: Joanne Denyer	**Relevé type**: Detailed relevé and condition assessment
Irish Vegetation Classification community: WL3D	**Annex I habitat:** 91E0

Relevé location

Figure 3.2. Relevé (R2) location in west of site

Photos

Photo 3.3. View within plot

Photo 3.4. Ground flora

APPENDIX C – ALLUVIAL WOODLAND RELEVÉ RESULTS

Detailed relevé

Species	% Cover	Species	% Cover
Crataegus monogyna	1	*Agrostis stolonifera*	3
Fraxinus excelsior	3	*Holcus lanatus*	3
Salix cinerea	40	*Poa trivialis*	5
Hedera hibernica	20	*Kindbergia praelonga*	3
Rubus fruticosus agg.	3	*Thuidium tamariscinum*	1
Sambucus nigra	5		
Sorbus aucuparia	5		
Angelica sylvestris	2		
Chamerion angustifolium	5		
Crepis paludosa	1		
Epilobium hirsutum	1		
Epilobium sp.*	3	Vascular plant species richness	21 species
Galium aparine	3	Bryophyte species richness	2 species
Geranium robertianum	70	Total species richness	23 species
Jacobaea vulgaris	3	Ground layer	3%
Solanum dulcamara	3	Field layer	100%
Taraxacum officinalis agg.	1	Shrub layer	5%
Urtica dioica	5	Canopy	85%

*Not flowering at time of survey

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Positive indicator species	7 species recorded: *Fraxinus excelsior, Salix cinerea, Crataegus monogyna, Solanum dulcamara, Agrostis stolonifera, Angelica sylvestris* and *Urtica dioica*.	6 species plus at least 1 target species.	Result = 2 target species plus 5 additional positive indicator species. **PASS**
Negative indicator species	None recorded	≤10% cover	Result = Absent **PASS**
Negative species regeneration	None recorded	Absent	**PASS**
Median canopy height (m)	10-12m	≥7m	**PASS**
Total canopy cover	85%	≥30% of plot	**PASS**
Proportion of target species in canopy	80%	≥50% of canopy	**PASS**
Native shrub layer cover	5%	10-50%	**FAIL**
Native dwarf shrub/ field layer cover	100%	≥20%	**PASS**
Native dwarf shrub/ field layer height (cm)	c50cm	≥20cm	**PASS**
Bryophyte cover	3%	≥4%	**FAIL**
Grazing pressure	No evidence of grazing at time of survey	No overgrazing	**PASS**
Regeneration and structure	Assessed multi-plot level.	Refer to full condition assessment	n/a

APPENDIX C(b) – ALLUVIAL WOODLAND RELEVÉ RESULTS

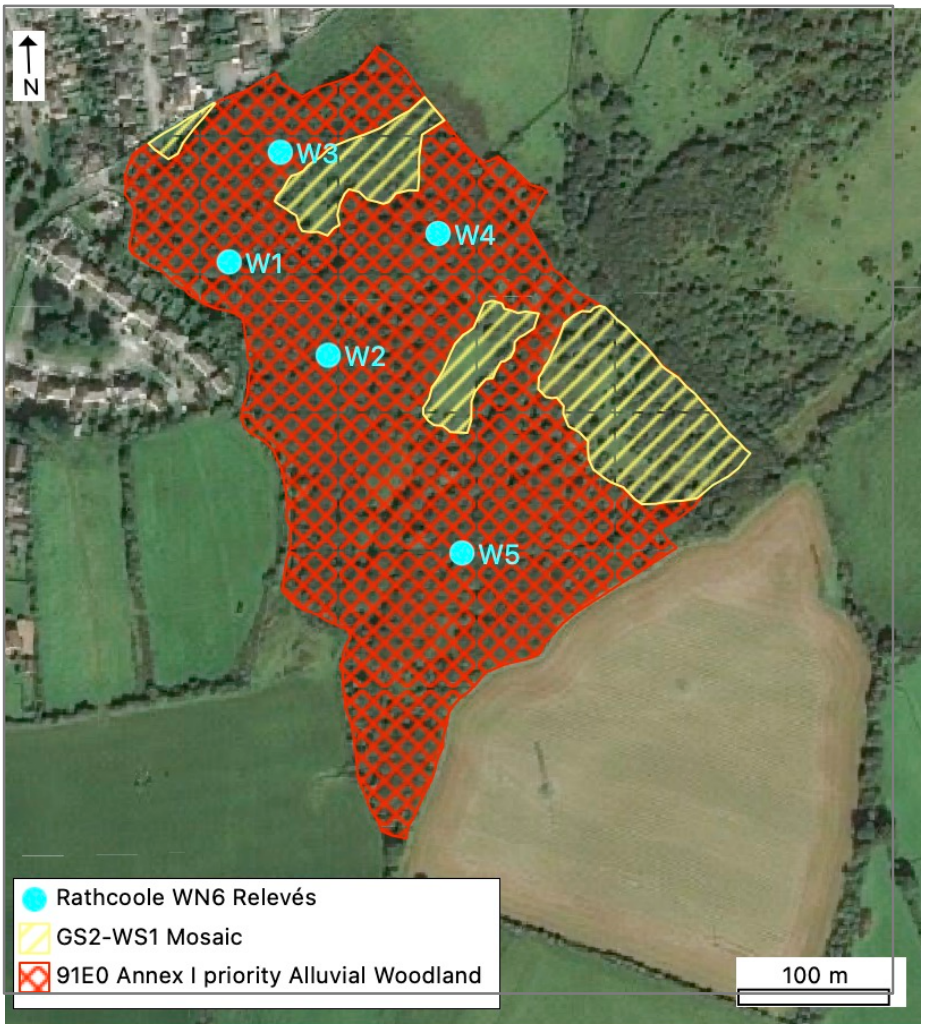
Site Name. Rathcoole	**Date:** Arpil 2021
Relevé no. W3, W4 and W5	**Grid Ref.** O 02447 26435
Recorder: Joanne Denyer	**Relevé type**: Additional relevé and condition assessment
Irish Vegetation Classification community: WL3D	**Annex I habitat:** 91E0

ADDITIONAL RELEVÉS

Following review of the two relevés undertaken in 2020, it was considered appropriate to broaden the physical extent of the surveys within the woodland area.

Three additional survey plots in the woodland at Rathcoole were undertaken in late April 2021. These followed the same methodology used in the 2020 surveys. A summary of the data from the five survey plots is given in this memo. The locations of the survey plots including the two original plots W1 and W2, and the three additional plots W3, W4 and W5, are shown in Figure 1.1 and the additional survey dates are given in Table 1.1.

Figure 1.1. Location of survey plots



APPENDIX C(b) – ALLUVIAL WOODLAND RELEVÉ RESULTS

Table 1.1. Woodland plots survey timing

Plot ID	Survey date
W1	May 2020
W2	May 2020
W3	April 2021
W4	April 2021
W5	April 2021

*IVC = Irish Vegetation Classification Community

Table 1.2. Positive indicator species recorded

Plot ID	W1	W2	W3	W4	W5	91E0*
Target species:						
Alnus glutinosa						
Fraxinus excelsior	x	x	x	x	x	x
Salix cinerea	x	x	x	x	x	x
Salix caprea						
Other woody species:						
Betula pubescens	x		x	x		x
Crataegus monogyna	x	x	x			x
Solanum dulcamara		x				x
Viburnum opulus						
Herbs & Ferns:						
Agrostis stolonifera	x	x	x	x	x	x
Angelica sylvestris	x	x	x		x	x
Carex remota						x
Filipendula ulmaria						x
Galium palustre						
Iris pseudacorus						x
Lycopus europaeus						
Mentha aquatica						x
Phalaris arundinacea						x
Ranunculus repens			x	x	x	x
Rumex sanguineus					x	x
Urtica dioica	x	x		x	x	x
Mosses & Liverworts:						
Calliergonella cuspidata						x
Climacium dendroides						
Thamnobryum alopecurum						x
Total number of positive indicator species:	7	7	6	6	7	17
Proportion of target species in canopy:	95%	95%	100%	100%	100%	n/a

*Within entire stand as mapped in Figure 1.1.

APPENDIX C(b) – ALLUVIAL WOODLAND RELEVÉ RESULTS

Plot photographs:

W1

W2

W3

APPENDIX C(b) – ALLUVIAL WOODLAND RELEVÉ RESULTS

W4

W5

Conclusions:

- Alluvial woodland can develop rapidly at a site and does not need to be old woodland. Specialist survey is required to identify and map this vegetation type as it requires detailed botanical and bryological survey and it is therefore sometimes overlooked.
- The woodland is dominated by *Salix cinerea* which shows that the water is at least periodically waterlogged and influenced by high water levels (not all areas are necessarily flooded). On drier soils, *Salix cinerea* would not be dominant. The wetland species present in the ground flora also reflect local winter flooding and wetland indicator species occur throughout the wet woodland. There are seasonal springs in the southern part of the woodland which clearly flood the local area.
- For the detailed botanical survey, five plots were recorded using the methodology of the most recent national guidance for the Annex I priority habitat type 91E0 Alluvial Woodland: O'Neill et al. (2013) and the latest Article 17 monitoring report (NPWS, 2019).
- Each plot recorded was 20m x 20m. As per the above guidelines, a requirement of a 91E0 plot is that it must contain either *Alnus glutinosa, Fraxinus excelsior* and/or *Salix* spp. *Fraxinus excelsior* and *Salix cinerea* were present in all five randomly placed plots.
- The Article 17 report for this habitat (2019) states that '*At the monitoring sites each plot was assessed based on the presence of typical species. For a plot to pass the typical species*

*criterion, there needed to be **at least one target species** present and at least **six other typical species**.'* The target species are listed in Table 1.2. In addition, target species must occupy over 50% of the tree canopy.

- All five plots had at least one target species present, at least six other typical species and target species occupied over 50% of the tree canopy (Table 1.2).
- In addition, 17 positive indicator species (including three target species) (Table 1.2) were recorded from the whole woodland stand (as mapped on Figure 1.1).
- Most of the woodland fits the Irish Vegetation Classification woodland type **WL3D** *Salix cinerea-Urtica dioica* woodland (57.6% of samples are examples of 91E0). Localised areas within the northern section have some affinity to WL4D *Betula pubescens-Rubus fruticosus* woodland, but *Salix cinerea* is still dominant and overall the area is considered to be consistent with WL3D species composition (and all plots in this area passed the positive indicator species criteria).
- The 2019 Article 17 report states that '*The Interpretation Manual of EU habitats 2013 states that all types occur on heavy soils which are **periodically inundated** by the annual rise of river levels, but which are **otherwise well-drained and aerated during low water***.'
- The 2019 Article 17 report states that 'The Irish Vegetation Classification (IVC; Perrin, 2016) **primarily places 91E0 habitat within the WL3 *Alnus glutinosa – Filipendula ulmaria* group**. All vegetation communities in this group (WL3A-WL3F) have an affinity to the Annex I habitat.

In conclusion, all of the WN6 Wet willow-alder-ash woodland at Rathcoole, is considered to be an **example of the Annex I priority habitat type** Alluvial Woodland (91E0) (Figure 1.1).

References

O'Neill, F.H. & Barron, S.J. (2013) *Results of monitoring survey of old sessile oak woods and alluvial forests*. Irish Wildlife Manuals, No. 71. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.

Perrin, P. (2016) *Irish Vegetation Classification Technical Progress Report No. 2. Unpublished report by BEC Consultants for the National Biodiversity Data Centre*.

APPENDIX D – Hedgerow Appraisal And Condition Assessment

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Site Name. Rathcoole	**Hedgerow/ treeline no.:** H1
Recorder: Joanne Denyer	**Relevé type**: Detailed Hedgerow Assessment
Survey date: 08/06/2020 & 02/07/2020	**Fossitt:** WL1/WL2/ WN6

Hedgerow description:
A mature non-linear boundary hedgerow running along the western boundary of the site. The woodland in the west of the site grades into this hedgerow and it now forms part of the main woodland. It is associated with a watercourse (small stream) which had standing water and a slight flow at the time of survey. There is a large bank (over 2m height in some places) on the western side of the stream. Grey Willow *Salix cinerea* is generally dominant with Hawthorn *Crataegus monogyna*. It is likely that this was a Hawthorn hedgerow which is now transitioning to wet willow-alder-ash woodland (WN6).

Photo 4.1. Hedgerow H1 (view to NW)

Photo 4.2. Hedgerow H1 - ditch with water (view to W)

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		
Betula pubescens		x	*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior		x	*Salix caprea*		
Hedera hibernica	x	x	*Salix cinerea oleifolia*	x	x
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		x
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*		x	*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus	x	x	*Prunus laurocerasus*		x
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris		x	*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium	x	x	*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum	x	x			
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*	x	x
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map:
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
	1			
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
-				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
0				
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
				4
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
			3	
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
The hedgerow ranks as a Highly significant (**Heritage Hedgerow**) as it scores 4 in one category and has a cumulative score of >16 over the five categories.				
				Total Significance Score = 20

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
	(locally but not overall)			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
	-			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
	-			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
	(locally only)			
Ground Flora / Hedge Base: Alien invasive species	Present			
	-			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
			2	
				Total Condition Assessment Score = 23/24

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Site Name. Rathcoole	**Hedgerow/ treeline no.:** H2
Recorder: Joanne Denyer	**Relevé type**: Detailed Hedgerow Assessment
Survey date: 08/06/2020 & 02/07/2020	**Fossitt:** WL1/ WL2

Hedgerow description:
A mature non-linear hedgerow running from the northern boundary to the southern boundary of the site (NE to SW). The woodland in the west of the site grades into this hedgerow and it now mostly forms part of the main woodland. There are some areas of dry meadow (GS2) on the northern side. It is associated with a watercourse (stream) which had a good flow at the time of survey. There is a calcareous spring complex (FP1) which arises to the south of the hedgerow at its western end and discharges through the line of the hedge into the watercourse. There is a bank (over 1m in height) associated with the watercourse. Grey Willow, Ash *Fraxinus excelsior* and Goat Willow are frequent with occasional Blackthorn *Prunus spinosa*. The hedgerow is now transitioning to wet willow-alder-ash woodland (WN6) on both sides. Non-native willow species (Crack-willow *Salix fragilis* and White Willow *Salix alba*) and Snowberry *Symphoricarpos albus* are present within the hedgerow.

Photo 4.3. Hedgerow H2 with watercourse (view to SW)

Photo 4.4. Hedgerow H2 – calcareous spring discharging to stream through hedgerow (view to N)

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna		x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*	x	x
Hedera hibernica	x	x	*Salix cinerea oleifolia*	x	x
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*	x	x
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		x
Carpinus betulus			*Salix fragilis*	x	x
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum	x	x			
Geum urbanum					
Glechoma hederacea	x	x			
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*	x	x
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map:
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
		2		
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
-				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
0				
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
				4
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
			3	
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance: It is associated with a calcareous tufa-producing spring complex				
The hedgerow ranks as a Highly significant (**Heritage Hedgerow**) as it scores 4 in one category and has a cumulative score of >16 over the five categories.				
				Total Significance Score = 21

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
			2	
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
			2	
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
		1		
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
	(locally but not overall)			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
	-			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
	-			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
	(locally only)			
Ground Flora / Hedge Base: Alien invasive species	Present			
	-			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
	n/a			
				Total Condition Assessment Score = 17/24

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Site Name. Rathcoole	**Hedgerow/ treeline no.:** H3
Recorder: Joanne Denyer	**Relevé type**: Detailed Hedgerow Assessment
Survey date: 08/06/2020 & 02/07/2020	**Fossitt:** WL1/ WL2

Hedgerow description:
A mature non-linear boundary hedgerow running along the southern boundary of the site. It continues to the east as Hedgerow H4. The hedgerow grades into the wet willow-alder-ash woodland (WN6) to the north and there is improved agricultural grassland (GA1) to the south. It is associated with a bank and ditch, which had standing water in some areas but no obvious flow. This contrasts with the flowing watercourse in contiguous H4. It may be that this stream flows in winter but was not observed to be flowing after heavy rainfall in June. Hazel *Corylus avellana* is locally abundant with Grey willow, Hawthorn and Blackthorn. Wood-sedge *Carex sylvatica* was also recorded (this is not included in the ground flora list of Foulkes et al. (2013), but is a high quality woodland indicator).

Photo 4.5. Hedgerow H3 Old coppiced Hazel in western section (view to S)

Photo 4.6. Hedgerow H3 - ditch with water (view to E)

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		x
Corylus avellana	x	x	*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior			*Salix caprea*	x	x
Hedera hibernica	x	x	*Salix cinerea oleifolia*	x	x
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum		x	*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		x
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum		x			
Geum urbanum		x			
Glechoma hederacea	x	x			
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*	x	x
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map:
				4
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
-				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
0				
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
			3	
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
			3	
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
The hedgerow ranks as a Highly significant (**Heritage Hedgerow**) as it scores 4 in one category and has a cumulative score of >16 over the five categories.				
				Total Significance Score = 21

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
	(locally but not overall)			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
	-			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
	-			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
	(locally only)			
Ground Flora / Hedge Base: Alien invasive species	Present			
	-			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
			2	
				Total Condition Assessment Score = 23/24

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Site Name. Rathcoole	**Hedgerow/ treeline no.:** H4
Recorder: Joanne Denyer	**Relevé type**: Detailed Hedgerow Assessment
Survey date: 08/06/2020 & 02/07/2020	**Fossitt:** WL1/ WL2

Hedgerow description:
A mature non-linear boundary hedgerow running along the southern boundary of the site. It continues to the west as Hedgerow H3. There is an area of species-rich wet grassland (GS4) to the north of the hedgerow and improved agricultural grassland to the south. It is associated with a watercourse (small stream) which had a good flow at all survey times (flowing to the east). The ditch/ stream to the east (H3) only had standing water and the main source of the stream water appeared to be a small stream joining from the south just east of where H3 and H4 join. The hedgerow is dominated by mature Ash and Grey willow with frequent Hawthorn. Common Spotted-orchid *Dactylorhiza fuchsii* was present on the northern side of the hedgerow. There was a remnant area of stone wall within the hedgerow in the western section.

Photo 4.7. Hedgerow H4 (view to W)

Photo 4.8. Hedgerow H4 – stream and bank (view to E)

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana	x	x	*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		x
Hedera hibernica	x	x	*Salix cinerea oleifolia*	x	x
Ilex aquifolium	x	x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus		x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum	x	x	*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		x
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum		x	*Viola* spp.		
Geranium robertianum	x	x			
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*	x	x
Dryopteris filix-mas	x	x	*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map:
				4
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
-				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
0			3	
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
				4
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
			3	
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance: Associated with species-rich, orchid-rich wet grassland on the northern side				
The hedgerow ranks as a Highly significant (**Heritage Hedgerow**) as it scores 4 in two categories and has a cumulative score of >16 over the five categories.				
				Total Significance Score = 25

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
			2	
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
	(locally but not overall)			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
	-			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
	-			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
	(locally only)			
Ground Flora / Hedge Base: Alien invasive species	Present			
	-			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
	0		2	
				Total Condition Assessment Score = 22/24

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Site Name. Rathcoole	**Hedgerow/ treeline no.:** H5
Recorder: Joanne Denyer	**Relevé type**: Detailed Hedgerow Assessment
Survey date: 08/06/2020 & 02/07/2020	**Fossitt:** WL1/ WL2

Hedgerow description:
A mature linear hedgerow running from the northern boundary to the southern boundary down the centre of the site. On old OS mapping there is a right of way shown in the southern section of the hedgerow. This area has exceptionally deep hedge banks (over 2m high). In the central area the hedge banks are lower but the ditch wider. It may have been associated with an old greenway. The ditch was wet at the tie of survey but with no obvious flowing water. The hedgerow grasdes into dry meadow-scrub (GS2-WS1) mosaic in the southern section and to the north-east and transitions to wet willow-alder-ash woodland (WN6) to the north-west. Hazel, Grey Willow, Blackthorn and Downy Birch are locally abundant with Hawthorn.

Photo 4.9. Hedgerow H5 – tall hedge banks (>2m) in southern section (view to N)

Photo 4.10. Hedgerow H5 – wide ditch within hedgerow in central section (view to N)

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens		x	*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana	x	x	*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior		x	*Salix caprea*		x
Hedera hibernica	x	x	*Salix cinerea oleifolia*	x	x
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*		
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum	x	x	*Oxalis acetosella*		
Chrysosplenium oppositifolium		x	*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*	x	x
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum	x	x			
Geum urbanum					
Glechoma hederacea	x	x			
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*	x	x
Dryopteris filix-mas	x	x	*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map:
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
	1			
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
-				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
			3	
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
			3	
		Badger Sett		
		Green Lane		
		2		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
			3	
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance: Very deep ditch (>2m) in southern section				
The hedgerow ranks as a Highly significant (**Heritage Hedgerow**) as it has a cumulative score of >16 over the five categories.				
				Total Significance Score = 21

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
	(locally but not overall)			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
	-			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
	-			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
	(locally only)			
Ground Flora / Hedge Base: Alien invasive species	Present			
	-			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
			2	
Total Condition Assessment Score = 23/24				

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Site Name. Rathcoole	**Hedgerow/ treeline no.:** H6
Recorder: Joanne Denyer	**Relevé type**: Detailed Hedgerow Assessment
Survey date: 08/06/2020 & 02/07/2020	**Fossitt:** WL1/ WL2

Hedgerow description:
A non-linear hedgerow running along the southern edge of the species-rich dry meadow (GS2) in the north of the site. This hedgerow is not shown on old mapping and this area was a large area of commons/ grazing land. There are large gaps in the western section of the hedgerow. It is a species-poor hedge dominated by Beech *Fagus sylvatica* with Grey Willow present to the east. There is dry meadow (GS2) on both sides of the hedgerow.

Photo 4.1. Hedgerow H6 (view to W)

Photo 4.2. Hedgerow H6 – hedgerow gap (view to E)

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna			*Rubus fruticosus* agg.*		
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior			*Salix caprea*		
Hedera hibernica			*Salix cinerea oleifolia*	x	x
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*		
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica	x	x	*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map:
	1			
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
0				
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
-				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
0				
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
		Dry Ditch	Wet Ditch / Drain	Stream / River
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
Other factors of significance				
The hedgerow ranks as being of Low significance as it has a cumulative score of <10 over the five categories.				
				Total Significance Score = 6

APPENDIX D – HEDGEROW APPRAISAL AND CONDITION ASSESSMENT

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
		1		
Width	<1m	1 - 2m	2 - 3m	>3m
		1		
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
			2	
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
			2	
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
		1		
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
	0			
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
% of canopy dominated by Ivy	>25%			
	(locally but not overall)			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
	0			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
	-			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
	(locally only)			
Ground Flora / Hedge Base: Alien invasive species	Present			
	-			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 10/24

APPENDIX E – Historic Landuse Study

A very detailed examination of older maps and other material in the National Library of Ireland was conducted by Liam Ua Bhroin (1943). A review of this survey was conducted to inform the current ecological conditions and habitats within the study area. Many of the features and habitats highlighted by Ua Bhroin remain extant today and these are discussed below.

The study lands at Rathcoole were previously under commonage (Broadmore Commons) as reported by Ua Bhroin (1943) who reports:

> 'Broadmore Commons was formerly the name of an area of about 23 statute acres in the townland of Rathcoole which Robert LaTouche, one of the then well-known family of Dublin bankers, purchased for £500 from the Commissioners for enclosing and allotting commons and waste lands, appointed under an act of Parliament of 23rd May, 1818 by authority of which it, and other lands in the neighbourhood of Rathcoole and elsewhere in County Dublin, were enclosed. A memorial of the deed of conveyance, dated 31st January, 1821, is preserved in the Registry of Deeds, Dublin'.

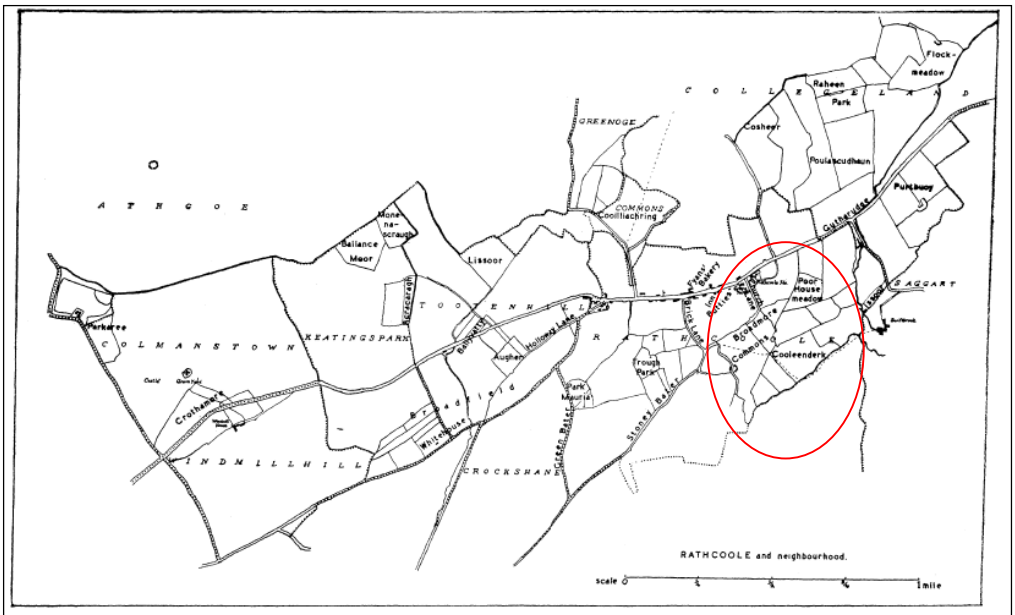


Figure 4.1.3. Broadmore Commons illustrated on the map prepared by Ua Bhroin (1943).

> 'As a place-name **Broadmore Commons** is quite forgotten. The area it denominated lies to the south of the Naas Road, behind Rathcoole House, the Church and the ruins of the Munster King inn. It consisted in the main of the three fields at: - (a) S 17cms., W 26cms., (b) S 18cms., W 26-5 cms., (c) S 19 cms., W 27-5cms. It also included a narrow winding passage which on the west bounds the largest of these fields; now known as **Shiel's Commons**, which name, with a short cut across the field, preserves memory of the former commons. The short cut leads to Swiftbrook Paper Mills in Saggart'.

'Streams almost surround this old commons area, and one passes between its two small fields. Their presence points to a possible derivation of the old name. The Irish for a watercourse, gully or stream bed is *brághaid*, which in combination with *mór* (big) and the article *an* would form the name *An Bhrághaid Mhór*, from which change to Broadmore is not great. None of the watercourses in the vicinity, however, seems big enough to justify use of the word *mór* but it is possible that since naming diminution has resulted from one cause or another, or it may be that *mór* was used in a comparative sense; one of the watercourses being larger than others adjacent.
A somewhat interesting example of place-name transformation would seem to be furnished by Map 1[2]. On it " Great Moor " is written in the position occupied by Broadmore on other maps and this leads to the assumption that the surveyor, hearing the first syllable of the name, mistook it for the English word broad, and further, that the second syllable was mistaken by him for moor (muar apparently was the colloquial form of *mór* about Rathcoole as it is in some Gaedhealtacht areas). The form "Great Moor" only appears on Map 1'.

'The **narrow winding passage** referred to as part of the commons is regarded by many as portion of an ancient road which led to Saggart or to the Coolmine Road. The formation of a road or passage in this position, however, was provided for in the enclosing scheme, as is apparent from the deed of conveyance referred to above, and it does not appear on the older maps, so that the passage probably did not exist prior to 1821. When made it extended to somewhat more than twice its present length, bordering the whole of the western and south eastern fences of the large field as shown on Map 9[3] and on the 1837 O.S. No doubt its purpose was to afford access to property previously approached from the open commons, including a house which stood at S 15-5cms., W 26-5cms.

A low mound and curving depressions on the commons land a little more than half way from the northern end of the still present portion of the winding passage strongly suggest the site of a rath which suffered defacement by being cut through, first by formation of the western fence of the commons and again by construction of the passage, the surface of which at the point is lower than the land on either side. These remains answer the brief description of "Cumhall's Rath" given by Eugene O'Curry in the O.S. Letters, except to the extent that they are not in a small field.

Raheen Park is shown on Map 14[4] as a holding which included the two fields to the west of the narrow passage. Its name - now quite

[2] Map 1. His Royal Highness the Duke of York his Lands in Rathcoole in ye County of Dublin in Ireland. Surveyed in 1670 by Thomas Emerson and copied by William Longfield, 1827.
[3] Map 9. A map of part of the lands of Rathcoole belonging to Laurence Clinch, Esq. Surveyed and traced by John Longfield, 1827.
[4] Map 14. A somewhat mutilated map embracing the Rathcoole district from the Camac to a short distance beyond Colmanstown corner. It is without title or date, but exhibits features from which it is clear that it is not earlier than 1788 or later than 1803.

forgotten - and position adjoining the remains just spoken of support the suggestion of a rath'.

'**Cooleenderk Meadow** appears on Map 9 as the name of each of two fields now comprised in a large one (S 17cms., W 28cms.), adjoining the commons land. The short cut previously mentioned passes through this field. Cooleendecks, Cooleendykes and Cooleen derks are surviving pronunciations of its name.

Derivation is not obvious, Cooleen very probably represents Cuilin (a little nook or corner) but derk presents difficulty. There is nothing in the vicinity to indicate the former presence of a cave or pit (dearc). Deirc (charity, an alms) suggests itself and invites one to ponder the possibility of association between the name and establishment of the institution endowed in 1734 by Mrs. Mercer concerning which the following note was written by Austin Cooper on visiting Rathcoole in 1780. 'Here is an handsome hse, on the Gates whereof is thus written " Mrs. Mercer's Alms House for poor Girls, 1744." 'x The house is now the Rectory'.

'Maps of property in and near Rathcoole belonging to the Trustees of Mrs. Mary Mercer's Charities are preserved in the National Library. On one of them (No. 3[5]) an area of 2A. IR. 5P. (Irish) is shown as part of the property, and scrutiny of its boundaries leaves no doubt that the area is included in the field now called Cooleendecks &c. Cuilin na deirce may therefore be a possible derivation for the name'.

'Poor House Meadow is shown on Map 9 as the name of the field at S 20cms., W 29cms. It adjoins the old commons land. Map 7[6] shows a field quite similar in position, shape and size, and a note at the bottom of it shows that a narrow strip within its eastern fence was the property of the Trustees of Mercer's Charities. Origin of Poor House Meadow - name still in use - is therefore clear'.

The location of **Poor House Meadow** corresponds to the location of the Annex I habitat 'Lowland hay meadows' within the study area and the presence of this habitat within this field today points to the importance of the longevity of grassland habitat in the area which given it's historic use as commonage is unlikely to have been fertilised or improved form an agricultural perspective.

With suitable management the areas of grassland currently described as GS2 could also become suitably species rich. These areas are currently coarse and becoming invaded by scrub through natural succession but the continued presence of common spotted orchid within this area points to their previous species rich content. If these areas were managed through appropriate grazing/mowing and removal of cuttings to reduce fertility within the sward

[5] Map 3. A Map of part of the Lands of Rathcoole in the Parish of Rathcoole, Barony of Upper cross and Newcastle and County of Dublin as taken from the Rt. Revd., and Revd. the Trustees of Mrs. Mary Mercer's Charities by James Ormsby, Esq., the particulars of which is [sic] fully described in the underneath reference. Laid down by a scale of 20 perches in one inch in March, 1792.

[6] Map 7. A map named " Rathcoole surveyed, 1826."

they would be expected over time to return to a species composition and structure akin to that of the Annex I habitat lowland hay meadows.

APPENDIX F – Invasive Species

The plant and animal species to which the Birds and Habitats Regulations (2011) apply are presented in Schedule Three of the Regulations. Part 1 details the plants species, while Part 3 outlines those animal or plant vector materials and are presented below.

Third Schedule: Part 1 Plants

Non-native species subject to restrictions under Regulations 49 and 50.

First column	**Second column**	**Third column**
Common name	**Scientific name**	**Geographical application**
American skunk-cabbage	*Lysichiton americanus*	Throughout the State
A red alga	*Grateloupia doryphora*	Throughout the State
Brazilian giant-rhubarb	*Gunnera manicata*	Throughout the State
Broad-leaved rush	*Juncus planifolius*	Throughout the State
Cape pondweed	*Aponogeton distachyos*	Throughout the State
Cord-grasses	*Spartina* (all species and hybrids)	Throughout the State
Curly waterweed	*Lagarosiphon major*	Throughout the State
Dwarf eel-grass	*Zostera japonica*	Throughout the State
Fanwort	*Cabomba caroliniana*	Throughout the State
Floating pennywort	*Hydrocotyle ranunculoides*	Throughout the State
Fringed water-lily	*Nymphoides peltata*	Throughout the State
Giant hogweed	*Heracleum mantegazzianum*	Throughout the State
Giant knotweed	*Fallopia sachalinensis*	Throughout the State
Giant-rhubarb	*Gunnera tinctoria*	Throughout the State
Giant salvinia	*Salvinia molesta*	Throughout the State
Himalayan balsam	*Impatiens glandulifera*	Throughout the State
Himalayan knotweed	*Persicaria wallichii*	Throughout the State
Hottentot-fig	*Carpobrotus edulis*	Throughout the State
Japanese knotweed	*Fallopia japonica*	Throughout the State
Large-flowered waterweed	*Egeria densa*	Throughout the State
Mile-a-minute weed	*Persicaria perfoliata*	Throughout the State
New Zealand pigmyweed	*Crassula helmsii*	Throughout the State
Parrot's feather	*Myriophyllum aquaticum*	Throughout the State
Rhododendron	*Rhododendron ponticum*	Throughout the State
Salmonberry	*Rubus spectabilis*	Throughout the State
Sea-buckthorn	*Hippophae rhamnoides*	Throughout the State
Spanish bluebell	*Hyacinthoides hispanica*	Throughout the State
Three-cornered leek	*Allium triquetrum*	Throughout the State
Wakame	*Undaria pinnatifida*	Throughout the State
Water chestnut	*Trapa natans*	Throughout the State
Water fern	*Azolla filiculoides*	Throughout the State
Water lettuce	*Pistia stratiotes*	Throughout the State
Water-primrose	*Ludwigia* (all species)	Throughout the State
Waterweeds	*Elodea* (all species)	Throughout the State
Wireweed	*Sargassum muticum*	Throughout the State

EU Regulation 1143/2014 on Invasive Alien Species

On 14 July 2016 the European Commission published Commission Implementing Regulation 2016/1141 which sets out an initial list of 37 species to which EU Invasive Alien Species Regulation 1143/2014 will apply. The associated restrictions and obligations came into force on 3rd August 2016.

Three distinct types of measures are envisaged under the Directive, which follow an internationally agreed hierarchical approach to combatting IAS:

- Prevention: a number of robust measures aimed at preventing IAS of Union concern from entering the EU, either intentionally or unintentionally.
- Early detection and rapid eradication: Member States must put in place a surveillance system to detect the presence of IAS of Union concern as early as possible and take rapid eradication measures to prevent them from establishing.
- Management: some IAS of Union concern are already well-established in certain Member States and concerted management action is needed so that they do not spread any further and to minimize the harm they cause.

Plant species listed on the directive include:

- American skunk cabbage *Lysichiton americanus*
- Asiatic tearthumb *Persicaria perfoliata* (*Polygonum perfoliatum*)
- Curly waterweed *Lagarosiphon major*
- Eastern Baccharis *Baccharis halimifolia*
- Floating pennywort *Hydrocotyle ranunculoides*
- Floating primrose willow *Ludwigia peploides*
- Green cabomba *Cabomba caroliniana*
- Kudzu vine *Pueraria lobata*
- Parrot's feather *Myriophyllum aquaticum*
- Persian hogweed *Heracleum persicum*
- Sosnowski's hogweed *Heracleum sosnowskyi*
- Water hyacinth *Eichhornia crassipes*
- Water primrose *Ludwigia grandiflora*
- Whitetop weed *Parthenium hysterophorus*

Animal species listed on the directive include:

- Amur sleeper *Perccottus glenii*
- Asian hornet *Vespa velutina*
- Chinese mitten crab *Eriocheir sinensis*
- Coypu *Myocastor coypus*
- Fox squirrel *Sciurus niger*
- Grey squirrel *Sciurus carolinensis*
- Indian house crow *Corvus splendens*
- Marbled crayfish *Procambarus* spp.
- Muntjac deer *Muntiacus reevesii*
- North american bullfrog *Lithobates (Rana) catesbeianus*
- Pallas's squirrel *Callosciurus erythraeus*
- Raccoon *Procyon lotor*
- Red swamp crayfish *Procambarus clarkii*

- Red-eared terrapin/slider *Trachemys scripta elegans*
- Ruddy duck *Oxyura jamaicensis*
- Sacred ibis *Threskiornis aethiopicus*
- Siberian chipmunk *Tamias sibiricus*
- Signal crayfish *Pacifastacus leniusculus*
- Small Asian mongoose *Herpestes javanicus*
- South American coati *Nasua nasua*
- Spiny-cheek crayfish *Orconectes limosus*
- Topmouth gudgeon *Pseudorasbora parva*
- Virile crayfish *Orconectes virilis*

On 13 July 2017 the European Commission published Commission Implementing Regulation 2017/1263 which added a further 12 species to the current list of 37 species regulated under the EU Invasive Alien Species Regulation (1143/2014). These are:

Plant species

- Alligator weed *Alternanthera philoxeroides*
- Milkweed *Asclepias syriaca*
- Nuttall's waterweed *Elodea nuttallii*
- Chilean rhubarb *Gunnera tinctoria*
- Giant hogweed *Heracleum mantegazzianum*
- Himalayan balsam *Impatiens glandulifera*
- Japanese stiltgrass *Microstegium vimineum*
- Broadleaf watermilfoil *Myriophyllum heterophyllum*
- Crimson fountaingrass *Pennisetum setaceum*

Animal species

- Egyptian goose *Alopochen aegyptiacus*
- Raccoon dog *Nyctereutes procyonoides*
- Muskrat *Ondatra zibethicus*

The associated restrictions and obligations came into force from 2 August 2017 for all these species apart from the Raccoon dog, which came into force on 2 February 2019.