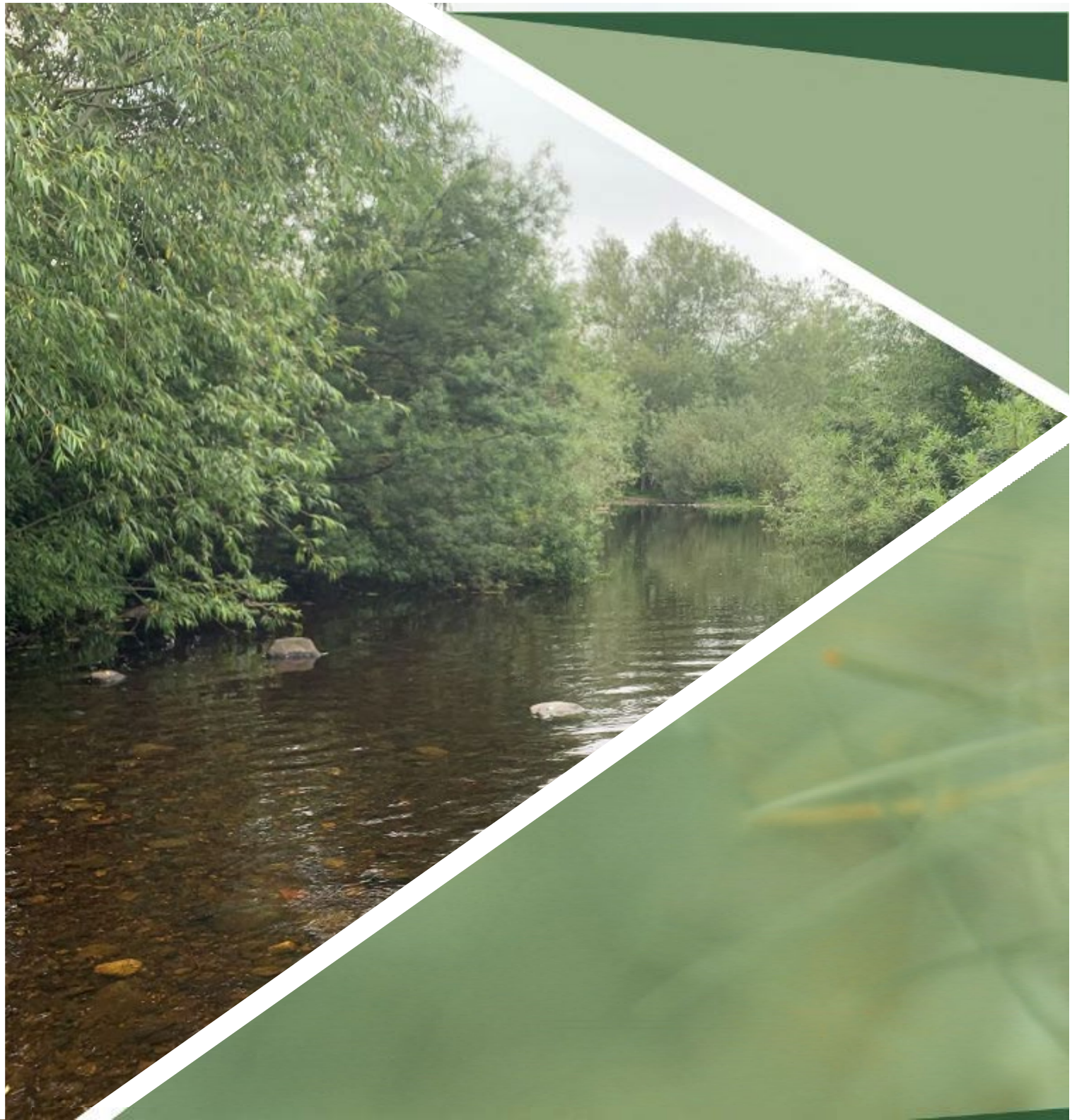
ECOLOGICAL IMPACT ASSESSENT REGARDING PART 8 PUBLIC CONSULTATION FOR THREE PLAYSPACES AND PLAY/SCULPTURE TRAIL AT OLD BAWN, MOUNT CARMEL AND CHERRYWOOD IN DODDER VALLEY PARK

JULY 2019



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1 Introduction

1.1 Description of proposed project

South Dublin County Council (SDCC) has prepared documentation for the public consultation phase of Dodder Valley Park Part 8 Play Space Project which proposes the provision of three large play spaces at Old Bawn, Mount Carmel and Cherrywood and for a play/sculpture trail to connect these play spaces. The approximate location of the project area is indicated in Figure 1, Figure 2 and Figure 3.

Figure 1: Approximate location of Dodder Valley Park (1:100,000)

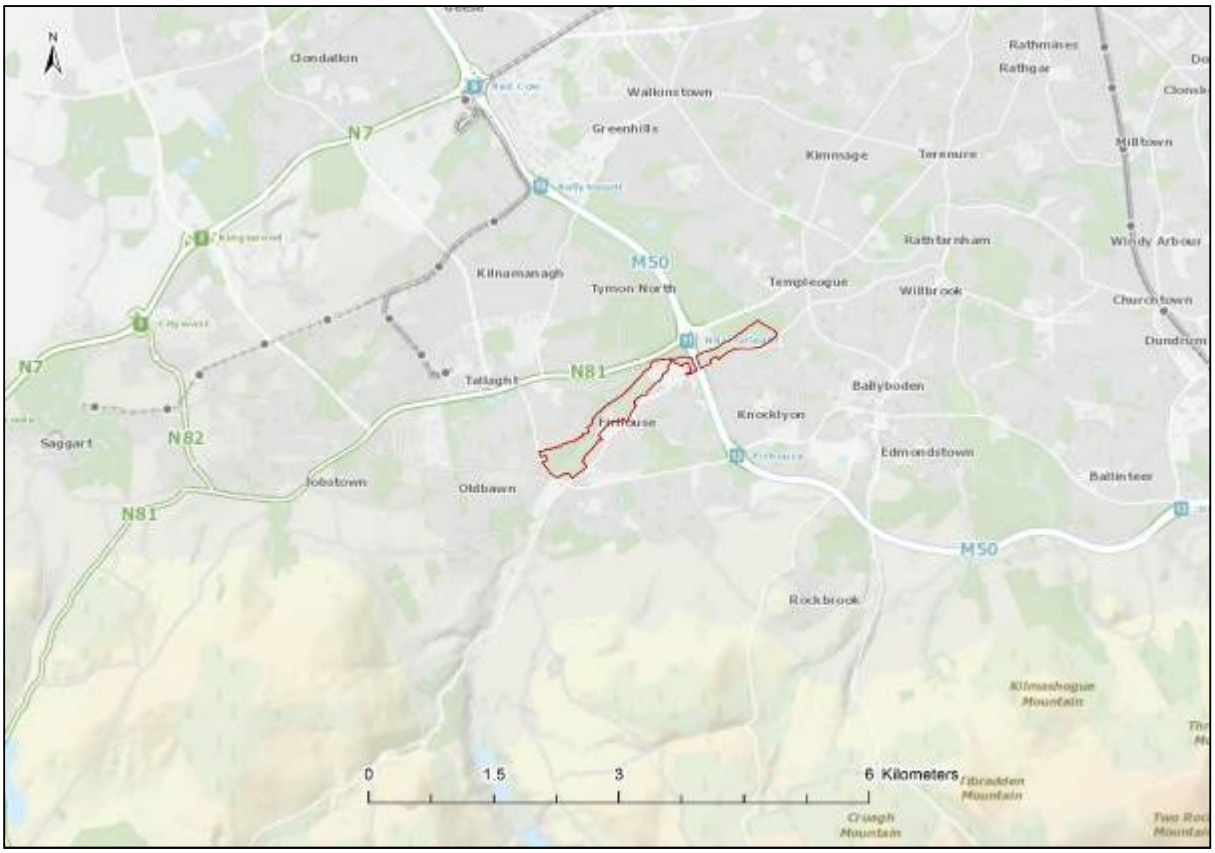

Figure 2: Approximate location of Dodder Valley Park (1:50,000)

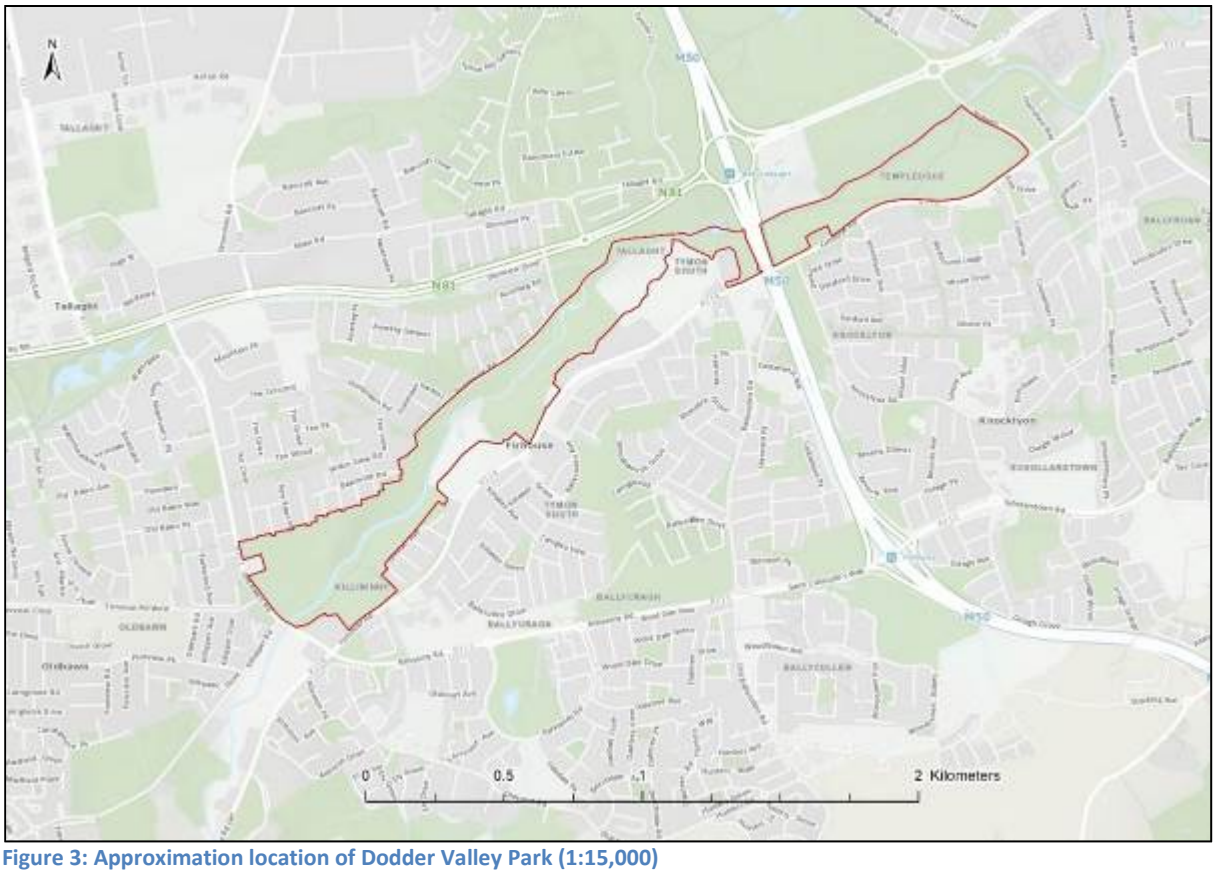

Figure 3: Approximation location of Dodder Valley Park (1:15,000)

The precise description of the project has not yet been developed. The design brief is currently at the "Preliminary Design" stage. The following descriptions are excerpts from documentation provided by South Dublin County Council:

"Section 1: Old Bawn to Mount Carmel

Access to Park at Old Bawn, Parking at Ahearn's Pub and access to Park at Mount Carmel Car park off the Firhouse Road.

Section 2: Mount Carmel to Cherrywood

Access to Park at Mount Carmel Car park off the Firhouse Road and access to Park from Cherrywood Car Park off the Spawell Roundabout.

MAP 1: *Location Map showing Extent of area for ecological surveys within Ballymount Park*

MAP 2: *Location of proposed play spaces at Old Bawn and Mount Carmel including play trail within Section 1 Dodder Valley Park, Old Bawn to Mount Carmel.*

Location of new play space at Old Bawn

Proposed locations of play trail/sculptures linking Old Bawn to Mount Carmel

Proposed location of new play space at Mount Carmel

MAP 3: *Location of proposed play spaces at Mount Carmel and Cherrywood including play trail within Section 2 Dodder Valley Park, Mount Carmel to Cherrywood.*

Proposed location of new play space at Mount Carmel

Proposed locations of play trail/sculptures linking Mount Carmel to Cherrywood

Proposed location of new play space at Cherrywood

…As part of the over plan to development a system of play spaces including a play/sculpture trail in Dodder Valley Park, it is proposed to divide the Park into 3 sections; with each section/area containing a large play area and each of the play areas then linked by a play/sculpture trail. The overall concept is that the play areas in conjunction with the play trail which will be located along the length of the park, encouraging movement and exploration throughout.

These larger play areas will be located at:

1. Dodder Valley Park, Old Bawn

2. Dodder Valley Park, Mount Carmel

3. Dodder Valley Park, Cherrywood

As part of this design and build tender the first area to be developed will be area 1 at Old Bawn. it is proposed that the play trail be located along the length of the park, encouraging movement and exploration throughout. The Park currently features formal surfaced pathways along the river bank and through areas containing pitches and more informal meadow/wild areas…"

Figure 4 – Dodder Valley Park and proposed location for play space at old bawn

It is proposed that the Dodder Valley Park Play space, Old Bawn Design Concepts comprise a large natural children's play area incorporating a harmoniously created playscape, set against the back drop of the Dublin Mountains and the Dodder River for all ages.

Figure 2 – detailed location for the play space at Old Bawn

Figure 3 – location of the new pavilion and car park at old bawn

Figure 4 – detailed location for the play space at old bawn

…Design Concept and Requirements

This project involves installation of natural play features, sculptural elements and play equipment through the park. The play trail should highlight elements of the landscape such as spectacular trees, the meadow landscape and gain views/perspective over the river valley.

Design proposals should include for imaginative play, constructive play, group play and include natural play opportunities. It should be durable and limit opportunities for anti-social activity e.g. no hidden areas/roofs, large surfaces that could be graffiti targets, no light materials. It should look as naturalistic as possible. Engineered woodchip is our preferred safety surfacing. Play areas to be landscaped and no edgings or other trip hazards to be present. Signage is to be specified which includes a "young lungs at play"/smoking prohibited message…"

1.2 FERS Company Background

Forest, Environmental Research and Services have been conducting ecological surveys and research since the company's formation in 2005 by Dr Patrick Moran and Dr Kevin Black. Dr Moran, the principal ecologist with FERS, holds a 1st class honours degree in Environmental Biology (UCD), a Ph.D. in Ecology (UCD), a Diploma in EIA and SEA management (UCD) a Diploma in Environmental and Planning Law (King's Inn) and a M.Sc. in Geographical Information Systems and Remote Sensing (University of Ulster, Coleraine). Patrick has in excess of 20 years of experience in carrying out ecological surveys on both an academic and a professional basis. Dr Emma Reeves, senior ecologist with FERS holds a 1st class honours degree in Botany, and a Ph.D. in Botany. Emma has in excess of 10 years of experience in undertaking ecological surveys on an academic and professional basis. Ciarán Byrne, a senior ecologist with FERS holds a 1st class honours degree in Environmental Management (DIT) and a M.Sc. in Applied Science/Ecological Assessment (UCC). Ciarán has in excess of 5 years in undertaking ecological surveys on both an academic and a professional basis.

FERS client list includes National Parks and Wildlife Service, An Bord Pleanála, various County Councils, the Heritage Council, Teagasc, University College Dublin, the Environmental Protection Agency, Inland Waterways Association of Ireland, the Department of Agriculture, the Office of Public Works and Coillte in addition to numerous private individuals and companies.

1.3 Aims of this report

The primary aim of the ecological impact assessment (EcIA) is to provide a complete baseline of ecological data for the study area as delineated by the boundary provided in shapefile format by SDCC, allowing a comprehensive assessment of any potential impacts (including cumulative impacts) of the proposed development on the local ecological resource. The primary aims of the Ecological Impact Assessment are:

- To survey all habitats, flora and fauna within the study area;
- To produce baseline GIS information on the presence, distribution and conservation status of ecological habitats and species of flora/fauna within the study area;
- To produce a digital habitat map for the study area to Fossitt Level 3;
- To highlight elements or particular areas of specific potential for biodiversity or conservation interest;
- To highlight elements with the potential to damage the ecological integrity of the study area, such as Alien Invasive Plant Species;

- To identify the potential presence and effectiveness of ecological corridors within the study area and linking the study area to adjoining areas of potential biodiversity interest that can inform a development Green Infrastructure Network;
- To assess and make recommendations on conservation priorities regarding the identified biodiversity resource of the site;
- To make recommendations regarding future habitat management and ecological monitoring at the site; and
- Where potential impacts are identified, detailed and comprehensive mitigation measures will be proposed, which will include avoidance of an element(s) if,and where deemed necessary.

2 Survey Methodology

2.1 Desk Study

2.1.1 NPWS database

The primary body consulted with regard to matters involving ecology within the Republic of Ireland is the National Parks and Wildlife Service (NPWS). The role of the NPWS is:

- To secure the conservation of a representative range of ecosystems and maintain and enhance populations of flora and fauna in Ireland;
- To implement the EU Habitats and Birds Directives;
- To designate and advise on the protection of Natural Heritage Areas (NHA) having particular regard to the need to consult with interested parties;
- To make the necessary arrangements for the implementation of National and EU legislation and policies and for the ratification and implementation of the range of international Conventions and Agreements relating to the natural heritage; and
- To manage, maintain and develop State-owned National Parks and Nature Reserves.

The desk study as pertaining to this survey involved querying the NPWS database for information pertaining to designated sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA), Natural Heritage Areas (NHA) and Proposed Natural Heritage Areas (pNHA)) occurring in the vicinity of the proposed development.

2.1.2 NBDC Database

In addition to consulting the NPWS database, the National Biodiversity Data Centre Database was consulted regarding species of conservation concern recorded as occurring within the vicinity of the study area

2.2 Field surveys

2.2.1 Botanical/Habitat surveys

2.2.1.1 General vegetation surveys

Field surveys of vegetation were carried out during June 2019 by Dr Patrick Moran Dr Emma Reeves and Ciarán Byrne, within the optimal timeframe for such surveys. Nomenclature follows "Stace's New Flora of the British Isles" (2010 – 4th Edn) and "Mosses and Liverworts of Britain and Ireland a Field Guide" (2010) The botanical and habitat survey consisted of walk-over surveys through study area. The surveys recorded all species of flora observed occurring within the study area. The botanical survey placed particular emphasis on rare, protected or annexed habitats/species by reference to-

a) Irish Plant Red Data Book;
b) Habitats listed on Annex I of the EU Habitats Directive;
c) Species listed on Annex II of the EU Habitats Directive; and
d) Ecological stepping-stones and ecological corridors (as covered under Article 10 of the EU Habitats Directive.

In addition to a complete species list, written descriptions of all habitats within the receiving environment were recorded, to include the dominant species occurring within each habitat. Photographs of representative areas of each habitat are presented. An evaluation of the ecological significance of flora and habitats occurring within the site relative to surrounding habitats was also undertaken. A detailed hedgerow survey was undertaken based on the Hedgerow Appraisal System (Foulkes *et al* 2013).

2.2.1.2 Species of Invasive Alien Plants listed on Part (1) of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations of 2011

The human introduction of alien plant species into ecosystems (intentionally or unintentionally) is historically a common-place occurrence. The vast majority of these alien plant species, when introduced into a foreign ecosystem for which they are not adapted, will die without specific care. In a small number of cases, however, these plants can come to dominate the ecosystem into which they have been introduced and become "Invasive". There is presently a great deal of concern regarding the potential for invasive plant species to threaten the species composition, community structure and overall biodiversity of native Irish habitats. Invasive species can change the character and/or condition of an ecosystem over an extensive area through several mechanisms, depending on the species of plant and the nature of the habitat. Given the location of the Nevinstown site, immediately adjacent to the River Blackwater, specific cognisance was given to the potential presence of Alien Invasive Plant

Species within the survey area. There are more than 30 species on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations of 2011. Riparian systems are particularly vulnerable to plant invasions owing largely to the naturally high disturbance frequencies within riparian habitats and the rapidity with which an invasive can spread utilising the medium of flowing water. In addition, there has been an historic tendency for people to plant "ornamental" species beside water. As a result, the vast majority of the species listed on the Third Schedule are associated broadly with riparian systems, occurring within the water course, or proliferating along the bank (see Table 1).

Table 1: List of plant species appearing on the Third Schedule

Common Name	Latin Name	Associated with freshwater habitats
American skunk-cabbage	*Lysichiton americanus*	*Yes*
Red alga	*Grateloupia doryphora*	*No*
Brazilian giant-rhubarb	*Gunnera manicata*	*Yes*
Broad-leaved rush	*Juncus planifolius*	*Yes*
Cape pondweed	*Aponogeton distachyos*	*Yes*
Cord-grasses	*Spartina (all species hybrids)*	*No*
Curly waterweed	*Lagarosiphon major*	*Yes*
Dwarf eel-grass	*Zostera japonica*	*No*
Fanwort	*Cabomba caroliniana*	*Yes*
Floating pennywort	*Hydrocotyle ranunculoides*	*Yes*
Fringed water-lily	*Nymphoides peltata*	*Yes*
Giant hogweed	*Heracleum mantegazzianum*	*Yes*
Giant knotweed	*Fallopia sachalinensis*	*Yes*
Giant-rhubarb	*Gunnera tinctoria*	*Yes*
Giant salvinia	*Salvinia molesta*	*Yes*
Himalayan balsam	*Impatiens glandulifera*	*Yes*
Himalayan knotweed	*Persicaria wallichii*	*Yes*
Hottentot-fig	*Carpobrotus edulis*	*No*
Japanese knotweed	*Fallopia japonica*	*Yes*
Large-flowered waterweed	*Egeria densa*	*Yes*
Mile-a-minute weed	*Persicaria perfoliata*	*Yes*
New Zealand pigmyweed	*Crassula helmsii*	*Yes*
Parrot's feather	*Myriophyllum aquaticum*	*Yes*
Rhododendron	*Rhododendron ponticum*	*No*
Salmonberry	*Rubus spectabilis*	*Yes*
Sea-buckthorn	*Hippophae rhamnoides*	*No*
Spanish bluebell	*Hyacinthoides hispanica*	*No*
Three-cornered leek	*Allium triquetrum*	*No*
Wakame	*Undaria pinnatifida*	*No*
Water chestnut	*Trapa natans*	*Yes*
Water fern	*Azolla filiculoides*	*Yes*
Water lettuce	*Pistia stratiotes*	*Yes*
Water-primrose	*Ludwigia (all species)*	*Yes*
Waterweeds	*Elodea (all species)*	*Yes*
Wireweed	*Sargassum muticum*	*Marine/transition*

Of the species listed in Part (1) of the Third Schedule, three species are of particular concern owing to the location of the survey area and the potential for spread along the Rivers Dodder:

- Japanese Knotweed (*Fallopia Japonica);*
- Himalayan Balsam (*Impatiens glandulifera*); and
- Giant Hogweed (*Heracleum mantegazzianum*).

The survey for Alien Invasive Species listed in Part (1) of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations of 2011 was undertaken in tandem with the habitats/vegetation surveys.

2.2.2 Hedgerow/ditch survey

A hedgerow and ditch survey was carried out in tandem with the general flora and habitat surveys, in accordance with the methodology presented in the recently published "Hedgerow Appraisal System – best practice guidance on hedgerow surveying, data collation and appraisal" (Foulkes *et al* 2013). The methodology presented comprises a standard recording methodology, allowing for consistency of recording of all hedgerow survey data in addition to a method for data appraisal, in order to maximise the value of the data collected. This is particularly useful in identifying and assessing the condition of hedgerows of ecological, historical and landscape significance.

2.2.3 Habitat Mapping

Field maps were prepared utilising a base-map provided by Boliden Tara Mines Ltd and ESRI Digital Globe Satellite Imagery. Field maps were prepared prior to surveys, allowing the surveyor to mark pertinent information (habitat type, location of unusual species, etc.) on field maps. These field maps were then utilised to generate a habitat map in ArcGIS 10.2. Habitat mapping was carried out based on "Best Practice Guidance for Habitat Survey and Mapping" (Smith *et al* 2011).

2.2.4 Bird Surveys

2.2.4.1 General Bird Survey – summer bird surveys

Bird Watch Ireland and the RSPB NI have agreed a list of priority bird species for conservation action on the island of Ireland. These Birds of Conservation Concern in Ireland are published in a list known as the BoCCI List. In this BoCCI List, birds are classified into three separate lists (Red, Amber and Green), based on the conservation status of the bird and hence conservation priority. The Red List birds are of high conservation concern, the Amber List birds are of medium conservation concern and the Green List birds are not considered threatened.

A general bird survey was carried by Dr Patrick Moran on the 18th June 2019 under optimal conditions utilising transects through the study area following a modified common bird census or Brown & Shepherd survey. Transects were walked at a slow pace, with all bird species observed noted and recorded and identified as breeding or not. The purpose of the bird surveys was to:

- To record any priority species (Annex I, Red or Amber listed) and assess their breeding status within the site;
- To identify any areas of habitat of particular interest with regard to avian biodiversity.

2.2.4.2 Kingfisher Survey

The importance of the biodiversity of Ireland's waterways is reflected in the designation of many of our waterways under the Birds and Habitats Directives. A number of species of European significance occur on our waterways including the Kingfisher (*Alcedo atthis*), which is listed on Annex I of the EU Birds Directive. In 2010 (Cummins *et al*), six major river systems - the Rivers Barrow, Blackwater (Munster), Boyne, Clare, Moy and Nore (in addition to two smaller systems, the Rivers Gill and Illen) – were surveyed in order to assess the distribution and abundance of Kingfisher in representative habitats throughout Ireland. Kingfisher were recorded on all river systems surveyed. Kingfisher are known to occur along the Dodder and as such a Kingfisher survey was carried out along the riparian habitat present within the survey area.

The primary goal of Kingfisher surveys was:

(1) To identify if there are areas suitable for nesting Kingfisher within the site; and

(2) To note any indications of foraging Kingfisher within the survey areas.

Kingfisher surveys were carried out by Dr Patrick Moran on the 18th of June (bankside) and the 26th of June (in stream) under optimal conditions (clear visibility, no rain, no wind), using a modified version of the methodology as presented in "Assessment of the distribution and abundance of Kingfisher *Alcedo atthis* and other riparian birds on six SAC river systems in Ireland" (Cummins *et al*, 2010) –

which was prepared by Birdwatch Ireland for the NPWS. It was not possible to obtain a clear view of the water course during the bankside survey, and for this reason an instream survey was undertaken by walking through a 1.5 km stretch of the Dodder at the western end of the survey area, deemed most suitable for nesting Kingfisher.

2.2.5 General Mammal survey

A general mammal survey (including otter as per Reid *et al* 2013) was undertaken at the site by Dr Patrick Moran on various dates between the 18th of June and the 2nd of July 2019. In addition to a survey of the area through direct observations (seeing the animal), observation of faeces, prey remains, shelters, hair, etc. regularly utilised wildlife trails were identified during this survey and trail cameras were deployed at locations for period of 1 week. These trail cameras are equipped with an infrared flash, enabling the capture of both still and video footage at night without being detected. The locations for the deployment of cameras was limited by high human activity as the cameras necessarily must be deployed in relatively open locations.

Figure 5: Trail cam deployed along the river Dodder at the eastern end of the survey area

2.2.5.1 Otter Survey

Otter (*Lutra lutra*) is a primarily piscivorous species, depending largely on salmonids but also consuming frogs, crayfish, etc. A bankside survey for Otter was deemed redundant owing to the degree of activity along the banks of the river. An in-stream Otter survey was carried out in tandem with Kingfisher surveys on the 26th of June under optimal conditions based on the methodology as presented by NPWS in the Irish Wildlife Manual 76 (National Otter Survey of Ireland 2010/12 – Reid *et al.,* 2013), with a survey being carried out for spraints (but also recording other signs, such as footprints, fish remains, slides, etc.) at suitable locations instream and stream-adjacent.

2.2.6 Bat surveys

Two types of bat surveys were undertaken at the site in order to assess bat activity within the study area:

2.2.6.1 Utilising Static monitors

Following a day time assessment, two Pettersson D500x Ultrasound recording units were deployed at locations deemed most suitable for use by bats within the study area along the River Dodder. One unit was deployed on a bank-side tree. The second unit was placed on the trunk of a tree that had fallen across the river, placing the over the river itself. The Pettersson D500x is an ultrasound recording unit, intended for long-term recording of bat calls. The triggering system allows the device to start recording as a sound is detected. The D500X detects the full spectrum of ultrasound and records in real time. It provides much more detailed data than either frequency division or time expansion detectors. The D500x units were pre-programed to record all bat-passes occurring during the period between 30 minutes before sunset and 30 minutes after sunrise throughout the survey. The units used were Mark II units, powered by internal batteries, as the survey area was too exposed to human interference to utilise external batteries. The locations of the D500X monitors is illustrated in Figure 6.

2.2.6.2 Emergence survey utilising hand-held detectors

An emergence survey was undertaken on the night of the 2nd of July under optimal conditions. The survey was undertaken from approximately 21:30 until 23:30 (sunset approximately 22:00). A transect was walked through the survey area with all bats encountered recorded utilising a Pettersson D1000x and an Echometer EM3+. The route taken is illustrated in Figure 9.

Figure 6: Map identifying locations of Pettersson D500x units

Figure 7: Pettersson D500x mounted on a tree beside the River Dodder

Figure 8: Location of Pettersson D500x over river Dodder

Figure 9: Route walked (just over 8km) during emergence survey (mapmywalk)

2.2.7 Selected Invertebrate Groups

2.2.7.1 Invertebrate Survey of the River Dodder

Kick/sweep sampling of the River Dodder was undertaken on the 2nd July 2019 at 4 locations. The samples were returned to the FERS office and the primary groups of invertebrates occurring at each location identified. A map indicating the sampling points is illustrated in Figure 10.

Figure 10: Approximate locations of Invertebrate Sampling Points (SP)

2.2.7.2 Butterfly

The diversity of Butterfly species occurring on site was surveyed by Ciarán Byrne on the mid-morning of 24th June 2019 under suitable conditions following a modified version of the methodology utilised for the National Butterfly Monitoring Scheme as run by the National Biodiversity Data Centre. Line transects were walked and all butterfly species (and any day-flying moth species) observed recorded.

2.2.7.3 Bees and Bumblebees

The diversity of Bee and Bumblebee species occurring on site was surveyed by Dr Emma Reeves on the mid-morning of 24th June 2019 under suitable conditions following a modified version of the methodology utilised for the National Bumblebee Monitoring Scheme as run by the National Biodiversity Data Centre.

2.2.8 GIS

Habitat mapping was achieved utilising standard methodologies and according to best practice (Smith *et al* 2011). Habitats having been identified and surveyed from field maps, field maps were digitised. Habitats were mapped as polygons or lines.

3 Results

3.1 Desk Study

3.1.1 National Parks and Wildlife Service database

This section of the desk study primarily involved the consultation of the NPWS data-base, which is publicly accessible. A GIS-based analysis of sites designated for conservation interests (Special Area of Conservation (SAC), Special Protection Area (SPA), Natural Heritage Area (NHA) and Proposed Natural Heritage Area(pNHA)) occurring within 2.5 km of the survey areas was undertaken. There are no NHAs or SPAs occurring within 2.5 km of the survey area. There is one site designated as a SAC (Glenasmole Valley SAC) and two sites designated as a pNHA (Dodder Valley pNHA, which is within the study area and the Glenasmole Valley pNHA) occurring within 2.5 km of the survey area. Of note, the River Dodder provides an ecological and physical link between the study area and the Glenasmole Valley SAC. Maps indicating the location of these designated sites relative to the study area are indicated in Figure 11 and Figure 12. The presence of a S-P-R linkage between the study site and the Glenasmole Valley SAC indicates that Appropriate Assessment of the proposed development is required. A rather outdated site synopsis of the Dodder Valley pNHA is recorded with in the NPWS pNHA Site Synopsis Portfolio. A site synopsis for the Glenasmole Valley pNHA is not recorded within the Portfolio presumably as it has been superseded by the relevant documentation of the Glenasmole Valley SAC.

The description (16/11/2009) of the Dodder Valley pNHA states "*…This stretch of the River Dodder extends for about 2 km between Firhouse Bridge and Oldbawn Bridge in the south-west of Dublin City. The vegetation consists of woodland scrub mainly of willows (Salix spp.), but up to thirteen species of tree have been recorded. The understorey vegetation contains a good variety of plant species, including Early-purple Orchid (Orchis mascula) and Bugle (Ajuga reptans). Along the banks there are wild flower meadows with a good diversity of plant species. There is also a pond in the river bed at Firville which has flourished greatly since the floods of 1986. Forty-eight bird species have been recorded recently in the area, including Little Grebe, Kingfisher, Dipper and Grey Wagtail. Part of the river bank supports a Sand Martin colony of up to 100 pairs. The site represents the last remaining stretch of natural river bank vegetation on the River Dodder in the built-up Greater Dublin Area…*". Of note, the site synopsis makes no reference to the presence of Green Figwort (*Scrophularia umbrosa*), a Red Data Book species found frequently during the field surveys.

Figure 11: Study area relative to proposed Natural Heritage Areas

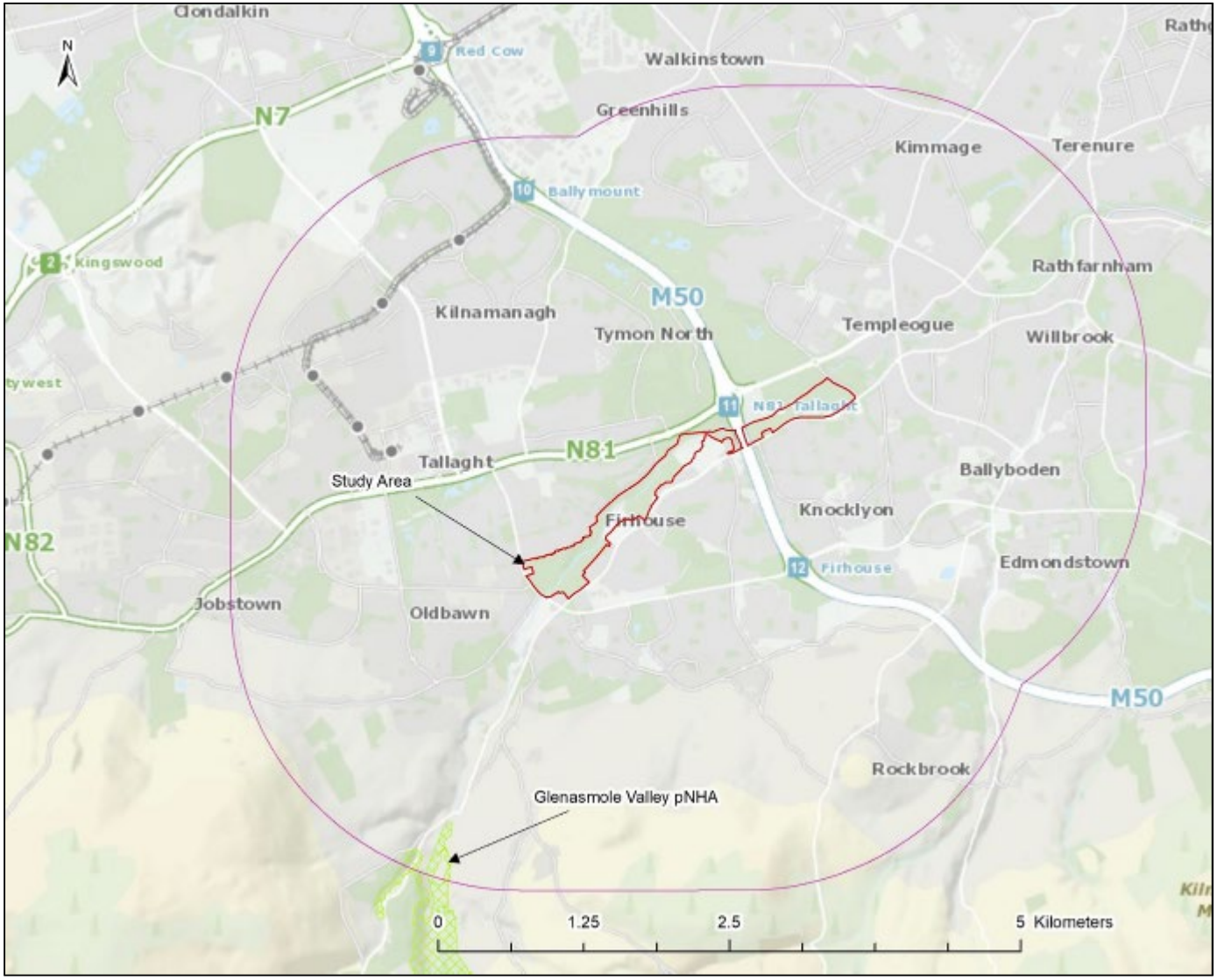

Figure 12: Study area relative to Special Areas of Conservation

The Glenasmole Valley SAC is described in the Natura 2000 data form (updated 09/2017) as "*…Glenasmole Valley lies at the northern foothills of the Dublin and Wicklow Mountains. It is a glaciated valley, with drift deposits, consisting of fluvioglacial sands and gravels of varying thickness and rich in Carboniferous limestone, occurring on the slopes. Spring lines occur along both sides of the northern part of the valley. The River Dodder flows through the valley and within the site the river has been impounded to form two reservoirs. Associated with the reservoirs are areas of swamp and marsh vegetation. The valley is heavily wooded, mostly with mixed woodland of both deciduous and coniferous species but also some native woodland. Dry calcareous pasture grassland, improved to varying degrees, is a main habitat of the valley sides and occurs in association with wet grassland and, in places of seepage, fen or marsh type vegetation. The site has important examples of petrifying springs. The physical and chemical properties of the springs have been studied. Good examples of orchid rich calcareous grassland, including Pseudorchis albida (legally protected) and Orchis morio (Red Data Book species) are found. The quality of grassland is variable owing to agricultural improvement. Molinia meadows are also represented. Several other Red Data Book plant species occur, along with a host of rare or scarce plant species for Co. Dublin. The botany of this site has been well studied since the 19th century. The site has Alcedo atthis, and is important for bats, with four Red Data Book species present (Pipistrellus pipistrellus, Nyctalus leisleri, Myotis daubentoni, Plecotus auritus…*".

3.1.2 National Biodiversity Data Centre database

The NBDC database was accessed on 24/06/19 to query records occurring within the vicinity of the project area. This area is very well recorded and for this reason, a custom polygon surrounding the survey area was created and queried. (see Figure 13). The species of conservation concern as recorded within this polygon are illustrated in Table 2.

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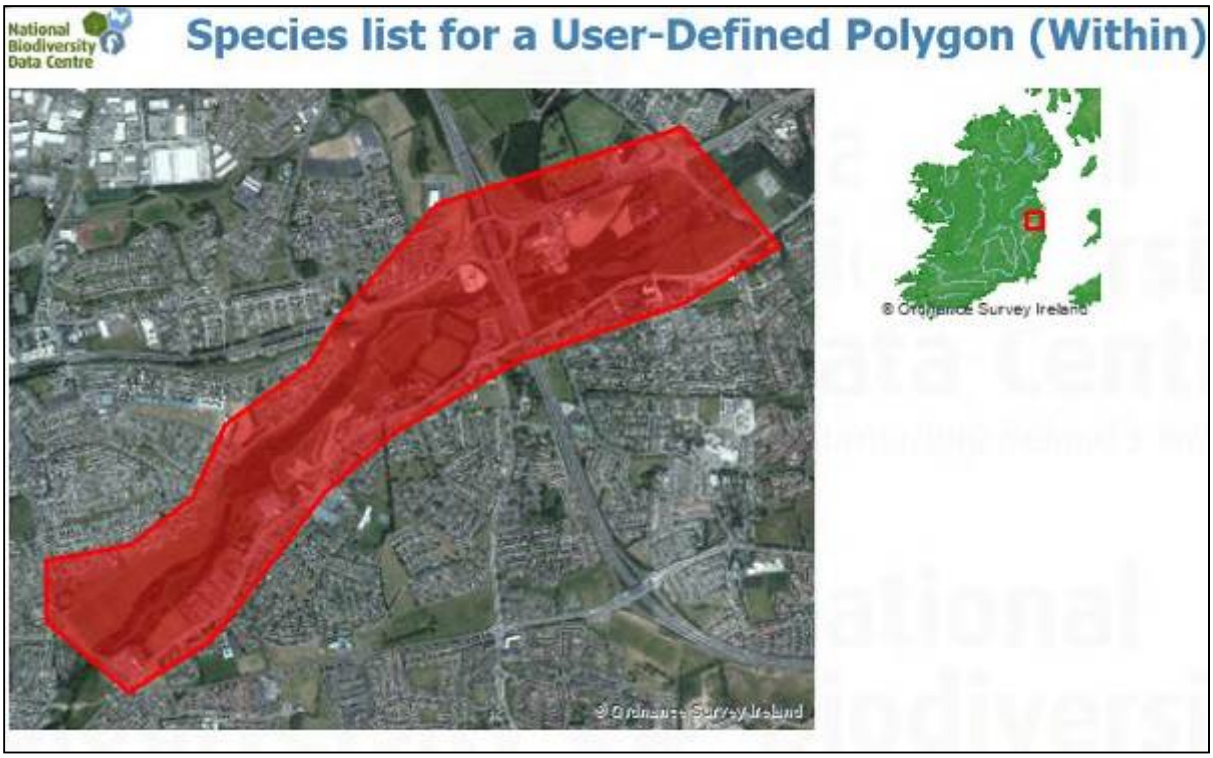

Figure 13: Location of polygon queried (National Biodiversity Data Centre)

Table 2: Species recorded within the user-defined polygon

Common Name	Scientific Name
Black-headed Gull	*Larus ridibundus*
Common Blackbird	*Turdus merula*
Eurasian Collared Dove	*Streptopelia decaocto*
Eurasian Teal	*Anas crecca*
Goldcrest	*Regulus regulus*
Great Cormorant	*Phalacrocorax carbo*
Grey Wagtail	*Motacilla cinerea*
Hedge Accentor	*Prunella modularis*
Hooded Crow	*Corvus cornix*
Mallard	*Anas platyrhynchos*
White-throated Dipper	*Cinclus cinclus*
Giant Hogweed	*Heracleum mantegazzianum*
Indian Balsam	*Impatiens glandulifera*
Winter Heliotrope	*Petasites fragrans*
Yellow-rattle	*Rhinanthus minor*
Harlequin Ladybird	*Harmonia axyridis*

Common Name	Scientific Name
Common Blue	*Polyommatus icarus*
Green-veined White	*Pieris napi*
Holly Blue	*Celastrina argiolus*
Large White	*Pieris brassicae*
Meadow Brown	*Maniola jurtina*
Orange-tip	*Anthocharis cardamines*
Painted Lady	*Vanessa cardui*
Peacock	*Inachis io*
Red Admiral	*Vanessa atalanta*
Ringlet	*Aphantopus hyperantus*
Small Copper	*Lycaena phlaeas*
Small Heath	*Coenonympha pamphilus*
Small Tortoiseshell	*Aglais urticae*
Small White	*Pieris rapae*
Speckled Wood	*Pararge aegeria*
White tailed Bumblebee	*Bombus lucorum agg.*
Buff-tailed Bumblebee	*Bombus terrestris*
Common Carder Bee	*Bombus (thoracombus) pascuorum*
Early Bumble Bee	*Bombus (Pyrobombus) pratorum*
Large Red-tailed Bumble Bee	*Bombus (melanobombus) lapidarius*
Moss Carder-bee	*Bombus (thoracombus) muscorum*
Mayfly	*Alainites muticus*
Mayfly	*Baetis rhodani*
Mayfly	*Centroptilum luteolum*
Mayfly	*Electrogena lateralis*
Mayfly	*Rhithrogena semicolorata*
Mayfly	*Serratella ignita*
Cinnabar	*Tyria jacobaeae*
Garden Grass-veneer	*Chrysoteuchia culmella*
Red Underwing	*Catocala nupta*
	Udea lutealis
Stonefly	*Amphinemura sulcicollis*

Common Name	Scientific Name
Stonefly	*Isoperla grammatica*
American Mink	*Mustela vison*
Daubenton's Bat	*Myotis daubentonii*
Eastern Grey Squirrel	*Sciurus carolinensis*
Eurasian Badger	*Meles meles*
European Otter	*Lutra lutra*
European Rabbit	*Oryctolagus cuniculus*
Lesser Noctule	*Nyctalus leisleri*
Pipistrelle	*Pipistrellus pipistrellus sensu lato*
Red Fox	*Vulpes vulpes*
Soprano Pipistrelle	*Pipistrellus pygmaeus*

3.2 Field Surveys

3.2.1 Botanical/Habitat surveys

In excess of 200 species of vascular plant were recorded within the study area. The Red Data List species, Green Figwort (*Scrophularia umbrosa*) was found frequently along several sections of the River Dodder. Of note, two species listed on Part (1) of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations of 2011 occur within the study area, Japanese Knotweed (*Fallopia japonica*) and Himalayan Balsam (*Impatiens glandulifera*). Knotweed is widespread, with significant populations occurring at several sites within the Park, particularly along the River Dodder. Himalayan Balsam was present along the River Dodder. A full species list of all species of flora recorded is presented in Appendix I - Complete List of vascular Flora observed during surveys. A habitat map is presented in Appendix II. A description of the habitats observed, and the dominant species present within habitat types are presented in the following sections, along with photographs of representative areas of habitat.

3.2.1.1 Freshwater habitats

3.2.1.1.1 River Dodder - FW2

The section of the River Dodder flowing through the study area corresponds to the Depositing/lowland river - FW2 habitat category. Gradients along this section of the river are low and consequently river flow is slow. Both in-stream and emergent vegetation are limited, dominated by a limited number of species. Along the margins of the river emergent vegetation comprised mainly Hemlock Water-dropwort (*Oenanthe crocata*), Butterbur (*Petasites* hybridus), Water-cress (*Nasturtium officinale*) and Fool's-water-cress (*Apium nodiflorum*). Green Figwort (*Scrophularia umbrosa*), a species assessed as "Near Threatened" in the 2016 Irish Red List of Vascular Plants was also found along sections of the River Dodder. Much of the habitats occurring within the park are relatively new, with a paucity of moss and liverwort species. Along the banks of the Dodder in suitable habitat, however, *Hookeria lucens, Plagiomnium undulatum, Pellia epiphylla* and various *Bryum* species are abundant.

Figure 14: Section of FW2 along the River Dodder

3.2.1.2 Grassland habitats

3.2.1.2.1 Amenity grassland - GA2

Amenity grassland accounts for a large proportion of grassland habitat within the study area. This comprises large areas of regularly mown grassland managed as playing pitches. Subject to a regular mowing regime, species diversity is relatively low with a limited number of graminoids including Perennial Rye-grass (*Lolium* perenne), Creeping Bent (*Agrostis stolonifera*), Crested Dog's-tail (*Cynosurus cristatus*) and Cock's-foot (*Dactylis glomerata*) dominating the sward. The broadleaved herb component typically comprises few broadleaved herbs including White Clover (*Trifolium repens*), Ribwort Plantain (*Plantago lanceolata*), Common Mouse-ear (*Cerastium fontanum*), Daisy (*Bellis perennis*), Creeping Buttercup (*Ranunculus* repens) and Dandelion (*Taraxacum* agg.).

Figure 15: GA2 amenity grassland

3.2.1.2.2 Dry calcareous and neutral grassland

Throughout the site, in suitable conditions, areas of dry calcareous grassland occur. This grassland type is best described as "Dry Calcareous and Neutral Grassland - GS1" according to Fossitt and vegetation type 3f *Festuca rubra-Lotus corniculatus* grassland under the Irish Semi-Natural Grasslands (ISGS) classification). This habitat is confined to two main areas within the site, a field within the eastern half of the site and an area of sloping ground along the River Dodder within the western half. Another area of GS1 which appears to have been seeded is located on raised ground adjoining a car park.

Areas of GS1 within the site typically form a mosaic with areas of GSi2 grassland. Where GSi2 grassland grades into GS1 grassland, tall, tussocky grasses become less frequent. In these areas the dominant grass species comprise Sweet Vernal-grass (*Anthoxanthum odoratum*) and Red Fescue (*Festuca rubra*) along with frequent Quaking-grass (*Briza media*). The broadleaved herb component includes Common Knapweed (*Centaurea nigra*), Common Restharrow (*Ononis repens*), Lady's Bedstraw (*Galium verum*), Cowslip (*Primula veris*), Red Clover (*Trifolium pratense*), Hairy Sedge (*Carex hirta*), Fairy Flax (*Linum catharticum*), Bird's-foot-trefoil (*Lotus corniculatus*), Meadow Vetchling (*Lathyrus pratensis*), Field Wood-rush (*Luzula campestris*) and Sticky Mouse-ear (*Cerastium glomeratum*). The orchids Pyramidal Orchid (*Anacamptis pyramidalis*) and Common Spotted-orchid (*Dactylorhiza fuchsii*) were recorded as occasional within areas of GS1 in both eastern and western sections of the site. In areas of GS1 along sloping ground in the western half of the site succession to scrub/woodland was noted with several oak and alder saplings.

Figure 16: GS1 grassland (left) & Pyramidal Orchid (right)

Figure 17: Ash saplings within GS1 grassland

A third area of GS1 with a markedly different species composition is located on raised ground adjoining the car park in the middle section of the site. In particular, the presence and high frequency of Fodder Burnet (*Poterium sanguisorba subsp. balearicum*) would suggest that this area of grassland was originally seeded with a seed mix.

Figure 18: Fodder Burnet within area of GS1

Dominant graminoids in this area of GS1 include Red Fescue (*Festuca rubra*), False Oat-grass (*Arrhenatherum elatius*) and Quaking-grass (*Briza media*). The broadleaved herb component is dominated by Meadow Vetchling (*Lathyrus pratensis*), Bird's-foot-trefoil (*Lotus corniculatus*), Red Clover (*Trifolium pratense*), Bush Vetch (*Vicia sepium*), Tufted Vetch (*Vicia cracca*), Wild Carrot

(*Daucus carota subsp carota*) and Common Knapweed (*Centaurea nigra*). Other occasional herbs included Oxeye Daisy (*Leucanthemum vulgare*), Hedge Bedstraw (*Galium album*) and Kidney Vetch (*Anthyllis* vulneraria), Wild Marjoram (*Origanum vulgare*). Winter Heliotrope (*Petasites fragrans*) was recorded as frequent on the north-eastern slope adjoining the pathway.

Figure 19: GS1 area with Quaking-grass dominant

3.2.1.2.3 Dry meadows and grassy verges - GS2

A large proportion of grassland throughout the site which is not subject to regular mowing comprises tall, rank swards dominated by a limited number coarse, competitive species. This grassland type is best described as improved dry meadow ("Dry Meadows and Grassy Verges - GSi2" according to Fossitt and vegetation type 3c *Festuca rubra* - *Plantago lanceolata* grassland under the Irish Semi-Natural Grasslands (ISGS) classification).

Figure 20: GSi2 grassland along pathway

Species composition is relatively uniform across the site with tall, tussocky grasses False Oat-grass (*Arrhenatherum elatius*) and Cock's-foot (*Dactylis glomerata*) dominating the sward. Perennial Rye-grass (*Lolium perenne*) is abundant in some areas of GSi2. Wall Barley (*Hordeum murinum*) was abundant at park entrances within GSi2 habitat along the base of walls where grass remained uncut.

Figure 21: GSi2 grassland dominated by Dactylis glomerata & Arrhenatherum elatius

Typical broadleaved herb species include Hogweed (*Heracleum sphondylium*), Meadow Buttercup (*Ranunculus acris*), Creeping Thistle (*Cirsium arvense*), Ribwort Plantain (*Plantago lanceolata*), Common Knapweed (*Centaurea nigra*), Yarrow (*Achillea* millefolium), Common Mouse-ear (*Cerastium fontanum*), Bush Vetch (*Vicia sepium*), Common Vetch (*Vicia* sativa), Red Clover (*Trifolium* pratense), Cut-leaved Crane's-bill (*Geranium* dissectum), Creeping Cinquefoil (*Potentilla* reptans), Common

Sorrel (*Rumex acetosa*), Dandelion (*Taraxacum* agg.), Meadow Vetchling (*Lathyrus pratensis*) and Great Willowherb (*Epilobium hirsutum*).

In some areas of GSi2 adjoining pathways the annual crucifer Bastard Cabbage (*Rapistrum rugosum*) is abundant and dominates larges areas, reaching a height of 1m. Areas adjoining pathways also had a higher frequency of ruderal species including Wild Turnip (*Brassica rapa subsp. campestris*), Charlock (*Sinapis arvensis*) and Curled Dock (*Rumex crispus*). Sulphur Cinquefoil (*Potentilla recta*), a species with a limited number of Irish records of naturalisation was found within an area of GSi2 in the middle section of the site.

Figure 22: Sulphur Cinquefoil (left) & Bastard Cabbage (right) within areas of GSi2

3.2.1.2.4 Wet grassland - GS4

Wet grassland is confined to a flushed area in the eastern half of the site where Hard Rush (*Juncus inflexus*) and sedges Glaucous Sedge (*Carex flacca*), Hairy Sedge (*Carex hirta*) and False Fox-sedge (*Carex otrubae*) are the main components of the vegetation. Frequent species include Meadowsweet (*Filipendula ulmaria*), Great Willowherb (*Epilobium hirsutum*), Meadow Buttercup (*Ranunculus acris*), Silverweed (*Potentilla anserina*), Common Spike-rush (*Eleocharis palustris*) and Field Horsetail (*Equisetum arvense*).

Figure 23: GS4 Wet grassland

3.2.1.3 Woodland and Scrub habitats

This category of habitat is dominated by structural elements comprised of trees, shrubs or brambles. Woodland habitat is dominated by trees, with canopy height typically greater than 5m. The primary division in woodland habitat classification concerns the nature of the woodland vegetation – chiefly whether the species are native or non-native. Also included here are hedgerow/treeline habitats and scrub habitats. Moss and liverwort species diversity is rather poor owing to the nature of much of the woodland. Common species such as *Radula complanata, Graphis scripta, Plagiomnium undulatum, Brachythecium rutabulum* and *Hypnum* spp occur in older areas of wooded habitat, and along the River Dodder riparian woodland area.

3.2.1.3.1 Mixed broadleaved woodland - WD1

Mixed broadleaved woodland stands of varying sizes, ages and species compositions are found throughout the survey area, ranging from small isolated blocks to more extensive wooded areas along the River Dodder.

The majority of these stands have originated from planting with canopies typically dominated by non-native tree species. Native planted species include Pedunculate Oak (*Quercus* robur), Alder (*Alnus* glutinosa), Silver Birch (*Betula* pendula), Downy Birch (*Betula* pubescens), Aspen (*Populus* tremula), Wild Cherry (*Prunus* avium), Hazel (*Corylus* avellana) and Rowan (*Sorbus* aucuparia). Non-native trees include Sycamore (*Acer* pseudoplatanus), Norway Maple (Acer *platanoides*), Italian Alder (*Alnus*

cordata), Grey Alder (*Alnus incana*), Hornbeam (*Carpinus betulus*), Beech (*Fagus* sylvatica), Horse-chesnut (*Aesculus hipposcastanum*) and Small-leaved Lime (*Tilia cordata*).

Figure 24: WD1 with Ash, Italian Alder, Wild Cherry, Small-leaved Lime, Pedunculate Oak & Beech

The ground flora in the majority of these planted stands is typically poor. Younger, densely planted stands are dominated by grasses with little or no woodland flora evident. Grass species including Rough Meadow-grass (*Poa trivialis*), Cock's-foot (*Dactylis glomerata*) and Perennial Rye-grass (*Lolium perenne*) constitute the main elements of the ground flora in these areas. Other broadleaved herbs include Meadow Buttercup (*Ranunculus acris*) and Bush Vetch *(Vicia sepium*). In areas with more open canopies species including Cow Parsley (*Anthriscus sylvestris*), Hogweed *(Heracleum sphondylium*), Nettle (*Urtica dioica*) and Wood Avens (*Geum urbanum*) are commonly found.

Figure 25: WD1 mixed deciduous woodland flora dominated by Cow Parsley & Hogweed

In areas of mature planted deciduous woodland the ground flora was also poorly developed. These areas were characterised by a large areas of bare ground, high litter percentages and a high percentage of small diameter deadwood. Bryophyte cover was poor, dominated by few species. The shrub layer was typically poorly developed and ground flora was dominated by Ivy (*Hedera hibernica*) in many areas.

Figure 26: Stand of Norway Maple with poorly developed ground flora

3.2.1.3.2 Riparian woodland - WN5

Riparian woodland is fragmented along the River Dodder and the original wet woodland along the river margins has largely been replaced or altered by plantings. Riparian woodland along more natural sections of the River Dodder comprises mature willows including Grey Willow (*Salix cinerea*) and Crack-willow (*Salix fragilis*) along with frequent Ash (*Fraxinus excelsior*), Alder (*Alnus glutinosa*) and occasional Sycamore (*Acer pseudoplatanus*). The field layer comprises species including Nettle (*Urtica dioica*), Wild Angelica (*Angelica sylvestris*), Pendulous Sedge (*Carex pendula*), Wood Dock (*Rumex sanguineus*), Common Figwort (*Scrophularia nodosa*), Remote Sedge (*Carex remota*), Hemlock Water-dropwort (*Oenanthe crocata*) and Tutsan (*Hypericum androsaemum*). Along the margins of the river wetland herbs including Water-cress (*Nasturtium officinale*) and Fool's-water-cress (*Apium nodiflorum*) were found. Green Figwort (*Scrophularia umbrosa*), a species assessed as "Near Threatened" in the 2016 Irish Red List of Vascular Plants was found along sections of the River Dodder.

Figure 27: WN5 riparian woodland along River Dodder

3.2.1.3.3 Treelines - WL2

Treelines, single lines of trees greater than 5m in height are occasional within the study area and are mainly found in the eastern half of the site. The main tree species include Ash (*Fraxinus excelsior*), and Wych Elm (*Ulmus glabra*) with occasional Scots Pine (*Pinus sylvestris*) and Small-leaved Lime (*Tilia cordata*). Shrub species include Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*) and Elder (*Sambucus nigra*) along with occasional Dog-rose (*Rosa canina*). The ground flora along treelines is typically dominated by ruderals.

Figure 28: Mature WL2 treeline with Ash

3.2.1.3.4 Scrub - WS1

This broad category of habitat includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. The canopy height is generally less than 5 m. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland. In the absence of grazing and mowing, scrub can expand to replace grassland. This habitat within the Park is commonly found along woodland margins, within areas of grassland not actively managed, and along the banks of the River Dodder. Scrub habitat is fragmented across the site and often occurs in a mosaic woodland and grassland habitats.

Typical species within scrub habitat included Gorse (*Ulex europaeus*), Bramble (*Rubus fruticosus* ag.), Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*), Dog-rose (*Rosa canina*) and Elder (*Sambucus nigra*). The broadleaved herb component is limited with species including Nettle (*Urtica dioica*), Hogweed (*Heracleum sphondylium*) and Creeping Thistle (*Cirsium arvense*).

Figure 29: WS1 Scrub dominated by Gorse

3.2.1.4 Exposed Rock and Disturbed ground habitats

3.2.1.4.1 Recolonising bare ground - ED3

There are several areas of ED3 habitat throughout the Park in disturbed areas. These revegetating areas are dominated by ruderals, with species such as Bastard Cabbage (*Rapistrum* rugosum), Wild Turnip (*Brassica rapa subsp. Campestris*) and Charlock (*Sinapsis arvensis*).

3.2.1.4.2 Buildings and artificial surfaces - BL3

This habitat includes all buildings and various areas of hard-standing that are covered with artificial surfaces. This habitat is comprised mainly of the network of pathways and cycle paths, in addition to car-parking areas to accommodate visitors to the Park.

3.2.2 Hedgerow Survey

Details of the hedgerow surveys are indicated in Appendix III. Hedgerow surveys carried out in June recorded 13 tree, shrub and woody climber species (Table 3) as occurring within the hedgerow network. Hedgerows (WL1) and treelines (WL2) subject to assessment are limited within the site to 4 qualifying features. Three of these features were classified as treelines (WL2), while the remaining feature was classified as hedgerow (WL1).

Ash (*Fraxinus excelsior*), Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*) and Elder (*Sambucus nigra*) were by far the most frequently occurring species. Other common components included *Rubus fruticosus*, *Rosa canina* and *Acer pseudoplatanus*.

Table 3: Tree, shrub and woody climber species observed within the Dodder River Valley Park

Species name	Common name	Number of hedgerows
Acer pseudoplatanus	Sycamore	2
Crataegus monogyna	Hawthorn	3
Cupressus macrocarpa	Monterey Cypress	1
Fagus sylvatica	Beech	1
Fraxinus excelsior	Ash	3
Hedera hibernica	Atlantic Ivy	2
Ilex aquifolium	Holly	1
Pinus sylvestris	Scots Pine	1
Prunus spinosa	Blackthorn	3
Rosa canina	Dog-rose	2
Sambucus nigra	Elder	3
Tilia cordata	Small-leaved Lime	1
Ulmus glabra	Wych Elm	2

Ground flora species at the base of the hedgerow, some of which can indicate hedgerow age or origin were recorded along each 30m sample strip. Hedgerow ground flora was predominantly dominated by ruderal species including Creeping Thistle (*Cirsium arvense*), Hogweed (*Heracleum sphondylium*), Nettle (*Urtica dioica*), Broad-leaved Dock (*Rumex obtusifolius*), Ribwort Plantain (*Plantago lanceolata*) and Creeping Buttercup (*Ranunculus repens*).

3.2.3 Species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations of 2011

Two species of plant listed on Part (1) of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations of 2011 were observed to occur within the study area, namely:

- *Fallopia japonica;* and
- *Impatiens glandulifera*

In addition, Snowberry was found at several locations. During an instream survey of the River Dodder for Kingfisher and Otter, Japanese Knotweed was observed to occur in small populations regularly along much of the stretch of the Dodder surveyed.

Table 4: Populations of Third Schedule (and Snowberry) observed

Species name	Common name	Grid reference	Comment
Fallopia japonica	Japanese Knotweed	O 12168 28051	Approximately 10 metres squared
Fallopia japonica	Japanese Knotweed	O 11715 27894	1 plant within River Dodder channel
Fallopia japonica	Japanese Knotweed	O 09982 26580	1 plant along southern bank of River Dodder
Fallopia japonica	Japanese Knotweed	O 09733 26330	1 plant at Oldbawn Bridge
Fallopia japonica	Japanese Knotweed	O 09791 26295	Approximately 15 metres squared. Some plants previously treated and showing regrowth
Fallopia japonica	Japanese Knotweed	Various	In-stream survey of Dodder indicated that Japanese Knotweed is present in small populations along much of the Dodder within study area
Impatiens glandulifera	Himalayan Balsam	O 12127 28221	Growing at edge of Dodder under overpass on gabions
Leycesteria formosa	Snowberry	O 12233 28087	Invasive but not listed in 3rd Schedule
Leycesteria formosa	Snowberry	O 11694 27850	Invasive but not listed in 3rd Schedule
Leycesteria formosa	Snowberry	O 11728 27819	Invasive but not listed in 3rd Schedule

Figure 30: One of many smaller populations of Japanese Knotweed occurring along the Dodder

Figure 31: Himalayan Balsam occurring under overpass at Cherrywood

3.2.4 Species of note – Green Figwort

The Green Figwort, *Scrophularia umbrosa* is generally very similar to *S. auriculata* in appearance and occurs primarily along river banks. It differs from *S. auriculata* in that stem-angles are more broadly winged. Leaves are acute to obtuse and serrate. A basal rosette is present and the leaves have a distinctive, fetid smell. The staminode is bifid, or with two divergent lobes at the apex. Microscopically, stomata occur on the lower surface of the leaf only. Green Figwort is very rare and is recorded primarily from the banks of the river Liffey and river Bann. Green Figwort is listed in the Irish Red Data Book.

It should be noted that identification of *umbrosa* vs *auriculata* based on leaf-shape or the degree of wingedness of the stems is inconclusive, owing to the large degree of variation in these characteristics and identification was based on the presence of a significantly winged stem, in combination with a bifid staminode (see Figure 32). It is important to note that a bifid staminode alone is not an indication of *S. umbrosa*, as the staminode of *S. nodosa* can be emarginated.

Figure 32: Macro photograph of *S. umbrosa*, showing bifid staminode (Patrick Moran)

Figure 33: *S. umbrosa* occurring immediately adjacent to the River Dodder

Bird Surveys

3.2.5 General bird surveys

A total of 38 species of bird were observed to occur within the survey area (see Table 5). Buzzard and Sparrowhawk (young heard calling) were recorded, but no Kestrel were observed, which reflects the general decline in this species over the last decade. A good diversity of seed and insect-eating species were recorded within the survey area. Kingfisher were not observed although the habitat at the western end of the survey area along the Dodder Valley is possibly suitable for breeding purposes. Of concern, the Sand Martin colony mentioned in the NPWS pNHA Site Synopsis was not observed (this would appear to be an old account of the pNHA). Numerous pairs of Dipper occur along the stretch of the Dodder, and large flocks of Long-tailed Tit were also observed. No owls were observed during the bat emergence survey.

Table 5: Birds observed to be present on site

Common Name	Scientific Name
Sparrowhawk	*Accipiter nisus*
Long-tailed Tit	*Aegithalos caudatus*
Mallard	*Anas platyrhynchos*
Swift	*Apus apus*
Heron	*Ardea cinerea*
Buzzard	*Buteo buteo*
Goldfinch	*Carduelis carduelis*
Greenfinch	*Carduelis chloris*
Dipper	*Cinclus cinclus*
Wood Pigeon	*Columba palumbus*
Hooded Crow	*Corvus cornix*
Rook	*Corvus frugilegus*
Jackdaw	*Corvus monedula*
House Marten	*Delichon urbicum*
Robin	*Erithacus rubecula*
Chaffinch	*Fringilla coelebs*
Moorhen	*Gallinula chloropus*
Jay	*Garrulus glandarius*
Swallow	*Hirundo rustica*
Herring Gull	*Larus argentatus*
Linnet	*Linaria canabina*
Grey Wagtail	*Motacilla cinerea*
Bluetit	*Parus caeruleus*
Great Tit	*Parus major*
Chiffchaff	*Phylloscopus collybita*
Willow Warbler	*Phylloscopus trochillus*
Magpie	*Pica pica*
Dunnock	*Prunella modularis*
Bullfinch	*Pyrrhula pyrrhula*

Common Name	Scientific Name
Goldcrest	*Regulus regulus*
Collared Dove	*Streptopelia decaocto*
Starling	*Sturnus vulgaris*
Blackcap	*Sylvia atricapilla*
Little Grebe	*Tachybaptus ruficollis*
Wren	*Troglodytes troglodytes*
Blackbird	*Turdus merula*
Song Thrush	*Turdus philomelos*
Mistle Thrush	*Turdus viscivorous*

3.2.6 Kingfisher Surveys

Targeted Kingfisher surveys were carried out on the 18th (bankside) and 24th (instream) under optimal conditions (clear visibility, no rain, no wind). Kingfisher were not observed on either occasion, although there was potentially suitable breeding habitat along the western end of the riverbank.

Figure 34: Vertical banks potentially suitable for breeding Kingfisher (but appearing to be subject to disturbance)

3.3 Mammal Surveys

3.3.1 General Mammal surveys (including badger)

General mammal surveys were carried out throughout the survey period by Dr Patrick Moran, Dr Emma Reeves and Ciarán Byrne. Evidence was observed for Fox (*Vulpes vulpes*), Badger (*Meles meles*), Rabbit (*Oryctolagus cunniculus*), Brown Rat (*Rattus norvegicus*), Pygmy Shrew (*Sorex minutus*), Woodmouse (*Apodemus sylvaticus*) and Grey Squirrel (*Sciurus carolinensis*) during the general mammal surveys. Although badger setts were observed at several locations, there were no indications observed that any of these are currently occupied by badger. Rabbit appear to have occupied the majority of setts and at dusk there was observed to be a high density of rabbit throughout the site, with rabbits feeding in areas of short grass beside pathways. Two foxes were also observed shortly after sunset during the bat emergence survey. Asking several interested members of the public if they had seen badgers, they commented that they had not seen badgers in the area for approximately 5 years but had commonly seen them before this time. This is in agreement with trail camera footage. The trail cameras were triggered most frequently birds, but very often by dogs. There was a surprising lack of mammal activity in general, which is likely associated with the uncontrolled activity of dogs at the site off the lead. Indeed one video clip captured a fox hearing a human whistling for a dog and running away. It is possible that the human presence at the site early in the morning and late at night has discouraged badger from living permanently within the study area. It is highly likely that badger do use some setts on an outlier basis. The area is likely subject to too much disturbance to support breeding setts.

Figure 35: Fox was the most commonly recorded wild mammal at the western end of the park

Figure 36: Grey Squirrel

Figure 37: Trail cams were most frequently triggered by birds, in particular blackbird

Figure 38: Still from video footage -cameras were often triggered by dogs

Figure 39: Grey Squirrel was wild mammal most frequently triggering trail cam at the eastern end of the park

Figure 40: Camera at eastern end frequently triggered by dogs

It must be noted that the placement of cameras was strongly biased by the need to place cameras in areas at which chance discovery was low. Despite this, human activity was recorded on both cameras, indicating a high level of disturbance at the site.

3.3.2 Otter Survey

Given the nature of the habitat present within the survey area, it is almost certain that Otter pass through the site from time to time. It is unlikely that there are any Holts present owing to very heavy disturbance levels associated with dogs and humans. A potential old spraint was observed on a rock instream, but recent rain had washed of the spraint away and the spraint could not be definitively identified.

3.3.3 Bat Surveys

3.3.3.1 Passive Monitors

The identification of bats from the calls recorded on the Pettersson D500X was accomplished through a combination of sound-analysis software (Batsound and Sonochiro) and manual interpretation. Illustrations of a sample spectrograph of a Soprano Pipistrelle and the associated power spectrum of one of the calls attained utilising the Batsound software is shown in Figure 41 and Figure 42.

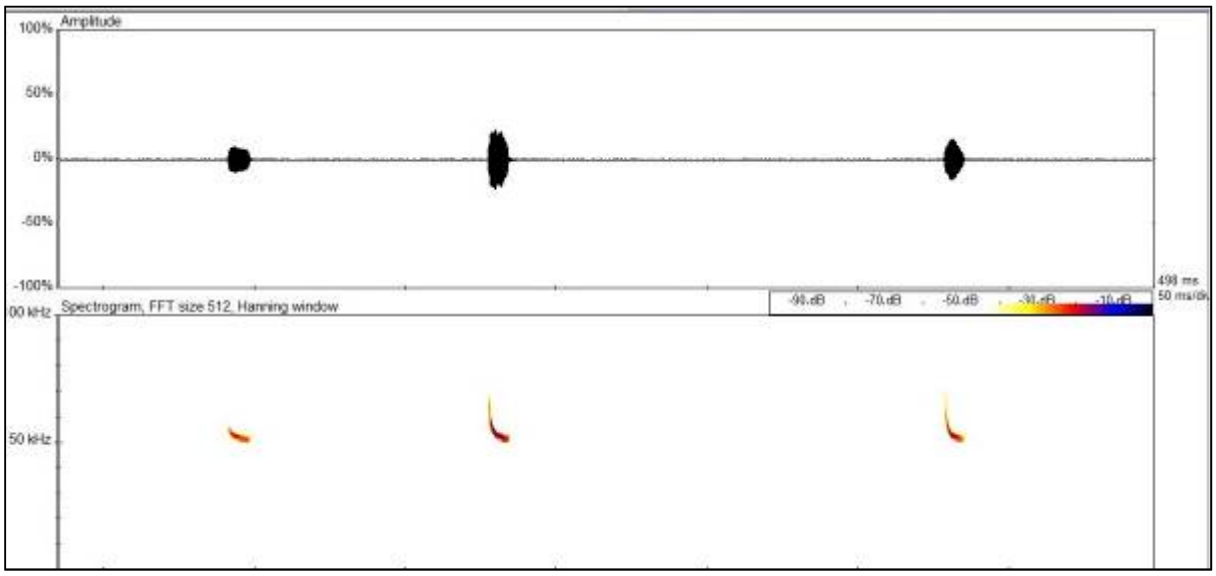

Figure 41: Spectrograph of the echolocation call of a soprano pipistrelle

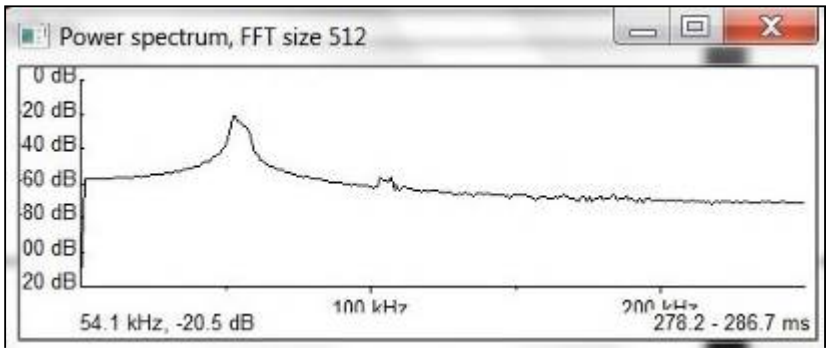

Figure 42: Power spectrum of one of the calls in Figure 41, showing that the maximum power of the call is at a frequency of 54.1 kHz

3.3.3.1.1 Western unit

The Pettersson D500x unit deployed on a bank-side tree at the western end of the survey area along the River Dodder recorded over the period between the 18th and 23rd of June 2019 with the

microphone at a right angle to the river approximately 1 metre above the water surface. There were over 450 bat passes recorded over the 5 nights of surveys, comprising a minimum of 4 species (owing to the cluttered environment and background noise associated with the flowing water, many calls could only be identified as *Myotis* species). Leisler's Bat (42 passes), Daubenton's Bat (24 passes), Common Pipistrelle (161 passes), Soprano Pipistrelle (175 passes) and *Myotis* species (64 passes) The most commonly recorded species was Soprano Pipistrelle. Emergence times would indicate that there is not a roost in the immediate vicinity.

3.3.3.1.2 Eastern Unit

The Pettersson D500x unit deployed on a fallen tree over the River Dodder recorded between the 18th and 21st of June 2019 with the microphone facing downstream in the centre of the watercourse. A higher degree of activity and increased background noise associated with the instream logs, etc. resulted in the batteries being utilised at a greater rate than the western unit. There were 894 bat passes recorded over the 4 nights of surveying, comprising a minimum of four species (owing to the cluttered environment and background noise associated with the flowing water, many calls could only be identified as *Myotis* species). Leisler's Bat (8 passes), Daubenton's Bat (4 passes), Common Pipistrelle (691 passes), Soprano Pipistrelle (160 passes) and *Myotis* species (31 passes). The most commonly recorded species by far was Common Pipistrelle. Bat passes of Common Pipistrelle commenced shortly after sunset, indicating a potential roost in the vicinity.

3.3.3.2 Emergence Survey

The emergence survey was undertaken on the night of the 2nd July 2019 under optimal conditions (starting temperature 16˚C, sunny, no wind, no rain, finishing temperature 12˚C) between 21:30 and 23:30 (sunset at approximately 22:00). The survey was undertaken while walking a transect through the site (just over 8 km in length) utilising Pettersson D1000x and Echometer EM3+ units. A total of 150 bat passes were recorded during the survey of four species (Leisler's Bat, Common Pipistrelle, Soprano Pipistrelle and Natterrer's Bat). Common Pipistrelle was the most commonly encountered species (101 bat passes), with Soprano Pipistrelle (27 bat passes) and Leisler's Bat (19 bat passes) also regularly encountered. Only three Natterer's bat passes were recorded, almost certainly the same individual. Natterer's was recorded along the path with wooded habitat on either side. No Daubenton's Bat were observed within the timeframe of the emergence survey.

3.4 Invertebrate survey of the River Dodder

11 Groups of invertebrates and two species of fish were encountered during the kick/sweep sampling of the River Dodder. The diversity decreased as the river passed through wooded habitat, being dominated by detritivores. Diversity was highest at the eastern end of the site, with fish recorded only from this sampling point, in addition to a minimum of 9 invertebrate groups. Diversity was lowest at the sampling point where the Dodder passes through relatively thick woodland (SP3), with samples almost entirely dominated by *Gammarus* and only three groups of invertebrates represented. Larger fish were observed "jumping" in deeper, slower flowing areas of the Dodder at the eastern end of the park.

Figure 43: Blackfly larva on leaf submerged in Dodder at SP1

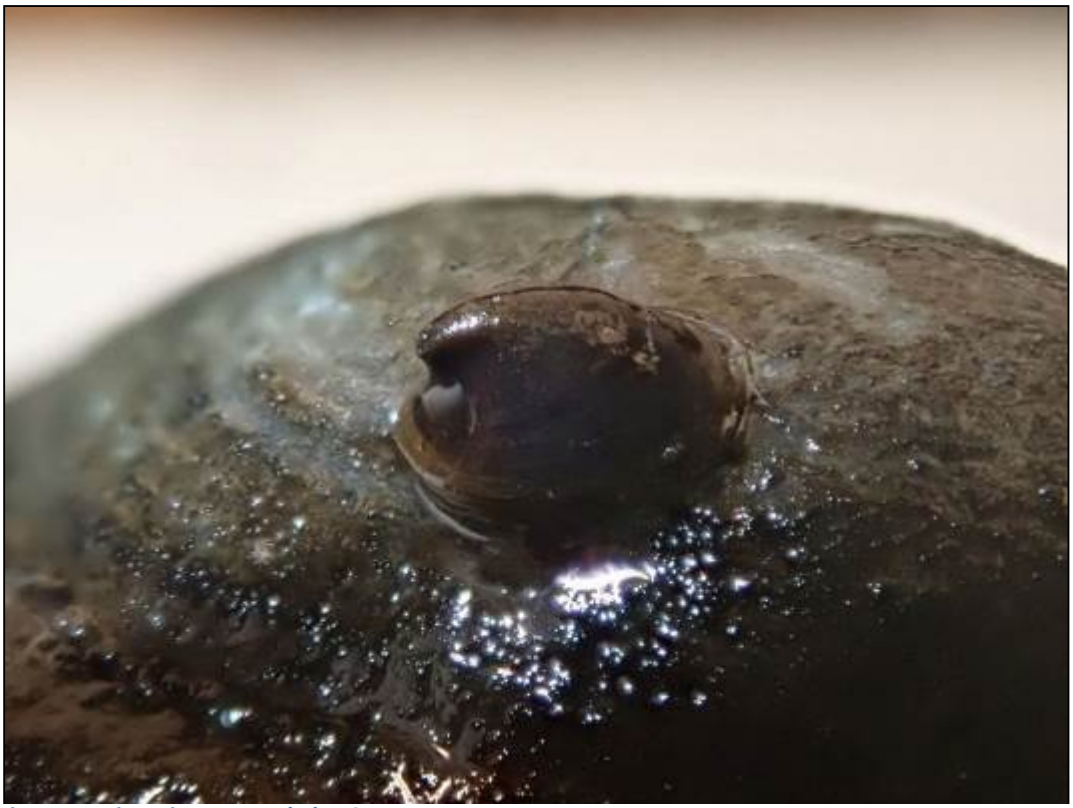

Figure 44: River Limpet sampled at SP4

Figure 45: Stoneloach sampled at SP4

3.5 Butterflies and Bees

The butterfly and bee surveys were undertaken under largely optimal conditions (minimum temperature 16˚C) although there was a light breeze on the day. The late Spring and early Summer has been rather wet in 2019, and there were low numbers and low diversity of butterfly species observed (only two of butterfly species were observed with one day-flying moth). It is likely that the diversity and overall numbers will be higher later in the Summer. Bee and bumblebee numbers and diversity was higher, but also would appear to have been impacted upon by a wet start to the summer. Numbers will likely be higher later in the summer.

Table 6: Buttlerfy and day-flying moth species observed

Species name	Common name
Aphantopus hyperantus	Ringlet
Pararge aegeria	Speckled Wood
Zygaena filipendulae	Six spot Burnet Moth

Figure 46: Six-spot Burnet Moth

Table 7: Bee & Bumblebee species observed

Species name	Common name
Apis mellifera	Honey Bee
Bombus lapidarius	Red-tailed Bumblebee
Bombus lucorum	White-tailed Bumblebee
Bombus pascuorum	Common Carder-bee
Bombus terrestris	Buff-tailed Bumblebee

Figure 47: Honey bee

Figure 48: Common Carder bee

Figure 49: Red-tailed bumblebee

4 Summary of findings

4.1 Elements or particular areas of specific potential for biodiversity or conservation interest;

The Dodder Valley Park within the study area represents a significant area (almost 75 ha) of grassland, woodland and freshwater habitats in an urban setting. As indicated by the status of the study area as a pNHA, the entire Dodder Valley Park is of significant biodiversity and conservation interest. Even areas of amenity grassland utilised as pitches are of significant biodiversity and conservation interest owing to the urban setting. These areas support a very large population of rabbit, which in turn are prey for numerous species. There are several elements of the study area of particular biodiversity and conservation interest.

4.2 River Dodder

The River Dodder itself is of National biodiversity and conservation interest. This watercourse provides an invaluable ecological corridor between the Wicklow Mountains (a site designated as both a Special Area of Conservation and a Special Protection Area) and the heart of Dublin city. The Dodder is known to support numerous species of conservation concern, including Otter and Kingfisher. Although the presence of either species was not noted during targeted surveys, these species certainly utilise the River Dodder at various times throughout the year. The degree of human (and dog) disturbance on site may have reduced the use of the river by these species. A significant bat population was recorded utilising the river Dodder corridor through the park as a commuting and foraging corridor. The lack of intensive lighting along the river corridor has likely permitted bat species such as Daubenton's Bat and Natterer's Bat to persist along this stretch of the river Dodder. Of particular note, although no Flora Protection Order Species were observed to occur, a significant population of the Red Data Book species Green Figwort (*Scrophularia umbrosa)* was observed to occur within and adjacent to the River Dodder.

4.3 Semi-natural Grassland

There is in excess of 20Ha of semi-natural grassland habitat present within the park (GS1, GS2 and GS4). This is reflected in a total of in excess of 200 species of vascular plant occurring within the study area. Given the urban nature of the surrounding habitat, these grassland habitats represent an invaluable biodiversity resource. Currently, the grasslands are of primarily botanical interest. With appropriate management, these habitats could potentially be of much higher biodiversity and conservation interest for invertebrates and avifauna.

4.4 Woodland and scrub habitats

The woodland and scrub habitats present within the park represent approximately 20 Ha of habitat of very high conservation and biodiversity importance given the location of the woodland resource along an important ecological corridor and the surrounding (urban) habitat. Much of the woodland habitat is in need of management. The woodland currently supports a relatively high diversity of bird species. With appropriate management, the biodiversity and conservation importance of the woodland habitat within the park could be greatly increased.

4.5 Elements with the potential to damage the ecological integrity of the study area, such as Alien Invasive Plant Species

There are occurring within the study area two species of plant listed in Part (1) of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations:

- Japanese Knotweed; and
- Himalayan Balsam.

4.5.1 Alien Invasive Plant Species

4.5.1.1 Japanese Knotweed

This plant is a rhizomatous perennial, capable of reaching 2m in height. This plant spreads exclusively by vegetative means, spreading very aggressively under disturbed conditions. The plant is capable of forming extensive monoculture stands. There is a negative impact on ecosystem function and biodiversity through a number of mechanisms – primarily through the shading-out of native plants due to the rapidity with which large stands of the plant can form. In addition, this plant has a deleterious effect on the banks of waterways owing to the fact that during the winter, when *F. japonica* dies back, there is little or no vegetation growing underneath, and hence nothing to prevent erosion of the bank. This species is well established in Ireland and is rapidly spreading throughout the country, especially by roadsides and along watercourses. Although most of the populations of this plant observed within the study area would appear to be undergoing eradication treatment, there are numerous populations within and immediately adjacent to the River Dodder that show no signs of treatment.

Figure 50: Japanese Knotweed immediately adjacent to the River Dodder

4.5.1.2 Himalayan Balsam

Impatiens glandulifera is one of the tallest annuals occurring in Europe, growing up to 150 cm. It is a native of the Himalayas and has rapidly become one of the most problematic of invasive species in Europe, particularly along watercourses. The dominance of large stands of *I. glandulifera* along watercourses causes problems for stream management in addition to the negative impact on native flora due to the formation of large monoculture stands. The massive production of nectar to induce pollinators, in addition to the "explosive" means by which seeds are spread (pods explode on contact, hurling seeds away from the parent plant) contribute to the ability of this plant to out-compete native species. This plant is rapidly becoming a serious threat to biodiversity along Ireland's waterways. Only a very small population of this species was observed to occur at the study area. This species, however, has the capacity to rapidly dominate an area in which it becomes established. Of some concern, this species tends to occur under the same conditions as *Scrophularia umbrosa*, to the detriment of *S. umbrosa*. The presence of Himalayan Balsam poses a significant threat to the (likely of National importance) continued existence of the population of this Red Data Book species.

Figure 51: Himalayan Balsam

4.5.2 Dogs not on a lead

There were observed to be high numbers of dogs off-lead throughout the study area. The disturbance associated with dogs has almost certainly resulted in a significant lowering of the potential biodiversity and conservation importance of the study area. In addition to potential impacts on species such as Otter and Badger, the presence of high numbers of dogs off-lead almost certainly prevents the use of the semi-natural grassland resource present by ground-nesting birds.

4.5.3 Dumping

There was observed throughout much of the study area significant evidence of dumping, including one area of woodland habitat in which it would appear that used sanitary towel containers are being emptied. Despite the presence of CCTV, there was also evidence of the dumping of furniture (see Figure 52).

Figure 52: Sofa and armchair dumped within the study area adjacent to the River Dodder

4.6 Presence and effectiveness of ecological corridors within the study area

The River Dodder and associated habitats occurring within the study area provide an invaluable ecological corridor within the study area, linking numerous ecological stepping stones (islands of habitat within the surrounding urban landscape). Given the location go the study area, and linkage with several Natura 2000 sites, the ecological corridor provided by the River Dodder and associated habitats are of National significance.

4.7 Conservation priorities regarding the identified biodiversity resource of the site

The conservation priorities regarding the identified biodiversity resource identified within the study area should be:

- To maintain and enhance the water quality of the River Dodder;
- To maintain and enhance the biodiversity of the semi-natural grassland habitats occurring;
- To maintain and enhance the biodiversity of the woodland habitats occurring;
- To control and/or eradicate species of Alien Invasive Plants occurring within the study area;
- To prevent off-lead dogs having free access to areas of ecological sensitivity; and
- If possible, to encourage people away from the River Dodder and immediately associated habitats.

4.8 Potential impacts and mitigation measures

The proposed development is limited to areas of lower ecological significance such as pathways and those areas immediately adjacent to pathways, carparks, grassland etc. It is not likely that the proposed development will directly impact on the ecological integrity of any element of the study area. It must be noted that the project is still at the "Preliminary Design" stage. The provision of play spaces and a play/sculptural trail may have the impact of drawing activity away from the River Dodder and habitats immediately adjacent and may improve the ecological integrity of the site. The exact location each of the elements should be subject to inspection by an ecologist prior to any construction to ensure that there will be no negative impacts associated with habitat disturbance.

There is always potential for contamination/pollution events to occur whenever construction is undertaken adjacent to water bodies. No major construction activities should be undertaken within 50m of the River Dodder. During all construction works, protection of water quality is paramount, and should be ensured by implementing the following:

Any contractor shall undertake all proposed works in such a manner as to avoid degradation of water quality by pollution (in particular, from hydrocarbons, chemicals.).

Specific measures to be taken to prevent the above shall include the following:

- The Undertaker's method statement should make specific reference to measures for the protection of water quality;
- Undertaker's plant, equipment etc. shall be free of any mechanical defects, and be well maintained so as to prevent soil or fuel leaks;
- Undertaker's plant, equipment etc. must arrive at the site free from propagules of any Alien Invasive Plant Species;

- The Undertaker's method statement should make specific reference to measures for the protection of water quality, to include measures to ensure no spillage of fuel or cement/lime-based material or any other leakages occur to any drains, etc. for the duration of the works;
- All works will be undertaken in accordance with the following best practice guidelines:
    - CIRIA Control of Water Pollution from Construction sites – Guidance for Consultants and Contactors (2001).
    - Eastern Regional Fisheries Board Guidance Notes 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Eastern Regional Fisheries Board, 2006);
    - NRA Guidelines (2006) NRA Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

The River Dodder and associated habitats are of high regional importance to bats, given the urban nature of the surrounding habitats. The lack of extensive lighting throughout the study area contributes to the occurrence of bat species such as Daubenton's Bat and Natterer's Bat in the area. There should be no lighting associated with any of the proposed development within sensitive habitats. Any lighting regime should be subject to a comprehensive assessment of potential impact on the utilisation of habitats present by bats.

4.9 Recommendations regarding future habitat management and ecological monitoring at the site; and

4.9.1 Habitat Management

There are a number of recommendations regarding future habitat management at the site:

- Key to the future habitat management of the survey area is the preparation and implementation of a comprehensive Biodiversity and Habitat Management Plan;
- It is imperative that an Alien Invasive Plant Control and Management Plan be prepared and implemented in order to ensure that Japanese Knotweed and/or Himalayan Balsam is not imported to, exported from or spread around the study area;
- There is currently an issue with regard to dogs being allowed to roam off-lead with the study area. This is almost certainly having an impact on the use of the habitat by mammals and ground-nesting birds;
- There is a very significant population of the Red Data Book species Green Figwort, occurring at the survey area. A Conservation Management Plan should be drawn up and implemented for this rare species; and
- There is significant activity of numerous species of bat within the study area. It is recommended that a Bat Conservation Management Plan be drawn up and implemented for the study area in order to ensure that any development within the study area is conducive to the continued use of the habitats by bats.

4.9.2 Ecological monitoring

There are numerous species of conservation concern recorded as occurring at/within the vicinity of the study area. The surveys undertaken for this report were limited as regards time. It is recommended that as a component of the management of the park, the following ecological monitoring be undertaken:

- Qualitative and quantitative monitoring of the semi-natural grassland habitats on a regular basis in order to monitor the success of any habitat management;
- Qualitative and quantitative monitoring of the woodland habitats on a regular basis in order to monitor the success of any habitat management;
- Monitoring of the River Dodder and associated ecological corridor for use by Otter on an ongoing basis;
- Monitoring of the River Dodder and associated ecological corridor for use by Kingfisher on an ongoing basis; and
- Monitoring of the study area, and in particular the River Dodder and associated ecological corridor for use by bats on an ongoing basis.

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www.npws.ie – website of the National Parks and Wildlife Service, source of information for data regarding Natura 2000 sites and Article 17 Conservation Assessments.

www.europa.eu – official website of the European Union, source of information on EU Directives.

6 Appendices

6.1 Appendix I - Complete List of vascular Flora observed during surveys

Species name	**Common name**
Acer campestre	Field Maple
Acer platanoides	Norway Maple
Acer pseudoplatanus	Sycamore
Achillea millefolium	Yarrow
Aegopodium podagraria	Ground-elder
Aesculus hippocastanum	Horse-chestnut
Agrostis stolonifera	Creeping Bent
Alliaria petiolata	Garlic Mustard
Alnus cordata	Italian Alder
Alnus glutinosa	Alder
Alnus incana	Grey Alder
Alopecurus pratensis	Meadow Foxtail
Anacamptis pyramidalis	Pyramidal Orchid
Anagalllis arvensis	Scarlet Pimpernel
Angelica sylvestris	Wild Angelica
Anisantha sterilis	Barren Brome
Anthoxanthum odoratum	Sweet Vernal-grass
Anthriscus sylvestris	Cow Parsley
Anthyllis vulneraria	Kidney Vetch
Apium nodiflorum	Fool's-water-cress
Arctium minus	Lesser Burdock
Arrhenatherum elatius	False Oat-grass
Arum maculatum	Lords-and-Ladies
Asplenium ruta-muraria	Wall-rue
Asplenium scolopendrium	Hart's-tongue
Avenula pubescens	Downy Oat-grass
Bellis perennis	Daisy
Betula pendula	Silver Birch
Betula pubescens	Downy Birch
Brachypodium sylvaticum	False Brome
Brachythecium rutabulum	Rough-stalked Feather-moss
Brassica rapa subsp campestris	Wild Turnip
Briza media	Quaking-grass
Bromus hordeaceus	Soft-brome
Buddleja davidii	Butterfly-bush
Calystegia sepium	Hedge Bindweed
Calystegia silvatica	Large Bindweed
Capsella bursa-pastoris	Shepherd's-purse
Cardamine flexuosa	Wavy Bittercress
Cardamine hirsuta	Hairy Bittercress
Cardamine pratensis	Cuckooflower

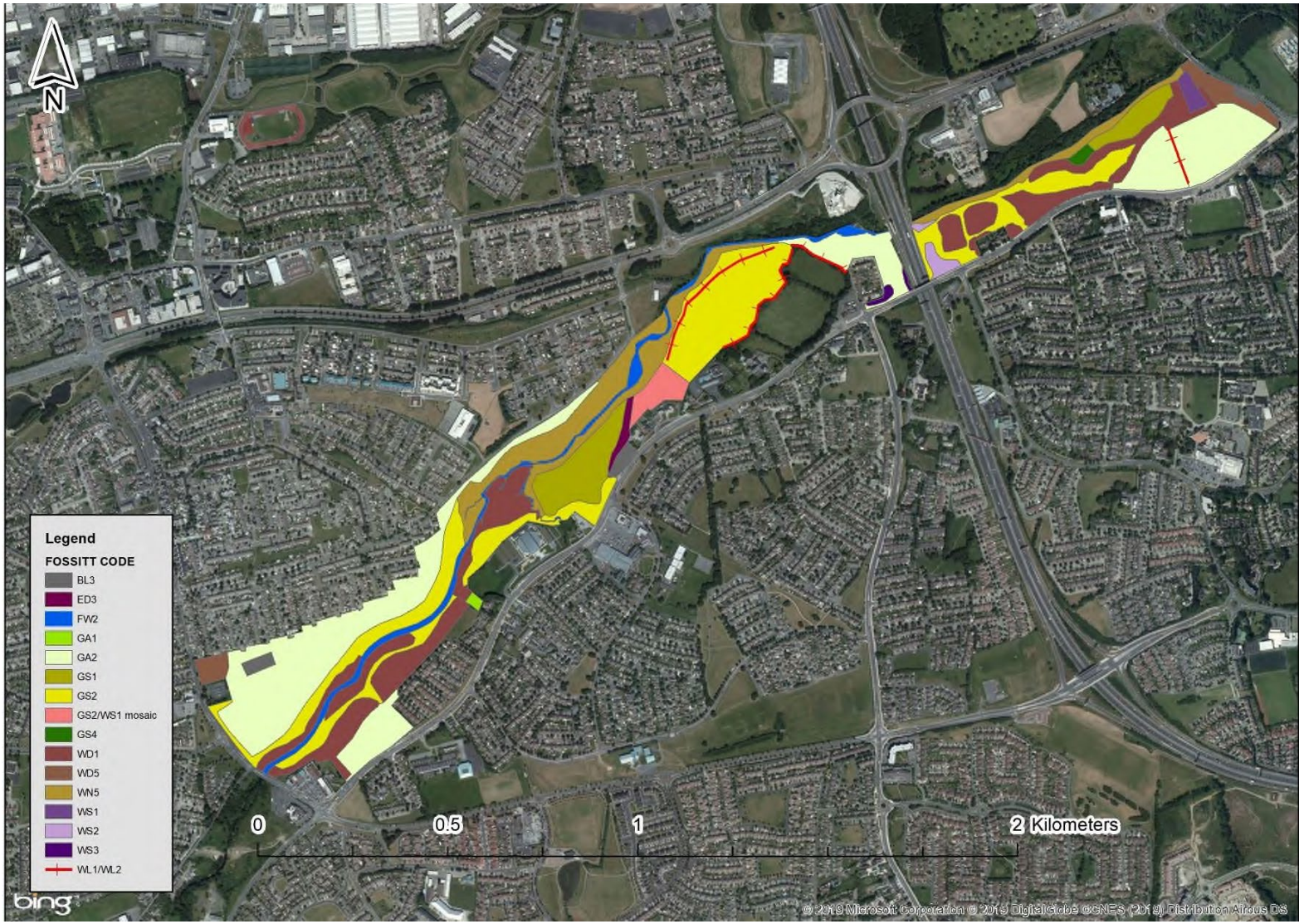
Species name	**Common name**
Carex flacca	Glaucous Sedge
Carex hirta	Hairy Sedge
Carex otrubae	False Fox-sedge
Carex pendula	Pendulous Sedge
Carex remota	Remote Sedge
Carpinus betulus	Hornbeam
Castanea sativa	Sweet Chestnut
Catapodium rigidum	Fern-grass
Centaurea nigra	Common Knapweed
Centranthus ruber	Red Valerian
Cerastium fontanum	Common Mouse-ear
Cerastium glomeratum	Sticky Mouse-ear
Chamerion angustifolium	Rosebay Willowherb
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Cornus sanguinea	Dogwood
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Crepis capillaris	Smooth Hawk's-beard
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Dactylorhiza fuchsii	Common Spotted-orchid
Daucus carota	Wild Carrot
Deschampsia flexuosa	Wavy Hair-grass
Dipsacus fullonum	Wild Teasel
Dryopteris affinis	Scaly Male-fern
Eleocharis palustris	Common Spike-rush
Epilobium hirsutum	Great Willowherb
Epilobium montanum	Broad-leaved Willowherb
Epilobium parviflorum	Hoary Willowherb
Equisetum arvense	Field Horsetail
Erysimum cheiri	Wallflower
Eupatorium cannabinum	Hemp-agrimony
Euphorbia peplus	Petty Spurge
Fagus sylvatica	Beech
Fallopia japonica	Japanese Knotweed
Festuca rubra	Red Fescue
Ficaria verna	Lesser Celandine
Filipendula ulmaria	Meadowsweet
Fragaria vesca	Wild Strawberry
Fraxinus excelsior	Ash
Galium album	Hedge Bedstraw
Galium aparine	Cleavers
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Crane's-bill

Species name	**Common name**
Geranium molle	Dove's-foot Crane's-bill
Geranium pyrenaicum	Hedgerow Crane's-bill
Geranium robertianum	Herb-Robert
Geum urbanum	Wood Avens
Hedera hibernica	Atlantic Ivy
Heracleum sphondylium	Hogweed
Holcus lanatus	Yorkshire Fog
Hordeum murinum	Wall Barley
Hyacinthoides non-scripta	Bluebell
Hypericum androsaemum	Tutsan
Hypericum humifusum	Trailing St John's-wort
Hypochaeris radicata	Cat's-ear
Ilex aquifolium	Holly
Iris pseudacorus	Yellow Iris
Juncus inflexus	Hard Rush
Lactuca serriola	Prickly Lettuce
Lamium purpureum	Red Dead-nettle
Lapsana communis	Nipplewort
Lathyrus pratensis	Meadow Vetchling
Lepidium didymum	Lesser Swine-cress
Leucanthemum vulgare	Oxeye Daisy
Leycesteria formosa	Himalayan Honeysuckle
Linum catharticum	Fairy Flax
Lolium perenne	Perennial Rye-grass
Lotus corniculatus	Common Bird's-foot-trefoil
Luzula campestris	Field Wood-rush
Lysimachia vulgaris	Yellow Loosestrife
Malva sylvestris	Common Mallow
Matricaria discoidea	Pineappleweed
Medicago lupulina	Black Medick
Mentha aquatica	Water Mint
Nasturtium officinale	Water-cress
Odontites vernus	Red Bartsia
Oenanthe crocata	Hemlock Water-dropwort
Ononis repens	Common Restharrow
Origanum vulgare	Wild Marjoram
Papaver rhoeas	Common Poppy
Petasites fragrans	Winter Heliotrope
Petasites hybridus	Butterbur
Phalaris arundinacea	Reed Canary-grass
Phragmites australis	Common Reed
Pinus sylvestris	Scots Pine
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Poa annua	Annual Meadow-grass

Species name	**Common name**
Poa pratensis	Smooth Meadow-grass
Poa trivialis	Rough Meadow-grass
Polygonum aviculare	Knotgrass
Polystichum setiferum	Soft Shield-fern
Populus alba	White Poplar
Populus tremula	Aspen
Populus x canadensis	Hybrid Black-poplar
Potentilla anserina	Silverweed
Potentilla recta	Sulphur Cinquefoil
Potentilla reptans	Creeping Cinquefoil
Poterium sanguisorba subsp balearicum	Fodder Burnet
Primula veris	Cowslip
Primula vulgaris	Primrose
Prunella vulgaris	Selfheal
Prunus avium	Wild Cherry
Prunus laurocerasus	Cherry Laurel
Prunus lusitanica	Portugal Laurel
Prunus spinosa	Blackthorn
Quercus cerris	Turkey Oak
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus repens	Creeping Buttercup
Rapistrum rugosum	Bastard Cabbage
Reseda luteola	Weld
Rhinathus minor	Yellow-rattle
Rosa canina	Dog-rose
Rubus fruticosus agg.	Bramble
Rubus idaeus	Raspberry
Rumex acetosa	Common Sorrel
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Rumex sanguineus	Wood Dock
Sagina procumbens	Procumbent Pearlwort
Salix cinerea	Grey Willow
Salix fragilis	Crack-willow
Sambucus nigra	Elder
Schedonorus arundinaceus	Tall Fescue
Schedonorus giganteus	Giant Fescue
Scrophularia auriculata	Water Figwort
Scrophularia nodosa	Common Figwort
Scrophularia umbrosa	Green Figwort
Senecio erucifolius	Hoary Ragwort
Senecio jacobaea	Common Ragwort
Senecio vulgaris	Groundsel
Sinapsis arvensis	Charlock

Species name	**Common name**
Sisymbrium officinale	Hedge Mustard
Smyrnium olusatrum	Alexanders
Solanum dulcamara	Bittersweet
Sonchus asper	Prickly Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sorbus aucuparia	Rowan
Stellaria alsine	Bog Stitchwort
Stellaria graminea	Lesser Stitchwort
Stellaria media	Common Chickweed
Taraxacum agg.	Dandelion
Taxus baccata	Yew
Tilia cordata	Small-leaved Lime
Torilis japonica	Upright Hedge-parsley
Trifolium campestre	Hop Trefoil
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Tussilago farfara	Colt's-foot
Ulex europaeus	Gorse
Ulmus glabra	Wych Elm
Urtica dioica	Nettle
Veronica beccabunga	Brooklime
Veronica chamaedrys	Germander Speedwell
Veronica filiformis	Slender Speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Vicia cracca	Tufted Vetch
Vicia sativa	Common Vetch
Vicia sepium	Bush Vetch
Viola riviniana	Common Dog-violet

6.2 Appendix II Habitat Map



6.3 Appendix III - Hedgerow Data – Composition and Significance

HEDGEROW NUMBER	TREES, SHRUBS & WOODY CLIMBERS	GROUND FLORA
1	FRAXINUS EXCELSIOR, CRATAEGUS MONOGYNA, ACER PSEUDOPLATANUS, ULMUS GLABRA, SAMBUCUS NIGRA	CIRSIUM VULGARE, GALIUM APARINE, DACTYLIS GLOMERATA, HERACLEUM SPHONDYLIUM, TARAXACUM AGG., ANTHRISCUS SYLVESTRIS, RANUNCULUS REPENS, URTICA DIOICA, BELLIS PERENNIS, RUMEX OBTUSIFOLIUS, PLANTAGO LANCEOLATA
2	CRATAEGUS MONOGYNA, HEDERA HIBERNICA, PRUNUS SPINOSA, ROSA CANINA	CIRSIUM VULGARE, VICIA SEPIUM, ARRHENATHERUM ELATIUS, DACTYLIS GLOMERATA, URTICA DIOICA, CENTAUREA NIGRA, RANUNCULUS ACRIS
3	CUPRESSUS MACROCARPA	URTICA DIOICA, GALIUM APARINE, VERONICA CHAMAEDRYS, GERANIUM ROBERTIANUM
4	FRAXINUS EXCELSIOR, TILIA CORDATA, ULMUS GLABRA, SAMBUCUS NIGRA, CRATAEGUS MONOGYNA, ROSA CANINA, PRUNUS SPINOSA, PINUS SYLVESTRIS	VICIA SEPIUM, URTICA DIOICA, GALIUM APARINE, ARRHENATHERUM ELATIUS, ALOPECURUS PRATENSIS, RANUNCULUS REPENS, RUMEX OBTUSIFOLIUS, GEUM URBANUM, POA TRIVIALIS, RANUNCULUS ACRIS, VERONICA CHAMAEDRYS

HEDGE_NO	LENGTH_M	SURV_TYPE	HIST_SIG	SPEC_DIV	GND_FL_DIV	STRUC_SIG	HAB_CONSIG	LS_SIG	STRUC_VAR	CONTINUITY	NEG_INDIC	WARN_STAT
1	340	S	4	1	0	2	1	2	2	1	1	Q, S
2	440	S	3	1	0	0	1	0	1	0	1	
3	170	S	4	0	0	0	1	2	2	2	0	Q
4	150	S	3	2	0	1	2	2	2	2	1	Q

6.4 Appendix IV – Invertebrate Groups sampled

GROUP		STATION 1 BELOW OVERPASS	STATION 2 DOWNSTREAM	STATION 3 AS DODDER FLOWS THROUGH	STATION 4 BELOW FOOTBRIDG
Tricladida	Flatworms	YES	NO	NO	NO
Oligochaeta	Segmented Worms	YES	YES	YES	YES
Hirudinea	Leeches	NO	NO	NO	NO
Gastropoda	Snails and Limpets	NO	NO	NO	YES
Bivalvia	Freshwater mussels	NO	NO	NO	NO
Araneae	Spiders	YES	NO	NO	YES
Amphipoda	Freshwater shrimp	YES	YES	YES	YES
Diptera	True flys	YES	YES	YES	YES
Astacidae	Crayfish	NO	NO	NO	NO

GROUP		**STATION 1 BELOW OVERPASS**	**STATION 2 DOWNSTREAM**	**STATION 3 AS DODDER FLOWS THROUGH**	**STATION 4 BELOW FOOTBRIDG**
Hemiptera	Water Bugs	YES	NO	NO	NO
Megaloptera	Alder flies	NO	NO	NO	NO
Odonata	Damselflys/Dragonfly	NO	NO	NO	NO
Trichoptera	Caddisflies	YES	YES	NO	YES
Ephemeroptera	Mayfly	YES	YES	NO	YES
Lepidoptera	Butterflies/Moths	NO	NO	NO	YES
Coleoptera	Beetles	YES	NO	NO	YES
VERTEBRATE SPECIES OF NOTE					
STONE LOACH	Fish	NO	NO	NO	YES
3-SPINED STICKLEBACK		NO	NO	NO	YES