

# Royal Canal Greenway Cycle and Pedestrian Route Phase 4 – Phibsborough to Ashtown

## Ecological Impact Assessment

June 2023



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### TABLE OF CONTENTS

<b>1. INTRODUCTION</b>	<b>1</b>
1.1 Background	1
1.2 Requirement for Ecological Impact Assessment	2
1.3 Approach and Objectives	4
<b>2. DESCRIPTION OF PROJECT</b>	<b>6</b>
2.1 Project Background and Context	6
2.2 Project Description	6
2.3 Construction Methodology	7
<b>3. METHODOLOGY</b>	<b>9</b>
3.1 Scope of the Assessment	9
3.2 Establishing the Zone of Influence	9
3.3 Establishing the Study Area	10
3.4 Desk Study	10
3.5 Field Surveys	12
3.5.1 Multidisciplinary Walkover and Habitat Survey	12
3.5.2 Otter Survey	12
3.5.3 Badger Survey	13
3.5.4 Bat Surveys	14
3.5.5 Other Mammals	14
3.5.6 Fisheries and Aquatic Fauna	14
3.5.7 Invertebrate Surveys	15
3.5.8 Invasive Aliens Plant Species Survey	15
3.5.9 Aquatic Plant Survey	15
3.6 Ecological Evaluation and Impact Assessment Methodology	15
3.6.1 Evaluation of Ecological Resources	15
3.6.2 Assessment of Impact Type and Magnitude	16
3.6.3 Process of Assessing Significance	17
3.7 Mitigation	17
3.8 Survey Limitations	17
<b>4. DESK STUDY RESULTS</b>	<b>19</b>
4.1 Designated Sites	19
4.1.1 European Designated Sites	19
4.1.2 Nationally Designated Sites	20
4.2 Habitats, Flora and Fauna	22

4.2.1	National Parks & Wildlife Service Data .....	22
4.2.2	National Biodiversity Data Centre Data.....	23
4.2.3	Environmental Protection Agency.....	26
4.2.4	Otter .....	26
4.2.5	Badger.....	27
4.2.6	Common Lizard.....	27
4.2.7	Invertebrates .....	27
4.2.8	Fish .....	27
4.2.9	Flora.....	28
4.2.10	Invasive Species .....	28
<b>5.</b>	<b>FIELD SURVEY RESULTS .....</b>	<b>29</b>
5.1	Habitats .....	29
5.1.1	Habitat Descriptions .....	29
5.2	Watercourses.....	32
5.3	Flora .....	33
5.4	Fauna .....	35
5.4.1	Badger (Meles meles) .....	35
5.4.2	Otter (Lutra lutra).....	35
5.4.3	Bat species.....	37
5.4.4	Additional Mammal Species .....	40
5.4.5	Birds.....	40
5.4.6	Invertebrates .....	41
5.4.7	Reptiles and Amphibians.....	42
5.5	Ecological Corridors.....	43
<b>6.</b>	<b>KEY ECOLOGICAL RECEPTORS .....</b>	<b>45</b>
6.1	Key Ecological Receptors Identified During the Surveys.....	45
6.2	Impacts on Key Ecological Receptors.....	46
6.2.1	General Impacts on Key Ecological Receptors.....	46
6.2.2	Impacts on Key Ecological Receptors .....	49
<b>7.</b>	<b>MITIGATION.....</b>	<b>53</b>
7.1	Mitigation by Design.....	53
7.1.1	Non-Specific Mitigation Measures .....	53
7.1.2	Specific Mitigation Measures .....	54
7.2	Residual Impacts .....	58
<b>8.</b>	<b>CONCLUSIONS .....</b>	<b>60</b>
<b>9.</b>	<b>REFERENCES .....</b>	<b>61</b>

**APPENDIX A Zone of Influence**

**APPENDIX B Habitat Map**

**APPENDIX C Otter Survey Report (Confidential)**

**APPENDIX D      Otter Resting and Breeding Locations Drawing (Confidential)**

**APPENDIX E      IAPS Map**

**APPENDIX F      Aquatic Plant Survey Report**

# 1. INTRODUCTION

## 1.1 Background

Roughan & O'Donovan (ROD) was commissioned by Dublin County Council (DCC) to prepare an Ecological Impact Assessment (EclA) in respect of the proposed Royal Canal Greenway Cycle and Pedestrian Route Phase 4 – Phibsborough to Ashtown, Co. Dublin, hereafter referred to as “the Project”.

This EclA provides an assessment of the baseline ecological conditions in the area likely to be impacted by the Project and of the nature, magnitude and significance of those impacts. This EclA also proposes appropriate mitigation measures to eliminate those impacts or, where this has not been possible, to minimise their effects as to no longer be considered significant.

The ecological surveys and reporting for this EclA were carried out by Kate Moore GradCIEEM. Kate is Ecologist with over five years' experience in ecological consultancy. She holds a BSc (Hons) in Environmental Biology from the University College Dublin and is a Graduate Member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

The survey for protected and alien invasive plant species in the aquatic environment, and the subsequent impact assessment, were carried out by John Brophy and Simon Barron of BEC Consultants. John holds a BA (Hons) in Natural Sciences (Zoology) from Trinity College Dublin and an MSc in Fisheries Management, Development and Conservation from University College Cork. He is a Full Member of CIEEM and a Chartered Ecologist (CEcol). John has over 15 years' experience in ecological consultancy, including field surveying and report writing for Environmental Impact Assessment and Appropriate Assessment.

Simon Barron has over 18 years' experience in ecological consultancy. He holds a BSc (Hons) in Geography from the University of Plymouth, is a Full Member of CIEEM and a Chartered Environmentalist (CEnv). Simon has extensive experience in aquatic Flora (Protection) Order species, carrying out numerous surveys for Opposite-leaved Pondweed along the Royal and Grand Canal, and also carried out translocation works for the species.

The otter survey was carried out by Ross Macklin and Bill Brazier of Triturus Environmental Ltd. Ross Macklin PhD (candidate), B.Sc. (Hons) MCIEEM., MIFM, HDip GIS, PDip IPM is an aquatic, fisheries and mammalian ecologist with over 17 years' professional experience in Ireland. Ross has a BSc in Applied Ecology and diplomas in integrated Pest Management and GIS. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EclA, CEMP and AA/NIS reporting, ECoW as well as biodiversity, water quality monitoring, invasive species, mammalian surveys and fisheries management. He has worked extensively within Dublin City and Cork City on mammal monitoring projects for Dublin City Council, Waterways Ireland, Pfizer, Irving Oil, Transport Infrastructure Ireland, OPW and for numerous consulting engineers and is considered an expert on urban otter ecology. He recently completed and was lead author of the Dublin City Otter survey which was the largest urban otter survey completed in the history of the state.

Bill Brazier (Ph.D. (candidate), B.Sc. (Hons.) Applied Freshwater & Marine Biology, MIFM) is an aquatic, fisheries and mammalian ecologist with over 11 year's professional experience in Ireland. Ltd. Bill studied Applied Freshwater & Marine Biology at Galway-Mayo IT. He has considerable experience in a wide range of

ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as the areas of fisheries assessments, fisheries management plans, fish health screening, renewable energy developments, flood relief schemes, road schemes, invasive species management, blueways/greenways, biodiversity projects and non-volant mammal monitoring. He recently completed and was second author of the Dublin City Otter survey, which was the largest urban otter survey completed in the history of the state. He was also lead author on the Dún Laoghaire-Rathdown otter survey, a catchment-wide otter survey completed for DLR Council in 2021.

This EcIA was reviewed by Patrick O'Shea MCIEEM. Patrick is an Ecologist with over nine years' experience in ecological consultancy and research. Patrick has a BA (Hons) in Natural Sciences from Trinity College Dublin and an MSc in Ecological Management and Conservation Biology from Queen's University Belfast.

## 1.2 Requirement for Ecological Impact Assessment

The European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) ("the Habitats Regulations") transpose into Irish law Directive 2009/147/EC (the Birds Directive) and Council Directive 92/43/EEC (the Habitats Directive), which list priority habitats and species of Community importance and that require protection. This protection is afforded in part through the designation of areas that represent significant populations of listed species within a European context, i.e. Natura 2000 sites. An area designated for bird species is classed as a Special Protection Area (SPA), and an area designated for other protected species and habitats is classed as a Special Area of Conservation (SAC). Birds in SPAs for which they are designated features and habitats and species listed on Annexes I and II, respectively, of the Habitats Directive in SACs for which they are designated features have full European protection. Species listed on Annex IV of the Habitats Directive are strictly protected wherever they occur, whether inside or outside the Natura 2000 network. Annex I habitats outside of SACs are still considered of national and international importance and, under Article 27(4)(b) of the Habitats Regulations, public authorities have a duty to strive to avoid the pollution or deterioration of Annex I habitats and habitats integral to the functioning of SPAs.

The Wildlife Act, 1976 (as amended) ("the Wildlife Act") is the principal mechanism for the legislative protection of wildlife in Ireland and outlines strict protection for species that have significant conservation value. In summary, the Wildlife Act protects species from injury, disturbance, and damage to breeding and resting sites. All species listed in the Wildlife Act must, therefore, be a material consideration in the planning process.

The Flora (Protection) Order, 2015 ("the FPO") is an important piece of national legislation for the protection wild flora, i.e. vascular plants, mosses, liverworts, lichens and stoneworts, and makes it illegal to cut, uproot or damage a listed species in any way or to alter, damage or interfere in any way with their habitats. This protection applies wherever the species listed in the Schedules to the Order are found.

Sites of national importance for nature conservation are afforded protection under planning policy and the Wildlife Act. Natural Heritage Areas (NHAs) are sites that are designated under statute for the protection of flora, fauna, habitats and geological interest. Proposed Natural Heritage Areas (pNHAs) are published sites identified as of similar conservation interest but have not been statutorily proposed or designated – pNHAs are nonetheless afforded some protection under planning policies and objectives. Other sites of national importance include statutory Nature Reserves, Wildfowl Sanctuaries and Refuges for Fauna.

Ireland's *National Biodiversity Action Plan 2017-2021* (DAHG, 2017), in accordance with the Convention on Biological Diversity, is a framework for the conservation and protection of Ireland's biodiversity, with an overall objective to secure the conservation, including, where possible, the enhancement and sustainable use of biological diversity in Ireland and to contribute to collective efforts for conservation of biodiversity globally. Action 1.1.3 of the National Biodiversity Strategy aspires that "*all Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure*". This is particularly relevant to developments. The plan is implemented through legislation and statutory instruments concerned with nature conservation. The Planning and Development Act and the European Communities (Environmental Impact Assessment) Regulations, 1989 (as amended) are particularly important in that regard and includes a number of provisions directly concerned with the protection of natural heritage and biodiversity.

The *All-Ireland Pollinator Plan 2021-2025* (NBDC, 2021) seeks to halt the decline in pollinators through a range of objectives. This plan is supplemented by the guidance document *Councils: Actions to Help Pollinators* (NBDC, 2016).

The *Dublin City Development Plan (2016 – 2022)* (Dublin City Council, 2016) sets out policies and objectives to guide how and where development will take place in the city over the lifetime of the Plan. It provides an integrated, coherent spatial framework to ensure the city is developed in an inclusive way, which improves the quality of life for its citizens, whilst also being a more attractive place to visit and work. The following policies are set out in the plan in relation to biodiversity:

**G123:** To protect flora, fauna and habitats, which have been identified by Articles 10 and 12 of Habitats Directive, Birds Directive, Wildlife Acts 1976–2012, the Flora (Protection) Order 2015 S.I No. 356 of 2015, European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.

**G124:** To conserve and manage all Heritage Areas, [SACs] and [SPAs] designated, or proposed to be designated, by the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

**G126:** To have regard to the conservation and enhancement of significant non-designated areas of ecological importance in accordance with development standards set out in this plan.

**G127:** To minimise the environmental impact of external lighting at sensitive locations to achieve a sustainable balance between the needs of an area, the safety of walking and cycling routes and the protection of light sensitive species such as bats.

The Biodiversity Plan for the Dublin County Council is currently under review. The *Draft Dublin City Biodiversity Action Plan 2021-2025* was published in May 2021. The draft Plan is based on the six themes that focus the outcomes for biodiversity conservation required across the city. Within these themes, there are 18 objectives for biodiversity management and conservation along with a series of targeted actions with measurable outcomes to achieve these objectives. Each theme links to the Strategic Objectives of the National Biodiversity Action Plan (2017-2021) while considering the urban context of biodiversity within Dublin. There is a new focus on restoration of biodiversity to respond to the public survey and reflect EU policy. A specific theme centres on Dublin as a Green Capital City to link biodiversity to quality of life, health, and economic competitiveness.

### 1.3 Approach and Objectives

A habitat is the environment in which an animal or plant lives, generally defined in terms of vegetation and physical structures. Features of ecological significance occurring or likely to occur within the Zone of Influence of the Project are classified as Key Ecological Receptors (Key Ecological Receptors) and may include:

- Designated sites;
- Habitats and species protected under the Habitats Directive, the Birds Directive, the Wildlife Act or the Flora (Protection) Order;
- Species subject to restrictions under the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), i.e. invasive alien species; or,
- Any other features deemed to be of ecological importance based on recent declines or rarity.

A Key Ecological Receptor can therefore be defined as any site, habitat, ecological feature, vegetative assemblage, community, species or individual:

- occurring in close proximity to the Project; and,
- considered likely to be impacted upon by the Project;

This EclA assesses the potential impacts on Key Ecological Receptors and identifies the mitigation measures required to avoid and reduce any likely significant impacts. Identification of impacts and specific mitigation measures have been devised following a collaborative approach by a multidisciplinary team at ROD comprising ecologists, hydrologists, environmental scientists and engineers.

A desk study was undertaken to review all available published data on European and nationally designated sites for nature conservation, other ecologically sensitive sites and habitats and species of interest within the Zone of Influence. Published data describing ecological conditions was then cross-referenced with publicly available maps and aerial orthophotography from Ordnance Survey Ireland (OSi), the National Biodiversity Data Centre (NBDC), the National Parks & Wildlife Service (NPWS) and the Environmental Protection Agency (EPA) to identify important ecological features. During preparation of this Ecology Report, the statutory consultee, the NPWS, provided data on designations of habitats and species of conservation interest. The baseline information obtained from the desk study was the first stage in defining the Zone of Influence of the Project.

Following the desk study, an ecological walkover survey was conducted of the entire site adhering to *Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (TII/NRA, 2009a) and *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011). The survey classified habitats according to *A Guide to Habitats in Ireland* (Fossitt, 2000). The ecology survey also included a bat roost suitability assessment. Bat activity surveys, a protected mammal survey (e.g. for otters and badgers) and an invertebrate survey were also undertaken. An aquatic plant survey was carried out by BEC Consultants. The surveys provided baseline information regarding ecological conditions of the site, identifying Key Ecological Receptors and the need for any specialist surveys, licensing and mitigation.

Using the comprehensive assessment of the existing environment (baseline conditions), it has been possible to accurately predict the likely impacts of the Project on the Key Ecological Receptors and correctly assign an ecological significance to each.

Where impacts have been identified, they have been examined and specific mitigation measures developed in accordance with the hierarchy of options suggested by the European Commission in *Managing Natura 2000 sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC* (EC, 2000). The adopted approach was:

- Avoid at source;
- Reduce at source;
- Abate on site; and, finally,
- Abate at receptor.

The information provided in this EclA accurately and comprehensively describes the baseline ecological environment, provides an accurate prediction of the likely ecological impacts of the Project, prescribes mitigation as necessary and describes the residual ecological impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate best practice guidelines for EclA, as described in Section 3.

## **2. DESCRIPTION OF PROJECT**

### **2.1 Project Background and Context**

Dublin City Council proposes to develop a high-quality cycle and pedestrian route along the banks of the Royal Canal from Sheriff Street in the City Centre to Ashtown. This will form part of the 165km Royal Canal Greenway Cycle and Pedestrian Route between Mullingar and Dublin.

Planning approval has previously been granted for the premium cycle and pedestrian route along the full 7.5km length of the Royal Canal within the Dublin City Council area. This is being developed in four phases of which this phase (Phase 4) comprises the final 4.2km between Phibsborough and Ashtown.

For the orderly and early completion of key elements of the project, sub-phases of the works have been defined and are being progressed by the Dublin City Council in the Scope of the project as follows:

The Project involves the development of a Greenway Improvement Scheme to increase the capacity and level of service of the existing greenway route that is in poor condition and too narrow in places through various means such as widening the towpath by realigning the north bank of the canal channel at discreet sections and setting back boundaries.

The Project will extend from Phibsborough to Ashtown along the northern bank of the Royal Canal. The Project commences at Cross Guns Bridge, tying into the proposed Toucan crossing, to be constructed across the Phibsborough Road, as part of Phase 3 of the overall route. The route will continue along the northern bank of the Royal Canal to The Tallow, just east of the village centre at Ashtown. The scheme is approximately 4.2km in length, and will incorporate new pavement, public lighting, CCTV for security, and will seek to remove existing kissing gate barrier restrictions at access points which are restrictive to cyclists, buggies and wheelchair users. The existing towpath is a shared cycleway and pedestrian path, which is also used for both vehicular access, for maintenance access by Waterways Ireland and Iarnród Éireann, and by the residents of Coke Oven Cottages, and for amenity purposes. It is the objective of the scheme to provide a premium cycle and pedestrian facility with environmental enhancements sensitive to the pNHA designation of the site.

An amending Part VIII submission proposes to widen the canal towpath route by between 1.7m and up to 2.6m at its widest at the Coke Oven Cottages, to overcome land constraints and ensure quality of service and safety considerations.

### **2.2 Project Description**

#### **Site Location**

The Project will involve the construction of a premium cycle and pedestrian route on the north bank of the Royal Canal between Cross Guns Bridge in Phibsborough and Ashtown.

#### **General Layout**

- The Project involves the construction of a 4.2 km premium cycle and pedestrian route up to a maximum width of 4.5m generally (5.5m locally at the Coke Oven Cottages).

- It is proposed to widen the towpath by realigning the north bank of the canal at the following three locations to overcome the need for third party land acquisition:
  - West of Lock 6 for approximately 600m, realigning by up to 2.15m
  - West of Broombridge for approximately 345m, realigning by up to 1.4m
  - West of Lock 8 for approximately 85m, realigning by up to 1.75m
- All surface water will drain over edge into a grass verge.
- Public lighting to be installed along the Project.
- Complementary landscaping and planting works.

### Lighting

As of March 2023, Dublin City Council is funding trials to survey the impact of public lighting on bat behaviour on the Royal Canal. Public lighting poles and ducting will be installed as part of the Project; however, the final lighting regime including timing, colour and lux levels, will be informed by the results of lighting trials and concurrent surveys of bat activity to be undertaken in Summer 2023. The preferred lighting regime will be agreed with DCC public lighting in consultation with the National Parks and Wildlife Service prior to being commissioned.

## 2.3 Construction Methodology

The construction phase will last for approximately 12 months and is likely to be phased over approximately 2 years.

The proposed reconstruction of the northern canal embankment, to facilitate the widening of the towpath at the above-described locations, will be carried out separately to the general towpath construction works. The proposed method of embankment reconstruction has been agreed with Waterways Ireland and will be as follows:

- Carefully remove existing planting and sod on the northern bank, and set aside to a designated wet bed area for re-use;
- Surplus silt material will be dredged from canal down to original lining (puddle clay in most instances) using tracked machines. This will most likely be done by dewatering the canal and dredging in the dry particularly where there is a potential or known risk of dredging contaminated materials
- Dewatering shall be achieved through the construction of temporary watertight dams or by opening the locks at the downstream end where possible. Where the dewatered section is not bounded by a downstream lock (for example where a bund is established) the canal will need to be dewatered by pumping.
- Electro fishing will be carried out prior to dewatering.
- Prepare ground for installation of additional fill material;
- Fill in northern side of canal with boulders and crushed stone to create the new embankment structure;
- Install new puddle clay and HDPE lining over this crushed stone;
- Install topsoil layer to the new embankment and reinstate planting from wet bed to integrate the Project into the area.

The remaining works to the canal towpath will use standard construction methods as follows:

- Site clearance clearing debris and scrub from the route in accordance with the landscaping plan.
- Careful removal of existing planting and sod affected by the works on the northern bank, and set aside for re-use.
- Excavate the existing pavement and base layers as required and remove to tip or set aside for re-use.
- Excavate the adjacent topsoil areas and set aside for re-use.
- Install ducting and other infrastructural elements for public lighting, CCTV and Waterways Ireland comms.
- The construction of ducting and associated chambers to ESB standard between Cross Gun's Bridge and Broom Bridge, comprising HDPE ducting and concrete chambers to increase the resilience of the ESB network, as well as accommodating the ever-increasing demand to accommodate new renewable energy sources and to serve new development. The future installation and energisation of high voltage cables will be a separate matter for the ESB subject to its own planning processes.
- Deposit and compact fill layers where required using paving machines. Such fill will be used to construct the path to the desired level.
- Proposed kerbs laid and an asphalt layer laid to finish.
- Install public lighting and CCTV columns.
- Reinstate sod / planting in new topsoil / embankment areas.
- Suitably sized (5-8Tn) Mini Diggers and Dumpers, with low ground pressure tyres/tracks will be used to reduce the space required for the works.
- Construction materials will be transported along the proposed cycleway/ footway as it is being constructed.
- No stockpiling of material will occur along the canal towpath.

### 3. METHODOLOGY

#### 3.1 Scope of the Assessment

This section describes the methodologies followed in the compilation of this EclA. Recognised guidelines were followed in relation to every aspect of the survey and assessment.

The assessment methodology is based primarily upon the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1.* (CIEEM, 2019). The survey methodology is based on the *TII/NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (TII/NRA, 2009).

In addition, other recognised guidance in Environmental and Ecological Impact Assessment regard provided direction in the preparation of the scope, structure and content of the assessment:

- *Guidelines for Assessment of Ecological Impacts of National Road Schemes Rev 2* (TII/NRA, 2009b) (referred to hereafter as the “TII/NRA Ecological Impact Assessment Guidelines”).
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft August 2017* (EPA, 2017)
- *Transport Infrastructure Ireland Design Manual for Roads and Bridges* (TII/NRA, 2013).
- *Transport Infrastructure Ireland 2010 Project Management Guidelines* (TII/NRA, 2010).
- *Environmental Impact Assessment of National Road Schemes – A Practical Guide* (TII/NRA, 2008a).
- *Environmental Assessment and Construction Guidelines* (TII/NRA, 2006).
- *Advice Notes on Current Practice (in preparation of Environmental Impact Statements)* (EPA, 2003).

#### 3.2 Establishing the Zone of Influence

The key variables determining whether important ecological features will be subject to impacts through development are: the physical distance of the Project to the Key Ecological Receptors identified by the desk study and the surveys; the sensitivities of the ecological receptors within the receiving environment; and the potential for in-combination effects. Having regard to the aforementioned key variables, the likely “Zone of Influence” of the Project was defined as:

- The entire area within 550 m of the Project boundary;
- The Royal Canal east of the Cross Guns Bridge as far as the River Liffey; and
- The transitional waters of Dublin Bay, from the Talbot Memorial Bridge downstream.

The buffer was defined as 550m around the Project which is the precautionary flushing distance for waterbirds informed by the sensitivity of different species, the potential for visual and noise disturbance, and the ambient disturbance levels (Cutts et al., 2009; Cutts et al., 2013). The 550m buffer includes all potential Light-Bellied Brent Goose feeding areas along the route of the Project. Any potential Light-Bellied Brent Goose feeding areas outside this buffer are screened by buildings, walls and natural boundaries which will act as effective barriers to noise and visual disturbance.

The Royal Canal east of the Cross Guns Bridge is the extent to which hydrological impacts could potentially occur downstream of the project in the canal. The 'transitional waters of Dublin Bay' are the extent to which hydrological impacts could potentially occur upstream and downstream of the Project in the River Liffey and Dublin Bay<sup>1</sup>.

The Zone of Influence is presented in Appendix A.

### 3.3 Establishing the Study Area

This Study Area is informed by the findings of desk study (presence/absence of protected habitats, flora or fauna within the receiving environment) and relevant best practice methodology for assessing impacts on those ecological features. The study area in this case included the development site and a 50m buffer. For Otter, this buffer was increased to 150m upstream and downstream along the Royal Canal in line with best practice guidance (TII/ NRA, 2009b).

### 3.4 Desk Study

A desktop study was carried out to collate information on the ecology of the Zone of Influence that will potentially be impacted by the Project. Information on species listed on Annex II and IV to the Habitats Directive; the Wildlife Act; the Flora (Protection) Order; Annex I to the Birds Directive; and, the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations were sourced from the statutory consultee, the NPWS, and the National Biodiversity Data Centre (NBDC). The NPWS online interactive map-viewer provided information relating to designated sites of conservation importance within the Zone of Influence of the Project. A spatial query of the Zone of Influence was undertaken using data provided by NBDC. The desk study undertaken for this EclA included a review of available ecological data including from the following sources:

- NPWS Map Viewer and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads which overlap with the Zone of Influence;
- NBDC Biodiversity Maps;
- EPA Maps;
- EPA Catchments Maps;
- The *Draft Dublin City Biodiversity Action Plan 2021-2025* (DCC, 2021); and,
- Dublin City otter survey. Report prepared by Triturus Environmental Ltd. for Dublin City Council as an action of the Dublin City Biodiversity Action Plan 2015-2020 (Macklin, Brazier & Sleeman, 2019).
- Royal Canal Ecological Assessment: Survey of the Royal Canal from Spencer Dock to Blanchardstown, Co Dublin (McCarthy Keville O'Sullivan Ltd, 2019).
- *DCC Internal Memo: Biodiversity Comments ref Pre Part 8 Consultation re Proposed Amending Part 8 for Phase 4B Royal Canal Greenway- Phibsborough to Ashtown. 12h October 2022.*

As with all desk studies, the data considered was only as good as the data supplied by the recorders and recording schemes. The recording schemes provide disclaimers

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<sup>1</sup> As defined in Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (the "Water Framework Directive"), transitional waters are as bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows.

in relation to the quality and quantity of the data they provide, and these were considered when examining outputs of the desk study.

### 3.5 Desk Study

The purpose of the consultations was to:

- Identify any relevant information that consultees held, including the presence of data on protected species or species of conservation concern;
- Identify any concerns that consultees may have in relation to the proposed development; and,
- Identify any issues that the consultees would like to see addressed during the ecological impact assessment process.

A summary of the consultations is presented in Table 3.1 below. Concerns raised by the consultees have been addressed as far as possible.

**Table 3.1 Consultations**

Consultee	Date	Summary
Department of Housing, Heritage, and Local Government (NPWS)	1 <sup>st</sup> December 2021	<p>A virtual meeting was held with the NPWS Regional Manager and Divisional Ecologist. At the meeting the NPWS staff made the following points:</p> <ul style="list-style-type: none"> <li>• Otter is known to be present in the area of the Project.</li> <li>• A specialist Otter survey should be undertaken.</li> <li>• Derogation licences are required prior to any works in exclusion zones.</li> <li>• The impact of lighting on Daubenton's bat is a key concern.</li> <li>• The use of non-native ornamental species and cultivars, and wildflower seed mixes, should be avoided.</li> </ul>
Department of Housing, Heritage, and Local Government (NPWS). Also present was the DCC Biodiversity Officer, Waterways Ireland environment and Heritage Officer	1 <sup>st</sup> March 2023	<p>A virtual meeting was held with the NPWS Divisional Ecologist and local Conservation Ranger. Also present was the DCC Biodiversity Officer and the Environmental and Heritage Officer with Waterways Ireland. At the meeting the NPWS staff made the following points:</p> <ul style="list-style-type: none"> <li>• The NPWS recommended annual Otter monitoring and DNA sampling along the Royal Canal, given the number of transport projects that require sections of the canal to be dewatered.</li> <li>• Evidence of the aquatic snail, <i>Myxas glutinosa</i> and a species of Stonewort of the <i>Tolypella</i> genus were recorded in the Royal Canal in the DCC area recorded in October 2022. Confirmation of these records is currently being undertaken.</li> </ul>

		<ul style="list-style-type: none"> <li>• The impact of lighting on Daubenton's bat is a key concern.</li> <li>• Evidence of Badger around the Coke Oven Cottages.</li> <li>• Records of orchids along the canal towpath.</li> <li>• Concern about the impact on hedgerows.</li> </ul>
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### 3.6 Field Surveys

**Table 3.2 Ecological Surveys**

Survey	Date (2021)	Surveyor
Badger	11 <sup>th</sup> March	Kate Moore
Habitat, Botanical & Invasive Species	13 <sup>th</sup> May	Kate Moore
Bat Activity Surveys	13 <sup>th</sup> & 25 <sup>th</sup> May	Kate Moore & ROD Environmental Team
Invertebrate Surveys	13 <sup>th</sup> & 25 <sup>th</sup> May	Kate Moore
Aquatic Plant Survey	18 <sup>th</sup> May	John Brophy & Simon Barron
Survey	Date (2022)	Surveyor
Otter Survey	24 <sup>th</sup> , 25 <sup>th</sup> & 26 <sup>th</sup> January	Ross Macklin & Bill Brazier
Bat Activity Surveys	9 <sup>th</sup> June; 8 <sup>th</sup> , 18 <sup>th</sup> August; 1 <sup>st</sup> , 22 <sup>nd</sup> & 29 <sup>th</sup> September	Kate Moore & ROD Environmental Team

#### 3.6.1 Multidisciplinary Walkover and Habitat Survey

The walkover survey aimed to detect the presence, or likely presence, of a range of protected species within the study area. A list of birds seen and heard during the survey was compiled. A list of flora encountered within the study area was also recorded. Surveys were carried out in accordance best practice guidance (TII/NRA, 2009b). The walkover included a habitat survey. This was undertaken in May which is within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith et al., 2011). The habitat survey was undertaken to identify the type, quality and extent of habitats present within an area, and to identify any habitats or features that might require more detailed surveys. Habitats were classified in accordance with the Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000). Habitat mapping was undertaken with regard to guidance set out in *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011). Habitat Mapping is provided in Appendix B.

#### 3.6.2 Otter Survey

A survey was undertaken by Ross Macklin and Bill Brazier of Triturus Environmental to identify the most important areas for otters along the Royal Canal corridor relative to the Project. This was based on an assessment of sign distribution and human-related disturbance using the novel human disturbance index (Macklin et al. 2019), in addition to observations on general aquatic and fisheries habitats.

The survey was completed during dry, mild, bright and settled conditions, which ensured that a good representation of habitat marked by otter could be recorded in the field, including territorial marking or marking of feeding areas. The survey also deliberately coincided with a prolonged dry period to not only ensure safe site access but also that the extent of otter signs (spraint, smears etc.) washed away due to recent precipitation was minimised.

Each otter sign was logged by type, location (handheld GPS), condition and approximate age for later interpretation to distinguish differences in habitat use and activity. Active holts have been defined as excavations in earth under trees or in embankments and or associated with artificial structures. The entrances are clear and without cobwebs and blockages with clear signs of soil erosion including slides and nearby spraint. Typically, they are situated in areas where associated higher usage by otter has been observed (i.e. spraint or couch sites). They are also invariably located in areas of lower disturbance with a high degree of cover and poor access. Inactive holts are structurally similar to active holts but with no recent signs of soil erosion, spraint or other scent marking. Typically, the entrances are partially collapsed with cobwebs and overgrowth by vegetation indicating no recent activity. Spraints were subjectively assessed as either fresh (very recent), mixed-age (recent and older spraints typically indicative of a regular sprainting site) or old (spraint breaking down and not recently deposited). Furthermore, indicative counts of spraint (i.e. number of individual spraints) and the number of sprainting sites (often separate clusters in one area) were noted. This helped indicate the frequency of otter marking, which can clarify levels of activity in particular areas.

The survey broadly followed the best practice survey methodology for otter as recommended by Lenton et al. (1980), Chanin (2003) and Bailey & Rochford (2006). However, methodology differed in that the entire waterline was surveyed rather than the standard 500-600m sections from accessible points (e.g. bridges). The novel survey technique, known as a total corridor otter survey (TCOS) (Macklin et al., 2019), encompassed the entire riparian zone and in-channel (boat-based) surveys along both banks of the Royal Canal. The linear survey area was divided into 40 no. discrete 500m sections (20 along each canal bank) to facilitate greater resolution of data. Additionally, a single 500m section of the River Liffey estuary adjoining the Royal Canal was also surveyed.

Total corridor survey methodology typically involves the use of two (or more) surveyors working independently (in tandem) along each respective bank of an individual watercourse (where practical). This also facilitates one to work from a more elevated position (e.g. bank top) with one surveying (with appropriate PPE such as a dry suit or chest waders) from within the channel/boat, thus greatly increasing the likelihood of otter sign detection. This is especially true of more cryptic signs such as holts, which can be located in undercut banks, under tree root systems etc. out of the view of traditional surveys. Surveyors can alternate between the channel and each bank depending on surveyor knowledge and experience of preferential areas of habitat likely to be used by otter.

The otter survey report is provided in Appendix C (Confidential).

### **3.6.3 Badger Survey**

Badgers and their setts are protected under the provisions of the Wildlife Act. The badger survey was conducted in order to determine the presence or absence of badgers within the Study Area. The survey was conducted in accordance with best practice guidance (TII/NRA, 2006a; 2009) and involved a systematic search of the

extent of the Study Area for physical evidence of badgers, e.g. setts, latrines, Badger paths.

### 3.6.4 Bat Surveys

The bat suitability assessment was conducted adhering to best practice guidance (TII/NRA, 2006b; Collins (ed.), 2016) and involved a visual assessment and categorisation of suitable features of trees capable of supporting roosting bats. The trees were assessed using the recognised criteria outlined in Collins (ed.) (2016). Linear landscape features (e.g. mature treelines and hedgerows) with potential to provide important foraging and commuting habitat for bats were also recorded and geospatially referenced.

In 2021, two bat activity surveys were undertaken on a transect along the route of the Project between sunset and two hours after sunset. The surveyors walked slowly using Anabat Walkabout bat detectors. The Anabat Walkabout detector allows visual validation of echolocation recordings (species identification) in real time and all audio files are linked to a Geographical Positioning System (GPS).

In 2022, a further six bat activity surveys were undertaken between sunset and two and a half hours after sunset. During each survey, three locations were simultaneously surveyed using Anabat Walkabout and EM3 detectors. The three locations surveyed were Lock 6, Broombridge and Ashtown.

All surveys were conducted adhering to best practice guidance (TII/NRA, 2006b; Collins (ed.), 2016). Following the surveys, recordings (detections) were processed using Kaleidoscope Pro Analysis and BTO Pipeline Acoustic software to extract information including sound recordings, sonograms, GPS coordinates, time, date and species identification confidence values.

### 3.6.5 Other Mammals

During the walkover survey, the potential for the Study Area to support additional protected mammals listed in the Wildlife Acts was assessed. No evidence of Pine Marten (*Martes martes*) Irish Hare (*Lepus timidus hibernicus*), Irish Stoat (*Mustela ermina hibernica*), Pygmy Shrew (*Sorex minutus*) or Hedgehog (*Erinaceus europaeus*) was recorded during field surveys. Impacts on small mammals is considered under the Key Ecological Receptors “Scrub” and “Hedgerows and Treelines” with regard to habitat loss and fragmentation. The site does not contain suitable habitat for Red Squirrel (*Sciurus vulgaris*). Therefore, there will be no impacts on this species as a result of the Project.

### 3.6.6 Fisheries and Aquatic Fauna

The Royal Canal was assessed in terms of its potential to support fish, including but not limited to salmonids and Lamprey. Detailed fish stock surveys were not conducted given that significant impacts on fisheries are not anticipated. This followed best practice guidance (TII, 2009) which states that “It will only be appropriate to undertake detailed surveys where significant impacts are anticipated on potentially valuable assemblages of fish, or important populations of a particular species” (p. 59). Dedicated surveys of Freshwater Pearl Mussel were not deemed necessary as the Study Area does not contain suitable habitat for this species. White-clawed Crayfish or whorl snails have not been recorded in the National 10 km Grid O13 (NBDC, 2021) pertaining to the Project and therefore no targeted surveys for these species have been undertaken.

### **3.6.7 Invertebrate Surveys**

Invertebrate surveys involved walking the route slowly and recording all invertebrates. Records of any invertebrate species detected were noted and where possible identified to the lowest possible taxonomical level. These surveys were undertaken in sunny, calm weather only, which is considered optimal for flying insects.

### **3.6.8 Invasive Aliens Plant Species Survey**

During the multidisciplinary walkover survey, the locations of invasive alien plant species (IAPS) were recorded using GPS. The focus was on identifying species subject to restrictions under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Target notes were taken of any invasive species, including the area of infestation, plant condition and height. Site features which could affect control measures, such as adjacent land use, structures and services, were also recorded. The location of IAPS subject to restrictions under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) during the surveys is provided in Appendix E.

### **3.6.9 Aquatic Plant Survey**

An aquatic plant survey targeting species listed on the Flora Protection Order 2015 and IAPS was carried out along sections of the Royal Canal between the 6<sup>th</sup> Lock and just upstream of the 8<sup>th</sup> Lock, in relation to the Project. The survey was carried out by John Brophy and Simon Barron of BEC Consultants. The sections of canal were surveyed using a bathyscope from a small boat. This allowed the surveyor to view the aquatic plants growing on the bottom of the canal. Three passes were made to ensure full coverage of the canal within the study area. The location of any species of interest was recorded on a hand-held GPS to allow for later mapping. While a full aquatic plant survey was not carried out, species present within each of the survey areas were recorded to provide context. The survey report is provided in Appendix F.

## **3.7 Ecological Evaluation and Impact Assessment Methodology**

### **3.7.1 Evaluation of Ecological Resources**

The criteria used for assessment of the value of the ecological resources follows those set out in Section 3.3 of the TII/NRA Ecological Impact Guidelines (2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular site is of importance on the following scale:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

This guidance clearly sets out the criteria by which each geographic level of importance can be assigned. For example, Locally Important (Lower Value) receptors contain habitats and species that are widespread and of low ecological significance and only of any importance in the local area. Conversely, Internationally Important sites are either designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected fauna.

All habitats and species within the Zone of Influence and study area were assigned a level of significance on the above basis and Key Ecological Receptors were established and classified on this basis. Features of Local importance (Lower Value) and features of no ecological value are not considered to be Key Ecological Receptors.

### 3.7.2 Assessment of Impact Type and Magnitude

Reference is made to the following parameters wherever appropriate when characterising impacts (Section 5):

- Magnitude – relates to the quantum of impact, for example the number of individuals affected by an activity;
- Extent – relates to the area over which the impact occurs;
- Duration – intended to refer to the length of time for which the impact is predicted to continue, until recovery or re-instatement;
- Reversibility – whether an impact is ecologically reversible, either spontaneously or through specific action; and,
- Timing – timing and/or frequency of impacts in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities (and associated impacts) would take place can be an important determinant of the impact on receptors.

The assessment of impact takes account of construction and operational phases; direct, indirect and synergistic impacts; and, those that are temporary, reversible and irreversible. The criteria for assessment of impact magnitude, type and significance are given in Table 3.2 and 3.3. The following terms are defined when quantifying duration (EPA, 2017):

- Temporary – up to 1 year;
- Short-term – 1 to 7 years;
- Medium term – 7 to 15 years;
- Long term – 15 to 60 years; and,
- Permanent – over 60 years.

**Table 3.2 Criteria for assessing impact significance based on (EPA, 2017)**

Significance	Criteria
No change	No discernible change in the ecology of the affected feature.
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

**Table 3.3 Criteria for assessing impact quality based on (EPA, 2017)**

Quality	Criteria
Positive	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

Once the potential impacts are characterised, the significance of any such impacts on the identified KERs will be determined. An impact is considered to be ecologically significant if it results in a change in the conservation status of a KER.

### 3.7.3 Process of Assessing Significance

The significance of any identified impacts is determined whereby impacts are assigned significance on the basis of an analysis of the factors which characterise them, irrespective of the value of the receptor. Significance is determined by effects on conservation status or integrity, regardless of geographical level at which these would be relevant.

If impacts are not found to be significant at the highest geographical level at which the resource has been valued, they may be significant at a lower level and this is determined sequentially. Similarly, impacts that do not affect the integrity of a site may, nevertheless, affect the conservation status of a valuable constituent habitat or species, at a lower geographic scale. An equivalent approach has been applied to mitigation measures prescribed, which may have a significant beneficial impact, but at a higher or lower geographic scale than the receptor to which they have been applied.

### 3.8 Mitigation

The Project has been designed to specifically avoid, reduce and minimise negative effects on all Key Ecological Receptors. The potential impacts of the Project have been considered and assessed to ensure that all impacts on Key Ecological Receptors are adequately addressed. Where potential significant negative effects on Key Ecological Receptors are predicted, mitigation has been prescribed to ameliorate such impacts.

Specific best practice design and mitigation measures are set out in this EclA and are feasible in terms of cost and practicality. Provided measures follow the prescribed methodologies and best practice guidelines where available. They have a high probability of success in terms of addressing the impacts on the identified Key Ecological Receptors. The need for compensation and/or enhancement measures has also been considered. Compensatory measures are those which ‘offset’ significant residual (i.e. post-mitigation) impacts. Enhancement measures are those which “seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation” (CIEEM, 2018, p. 12).

### 3.9 Survey Limitations

Any biases or limitations associated with these methods could potentially affect the results collected. It is recognised that whenever a survey is carried out (within the

defined season), it is a compromise, suitable for the vast majority of species, but possibly too early or too late for others.

## 4. DESK STUDY RESULTS

### 4.1 Designated Sites

#### 4.1.1 European Designated Sites

The NPWS online map viewer was consulted in order to identify the boundaries of designated sites within the Zone of Influence. It was determined that three European sites, namely the South Dublin Bay & River Tolka Estuary SPA, the North Bull Island SPA and the North Dublin Bay SAC occur within the Zone of Influence for the project and that the South Dublin Bay SAC occurs adjacent to the Zone of Influence. The South Dublin Bay SAC is not considered to be in any way connected to the Project as the Great South Wall forms an effective barrier against any impacts from the Project to the Qualifying Interests of this site. The designated sites within the Zone of Influence are presented in Table 4.1

**Table 4.1 European sites within the Zone of Influence.**

European site [site code]	Pathway for impacts.
<b>South Dublin Bay and River Tolka Estuary SPA [004024]</b>	The shortest absolute distances from the Project to this site are c. 2.8 km east to the Tolka Estuary and c. 5.1 km south-east to Sandymount Strand. These distances are over land and neither of those locations are within the likely zone of impact, i.e. there is no connection along these distances. The shortest distance from the Project to the site via a hydrological connection is 6.6km east (through the Royal Canal and the River Liffey) to Dublin Port which is within the likely Zone of Influence. Therefore, the effective distance to the site is considered to be 6.6 km.
<b>North Bull Island SPA [004006]</b>	The shortest absolute distance from the Project to this site is c. 5.9 km east. This distance is over land, i.e. there is no connection along this distance. The shortest distance from the Project to the site via a hydrological connection is 8.3 km east (through the Royal Canal and the River Liffey and across the River Tolka Estuary) to the North Bull Wall, which is within the likely Zone of Influence. Therefore, the effective distance to the site is considered to be 8.3 km.
<b>North Dublin Bay SAC [000206]</b>	The shortest absolute distance from the Project to this site is 5.9km east. This distance is over land. The shortest distance from the Project to the site via a hydrological connection is 8.3 km east (through the Royal Canal and the River Liffey and across the River Tolka Estuary) to the North Bull Wall, which is within the likely Zone of Influence. Therefore, the effective distance to the site is 8.3km.

An Appropriate Assessment (AA) Screening Report was prepared by ROD on behalf of Dublin City Council (the Competent Authority in this case) for the Project in compliance with Part XAB of the Planning and Development Act, 2000 (as amended). As part of that assessment, the potential for the Project to significantly affect any European sites in the likely zone of impact was considered. The AA Screening Report concluded as follows:

*“It is the considered opinion of ROD-AECOM, as the author of this AA Screening Report, that Dublin City Council, as the Competent Authority, may find in completing its AA Screening in respect of the Royal Canal Greenway Cycle and Pedestrian Route Phase 4 – Phibsborough to Ashtown, that the Project, either*

*individually or in combination with other plans and projects, is not likely to have a significant effect on the South Dublin Bay and River Tolka Estuary SPA, the North Bull Island SPA, the North Dublin Bay SAC or any other European site, in view of best scientific knowledge and the Conservation Objectives of the site concerned. Therefore, it is the recommendation of the author of this AA Screening Report that the Competent Authority may determine that AA is not required in respect of the Project.”*

Based on this conclusion, no European Sites have been included as Key Ecological Receptors in relation to the Project.

#### 4.1.2 Nationally Designated Sites

It was determined three nationally designated sites, namely, the Royal Canal pNHA, the ‘Dolphins, Dublin Docks’ pNHA and the North Dublin Bay pNHA lie within the Zone of Influence. The South Dublin Bay pNHA is adjacent to the Zone of Influence; however, it is not considered to be in any way connected to the Project as the Great South Wall forms an effective barrier against any impacts from the Project Table 4.2 details the pathway for impact between the Project and the sites.

**Table 4.2 Nationally designated sites within the Zone of Influence.**

Nationally designated site [site code]	Pathway for impacts.
Royal Canal pNHA [002103]	The Project is located with the pNHA.
Dolphins, Dublin Docks’ pNHA [000201]	This pNHA is located approximately 6.1km downstream of the Project boundary. The pNHA is hydrologically connected to the project through the Royal Canal and River Liffey.
North Dublin Bay pNHA [000206]	This pNHA is located approximately 7.5km downstream of the Project boundary. The pNHA is hydrologically connected to the project through the Royal Canal and River Liffey.

##### 4.1.2.1 Royal Canal pNHA

The description of the Royal Canal pNHA is based on the Site Synopsis (NPWS, 2009).

The Royal Canal is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Termonbarry. There is a branch line from Kiltashee to Longford Town. The pNHA comprises the central channel and the banks on either side of it. The main water supply is from Lough Owel (a Ramsar site, SPA, SAC and pNHA) via a feeder channel into the canal at Mullingar. The Royal Canal was closed to navigation in 1961. The section of canal west of Mullingar was allowed to dry out, and the eastern section silted up and became overgrown. Restoration began in 1988, and is still in progress. A number of different habitats are found within the canal boundaries – hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The hedgerow, although diverse, is dominated by Hawthorn (*Crataegus monogyna*). On the limestone soils of the midlands, Spindle (*Euonymus europaeus*) and Gelderrose (*Viburnum opulus*) are present. The vegetation of the towpath is usually dominated by grass species. Crested Dogs-tail (*Cynosurus cristatus*), Quaking-grass (*Briza media*) and Sweet Vernal-grass (*Anthoxanthum odoratum*) are typical species of the calcareous grasslands of the midlands. Where the canal was built through a bog, soil (usually calcareous) was brought in to make the banks. The contrast between the calcicolous species of the towpath and the calcifuge species of the bog is very striking. Otter spraints are found along the towpath, particularly where the canal passes over a river or stream. The rare and legally protected Opposite-leaved Pondweed

(*Groenlandia densa*) (an FPO species) is present at one site in Dublin, between Locks 4 and 5. *Tolypella intricata* (a stonewort listed in the Red Data Book as being vulnerable) is also in the Royal Canal in Dublin, the only site in Ireland where it is now found. The ecological value of the canal lies more in the diversity of species it supports along its linear habitat than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.

The Project is located within the pNHA and therefore has the potential to impact on habitats and species for which the Royal Canal pNHA is designated. The Royal Canal pNHA has been selected as a Key Ecological Receptor in relation to the Project.

#### **4.1.2.2 'Dolphins, Dublin Docks' pNHA**

The description of the 'Dolphins, Dublin Docks' pNHA is adapted from the South Dublin Bay and River Tolka Estuary SPA Site Synopsis (NPWS, 2015).

Both Common Tern and Arctic Tern breed in the Dublin Docks, on man-made mooring structures known as 'dolphins'. Small numbers of Common Tern and Arctic Tern were recorded nesting on this dolphin in the 1980s. A survey in 1995 recorded nationally important numbers of Common Tern nesting here (52 pairs). The breeding population of Common Tern at this site has increased, with 216 pairs recorded in 2000. This increase was largely due to the ongoing management of the site for breeding terns. More recent data highlights this site as one of the most important Common Tern sites in the country with over 400 pairs recorded here in 2007. South Dublin Bay is an important staging/passage site for a number of tern species in the autumn (mostly late July to September). The origin of many of the birds is likely to be the Dublin breeding sites (Rockabill and the Dublin Docks) though numbers suggest that the site is also used by birds from other breeding sites, perhaps outside the state.

Given the implementation of strict environmental controls which are incorporated into the design of the Project, there will be no significant impact on Tern species for which the 'Dolphins, Dublin Docks' pNHA is designated. Based on this conclusion, the 'Dolphins, Dublin Docks' pNHA has not been included as a Key Ecological Receptor in relation to the Project.

#### **4.1.2.3 North Dublin Bay pNHA**

The description of the 'North Dublin Bay pNHA is adapted from the North Dublin Bay SAC Site Synopsis (NPWS, 2013).

This site covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head. The North Bull Island is the focal point of this site. North Bull Island is a sandy spit which formed after the building of the South Wall and Bull Wall in the 18th and 19th centuries. It now extends for about 5km in length and is up to 1km wide in places. A well-developed and dynamic dune system stretches along the seaward side of the island. Various types of dunes occur, from fixed dune grassland to pioneer communities on foredunes. About 1km from the tip of the island, a large dune slack with a rich flora occurs, usually referred to as the 'Alder Marsh' because of the presence of Alder trees (*Alnus glutinosa*). The water table is very near the surface and is only slightly brackish. Saltmarsh extends along the length of the landward side of the island. The edge of the marsh is marked by an eroding edge which varies from 20cm to 60cm high. The marsh can be zoned into different levels according to the vegetation types present. Towards the tip of the island, the saltmarsh grades naturally into fixed dune vegetation.

The habitat 'annual vegetation of drift lines' is found in places, along the length of Dollymount Strand, with species such as Sea Rocket (*Cakile maritima*), Oraches (*Atriplex* spp.) and Prickly Saltwort (*Salsola kali*). The island shelters two intertidal lagoons which are divided by a solid causeway. The sediments of the lagoons are mainly sands with a small and varying mixture of silt and clay. The north lagoon has an area known as the "Salicornia flat", which is dominated by *Salicornia dolichostachya*, a pioneer glasswort species, and covers about 25 ha. The sediments on the seaward side of North Bull Island are mostly sands. The site extends below the low spring tide mark to include an area of the sublittoral zone. Three rare FPO species have been recorded on the North Bull Island. These are Lesser Centaury (*Centaureum pulchellum*), Red Hemp-nettle (*Galeopsis angustifolia*) and Meadow Saxifrage (*Saxifraga granulata*). Two further species listed as threatened in the Red Data Book, Wild Clary/Sage (*Salvia verbenaca*) and Spring Vetch (*Vicia lathyroides*), have also been recorded. A rare liverwort, *Petalophyllum ralfsii*, was first recorded from the North Bull Island in 1874 and has recently been confirmed as still present. This species is of high conservation value as it is listed on Annex II to the Habitats Directive. The North Bull is the only known extant site for the species in Ireland away from the western seaboard. North Dublin Bay is of international importance for waterfowl. Some of these species frequent South Dublin Bay and the River Tolka Estuary for feeding and/or roosting purposes (mostly Light-bellied Brent Goose, Oystercatcher, Ringed Plover, Sanderling and Dunlin). The tip of the North Bull Island is a traditional nesting site for Little Tern. A high total of 88 pairs nested in 1987. However, nesting attempts have not been successful since the early 1990s. A well-known population of Irish Hare is resident on the island. The invertebrates of the North Bull Island have been studied and the island has been shown to contain at least seven species of regional or national importance in Ireland. This site is an excellent example of a coastal site with all the main habitats represented.

Given the implementation of strict environmental controls which are incorporated into the design of the Project, there will be no significant impact on habitats and species for which the North Dublin Bay pNHA is designated. Based on this conclusion, the North Dublin Bay pNHA has not been included as a Key Ecological Receptor in relation to the Project.

## 4.2 Habitats, Flora and Fauna

### 4.2.1 National Parks & Wildlife Service Data

The NPWS provided records of rare and protected species of flora or fauna pertaining to the Zone of Influence. Post 1990 records are listed in Table 4.3 below. Possible records of Glutinous Snail (*Myxas glutinosa*) and a Stonewort of the genus *Tolypella* from October 2022 were highlighted by the NPWS and DCC. A data submission was made to the NPWS to confirm the locations and positive ID to species level. At the time of writing no response was received. The project team will continue to liaise with DCC Parks and Biodiversity, and the NPWS in relation to *Myxas* and *Tolypella*, should records of red listed species be confirmed.

**Table 4.3 NPWS records for Rare and Protected Species**

Common Name	Scientific Name	Status
<b>Amphibians &amp; Reptiles</b>		
Common Frog	<i>Rana temporaria</i>	Annex V, WA
Smooth Newt	<i>Lissotriton vulgaris</i>	WA
<b>Birds</b>		

Common Name	Scientific Name	Status
Barn Owl	<i>Tyto alba</i>	Red, WA
Black-headed Gull	<i>Larus ridibundus</i>	Red, WA
Herring Gull	<i>Larus argentatus</i>	Red, WA
Starling	<i>Sturnus vulgaris</i>	Amber, WA
<b>Fish</b>		
River Lamprey	<i>Lampetra fluviatilis</i>	Annex II, V, WA
<b>Invertebrates</b>		
Desmoulin's Whorl Snail	<i>Vertigo moulinsiana</i>	Annex II, WA
<b>Mammals</b>		
Badger	<i>Meles meles</i>	WA
Irish Hare	<i>Lepus timidus subsp. hibernicus</i>	Annex V, WA
Otter	<i>Lutra lutra</i>	Annex II, IV, WA
<b>Plants</b>		
Hairy St John's-wort	<i>Hypericum hirsutum</i>	FPO
Hairy Violet	<i>Viola hirta</i>	FPO
Meadow Barley	<i>Hordeum secalinum</i>	FPO
Opposite-leaved Pondweed	<i>Groenlandia densa</i>	FPO

Status (listing conferring protection or describing conservation status) abbreviations: Annex II/IV/V (non-avian species) = Habitats Directive (HD); WA = Wildlife Acts and FPO = Flora (Protection) Order, 2015.

#### 4.2.2 National Biodiversity Data Centre Data

The National Biodiversity Data Centre (NBDC) database was accessed prior to conducting the multi-disciplinary walkover survey. Table 4.4 lists the rare and protected species recorded within 5km of the Project. To avoid replication, all records of species represented in the NPWS dataset have been removed from the displayed NBDC data. Only those bird species which are listed on Annex I to the Birds Directive and/or are Amber or Red-listed Birds of Conservation Concern in Ireland (BoCCI), and/or are raptors have been listed here. Table 4.5 lists NBDC records of invasive species, subject to restrictions as listed on the Third Schedule of the Birds and Natural Habitats Regulations, within the Zone of Influence.

**Table 4.4 Records of Rare and Protected Species, NBDC**

Common Name	Scientific Name	Status
<b>Birds</b>		
Barnacle Goose	<i>Branta leucopsis</i>	Annex I, Amber
Bar-tailed Godwit	<i>Limosa lapponica</i>	Annex I, Amber
Black Guillemot	<i>Cepphus grylle</i>	Amber
Common Tern	<i>Sterna hirundo</i>	Annex I, Amber
Coot	<i>Fulica atra</i>	Amber
Cormorant	<i>Phalacrocorax carbo</i>	Amber

<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
Curlew	<i>Numenius arquata</i>	Red
Dunlin	<i>Calidris alpina schinzii</i>	Annex I, Red
Gannet	<i>Morus bassanus</i>	Amber
Guillemot	<i>Uria aalge</i>	Amber
House Martin	<i>Delichon urbicum</i>	Amber
House Sparrow	<i>Passer domesticus</i>	Amber
Kestrel	<i>Falco tinnunculus</i>	Red
Kingfisher	<i>Alcedo atthis</i>	Annex I, Amber
Kittiwake	<i>Rissa tridactyla</i>	Red
Knot	<i>Calidris canutus</i>	Red
Lapwing	<i>Vanellus vanellus</i>	Red
Lesser Black-backed Gull	<i>Larus fuscus</i>	Amber
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	Amber
Linnet	<i>Linaria cannabina</i>	Amber
Little Egret	<i>Egretta garzetta</i>	Annex I
Little Grebe	<i>Tachybaptus ruficollis</i>	Amber
Mediterranean Gull	<i>Larus melanocephalus</i>	Annex I, Amber
Mute Swan	<i>Cygnus olor</i>	Amber
Peregrine	<i>Falco peregrinus</i>	Annex I
Pintail	<i>Anas acuta</i>	Amber
Pochard	<i>Aythya ferina</i>	Red
Redshank	<i>Tringa totanus</i>	Red
Sand Martin	<i>Riparia riparia</i>	Amber
Scaup	<i>Aythya marila</i>	Red
Shag	<i>Phalacrocorax aristotelis</i>	Amber
Shoveler	<i>Spatula clypeata</i>	Red
Skylark	<i>Alauda arvensis</i>	Amber
Snipe	<i>Gallinago gallinago</i>	Red
Spotted Flycatcher	<i>Muscicapa striata</i>	Amber
Swallow	<i>Hirundo rustica</i>	Amber
Swift	<i>Apus apus</i>	Amber
Teal	<i>Anas crecca</i>	Amber
Tree Sparrow	<i>Passer montanus</i>	Amber
Tufted Duck	<i>Aythya fuligula</i>	Amber
Wheatear	<i>Oenanthe oenanthe</i>	Amber
Wigeon	<i>Mareca penelope</i>	Red
Yellowhammer	<i>Emberiza citrinella</i>	Red

Common Name	Scientific Name	Status
<b>Invertebrates</b>		
Marsh Fritillary	<i>Euphydryas aurinia</i>	Annex II, VU
<b>Mammals</b>		
Grey Seal	<i>Halichoerus grypus</i>	Annex II, V, WA
Striped Dolphin	<i>Stenella coeruleoalba</i>	Annex IV, WA
Pine Marten	<i>Martes martes</i>	Annex V, WA
Daubenton's Bat	<i>Myotis daubentoni</i>	Annex IV, WA
Whiskered Bat	<i>Myotis mystacinus</i>	Annex IV, WA
Natterer's Bat	<i>Myotis nattereri</i>	Annex IV, WA
Leisler's Bat	<i>Nyctalus leisleri</i>	Annex IV, WA
Nathusius' Pipistrelle	<i>Pipistrellus nathusii</i>	Annex IV, WA
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	Annex IV, WA
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	Annex IV, WA
Brown Long-eared Bat	<i>Plecotus auritus</i>	Annex IV, WA
Pygmy Shrew	<i>Sorex minutus</i>	WA

Status (listing conferring protection or describing conservation status) abbreviations: Annex II/IV/V (non-avian species) = Habitats Directive (HD); Annex I, II, III = Birds Directive (BD); WA = Wildlife Acts and Red/Amber/Green = Birds of Conservation Concern in Ireland, 2014 to 2019 (BOCCI). All wild bird species (except Bullfinch) in Ireland are protected under the Wildlife Acts 1976 to 2012.

**Table 4.5 Invasive Species listed on S.I. 477 or EU Regulation 1143/2014(\*) recorded within the 5km of the Project.**

Common Name	Scientific Name
American Mink	<i>Mustela vison</i>
American Skunk-cabbage	<i>Lysichiton americanus</i>
Giant-rhubarb	<i>Gunnera manicata</i>
Curly Waterweed	<i>Lagarosiphon major</i>
Grey Squirrel	<i>Sciurus carolinensis</i>
Bohemian Knotweed	<i>Fallopia bohemica</i>
Giant Hogweed	<i>Heracleum mantegazzianum</i>
Giant Knotweed	<i>Fallopia sachalinensis</i>
Giant-rhubarb	<i>Gunnera tinctoria</i>
Harlequin Ladybird	<i>Harmonia axyridis</i>
Himalayan Balsam	<i>Impatiens glandulifera</i>
Japanese Knotweed	<i>Fallopia japonica</i>
New Zealand Pigmyweed	<i>Crassula helmsii</i>
Nuttall's Waterweed	<i>Elodea nuttallii</i>
Parrot's-feather	<i>Myriophyllum aquaticum</i>

Common Name	Scientific Name
Rhododendron ponticum	<i>Rhododendron ponticum</i>
Roach	<i>Rutilus rutilus</i>
Ruddy Duck	<i>Oxyura jamaicensis</i>
Sea-buckthorn	<i>Hippophae rhamnoides</i>
Spanish Bluebell	<i>Hyacinthoides hispanica</i>
Three-cornered Garlic	<i>Allium triquetrum</i>
Water Fern	<i>Azolla filiculoides</i>

#### 4.2.3 Environmental Protection Agency

The online *EPA Maps* and *EPA Catchments maps* were consulted on the 10<sup>th</sup> May 2021 regarding the water quality status of the watercourses within the Zone of Influence. This service provides access to information for individual waterbodies and Water Management Units for all River Basin Districts in Ireland. “Waterbodies” include both surface waters (i.e. rivers, lakes, estuaries [transitional waters] and coastal waters) and groundwaters. River Basin Districts are geographical and hydrological units for water management and are used instead of administrative or political boundaries.

Water quality in Ireland is expressed as Q-values and water quality classes, which are assigned using the Biotic Index of Water Quality (BIWQ - developed in Ireland by the EPA). This index uses a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody to describe water quality. Individual macro-invertebrate species are ranked for their sensitivity to pollution and the Q-value is assigned based, primarily, on the relative abundance of these species within a biological sample.

Table 4.6 shows the information recorded regarding water quality status at the relevant waterbodies within the Zone of Influence.

**Table 4.6 EPA Water Quality Results**

Waterbody	WFD Status 2013-2018	Latest River Q Values Status
Royal Canal Main Line (Liffey and Dublin Bay)	The watercourse has been assigned Good Status.	N/A
Liffey Estuary Lower	The watercourse has been assigned Good Status.	N/A
Tolka Estuary	The watercourse has been assigned Moderate Status.	N/A
TOLKA_060	Unassigned	Poor
TOLKA_050	The watercourse has been assigned Poor Status.	Poor

#### 4.2.4 Otter

Waterways Ireland provided the following information about otter within the study area:

- Otter use the upstream 7<sup>th</sup> Level near Broombridge station.
- NPWS have confirmed otter move through the locks and through the sluice gates in the lock chambers.

- Otter use the 6<sup>th</sup> Level upstream towards Broombridge.
- Otter may use or feed on the 5<sup>th</sup> Level.

The Dublin City Otter Survey (Macklin, Brazier & Sleeman, 2019) was reviewed. While the report does not detail evidence of otter along the Royal Canal or within the study area for the Project it does provide many references to otter activity within the Zone of Influence of the Project.

#### 4.2.5 Badger

Badger setts were recorded in the grounds of Ashton House by ROD Ecologists in March 2021 during surveys undertaken to inform another development. A resident of the Coke Oven Cottages provided video footage of Badger in this area on 30<sup>th</sup> April 2021(Photo 1).



Photo 1: Badger (*Meles meles*) at the Coke Oven Cottages.

#### 4.2.6 Common Lizard

There are anecdotal reports of Common Lizard close to the Coke Oven Cottages.

#### 4.2.7 Invertebrates

According to the Royal Canal Ecological Assessment (McCarthy Keville O'Sullivan Ltd, 2019) Dingy Skipper (*Erynnis tages*), a rare butterfly species, was recorded adjacent to the canal at Ashtown during the 1990's and it is possible that the species is still present in the area.

#### 4.2.8 Fish

The following was reported by McCarthy Keville O'Sullivan Ltd (2019) with regard to fish in the Canal:

*“The Royal Canal primarily consists of glide habitat and is relatively uniform along its entire length. The canal offers suitable habitat for a range of coarse fish including roach, roach x bream hybrid, perch, pike, bream, stickleback and tench. Due to the modified nature of the canal, no suitable spawning habitat for salmonids in the form of well sorted gravels exist. Furthermore, the numerous lock gates along the canal act as obstacles to migrating fish such as salmonids and lamprey species. However, there are records for European eel within the Royal Canal*

*system. Juvenile eel, or elvers, have the ability to overcome obstacles by climbing wet and rough substrates such as rough surfaces, vegetation and artificial substrates (O'Connor, 2003) which may allow them to enter sections of the canal.”*

The Royal Canal provides suitable habitat for fish including European Eel (*Anguilla anguilla*). Fish species are sensitive to water quality and lighting impacts. As the Project provides for such impacts. The protection of Fish has been considered under the “Royal Canal pNHA” Key Ecological Receptor.

#### **4.2.9 Flora**

Waterways Ireland provided details of the recovery of Opposite-leaved Pondweed (*Groenlandia densa*) following disturbance:

- It was found during dredging works that disturbance of the sediment bed in-situ was the best way of encouraging regrowth of Opposite-leaved Pondweed in the canal. Prior to works there was no evidence of Opposite-leaved Pondweed and through the disturbance from dredging the seed bank was revitalised and it grew back in abundance.
- Dormant seed re-disturbance seems to be more effective than current vibrant plant relocation on the Grand Canal.
- Opposite-leaved Pondweed was last recorded on the Royal Canal in 1991 downstream of Lock 2 on the Croke Park level.

#### **4.2.10 Invasive Species**

Waterways Ireland provided a record of a stand of Japanese Knotweed on a steep heavily vegetated bank south of the Canal and west of the Coke Oven Cottages, behind the old Batchelor’s factory and LUAS line fence.

## 5. FIELD SURVEY RESULTS

### 5.1 Habitats

A total of 14 habitats, including one mosaic (area characterised by a mixture of two or more habitat types), were recorded within the study area (see Table 5.1). No habitats corresponding to Annex I types were recorded within the study area. A habitat map is provided in Appendix B.

**Table 5.1 Habitats Recorded Within the Study Area and their Respective Codes. Habitat Classification follows Fossitt (2000).**

Habitat Name	Fossitt Code
Canals	FW3
Amenity Grassland	GA2
Dry Meadows and Grassy Verges	GS2
Wet Grassland	GS4
Scattered Trees and Parkland	WD5
Scrub	WS1
Hedgerows	WL1
Treelines	WL2
Recolonising Bare Ground	ED3
Horticultural Land	BC2
Flowerbeds & Borders	BC4
Stone Walls & Other Stonework	BL1
Buildings and Artificial Surfaces	BL3
Buildings and Artificial Surfaces/Amenity Grassland /Flowerbeds & Borders Mosaic	BL3/GA2/BC4

#### 5.1.1 Habitat Descriptions

##### Canals (FW3)

The project lies within and adjacent to the Royal Canal. Canals are artificial waterways that form part of the navigable waterway system. The canal environment is typically within a maintained modified state to accommodate largely seasonal and recreational boat traffic. Canals need a reliable supply of water in order for locks to function. The Royal Canal pNHA is a site designated for canal flora, fauna and semi-natural habitats and the heritage value of the canal structures (locks, tunnels, bridges). The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species.

Within the study area the canal bank varies in species composition and structure. Vegetation along the riparian zone includes Common Stonewort (*Chara vulgaris* var. *papillata*), Bulrush (*Typha latifolia*), Branched Bur-reed (*Sparganium erectum*), Reed Sweet-grass (*Glyceria maxima*) and Yellow Iris (*Iris pseudacorus*). The canal benthos is dominated by Canadian Waterweed (*Elodea canadensis*) and Nuttall's Waterweed. Water Lily (*Nuphar lutea*), Ivy-leaved Duckweed (*Lemna trisulca*) and Spiked Water-milfoil (*Myriophyllum spicatum*) are also present within the canal.

The canal realigned to facilitate the construction of the Project. The Royal Canal pNHA has been selected as a Key Ecological Receptor.

### **Amenity Grassland (GA2)**

This type of grassland is improved, or species-poor, and is managed for purposes other than grass production. It includes amenity, recreational or landscaped grasslands, but excludes farmland. Small sections of amenity grassland were identified along the verges of the canal, often adjacent to buildings.

### **Dry Meadows and Grassy Verges (GS2)**

Dry meadows and grassy verges were occasionally recorded along the towpath and south bank of the canal. These areas are occasionally mown and there is little or no grazing or fertiliser application. Species recorded within this habitat included Bird's-foot-trefoil (*Lotus corniculatus*), Bush Vetch (*Vicia sepium*) and clovers (*Trifolium* spp).

### **Wet Grassland (GS4)**

This habitat was recorded in fields adjacent to the Coke Oven Cottages. This type of grassland can be found on flat or sloping ground in upland and lowland areas. It occurs on wet or waterlogged mineral or organic soils that are poorly drained or, in some cases, subjected to seasonal or periodic flooding.

### **Scattered Trees and Parkland (WD5)**

Scattered trees and Parkland was occasionally recorded within the study area. This category can be used in situations where scattered trees, standing alone or in small clusters, cover less than 30% of the total area under consideration but are a prominent structural or visual feature of the habitat. This usually occurs in areas of cultivated grassland, particularly amenity areas.

### **Scrub (WS1)**

This broad category includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. The canopy height is generally less than 5m, or 4m in the case of wetland areas. This classification is ubiquitous throughout the canal boundary and is often found next to the towpath verge, behind the Calp Wall and associated with treelines and along the southern bank of the canal. Common components of this habitat include spinose plants such as Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Bramble (*Rubus fruticosus* agg.). Scrub provides cover and foraging resources for numerous species and has been selected as a Key Ecological Receptor.

### **Hedgerows (WL1)**

Hedgerows are linear strips of shrubs, often with occasional trees. The hedgerows grade into scrub in places. Typical species recorded along the hedgerows included Hawthorn (*Crataegus monogyna*) and Bramble (*Rubus fruticosus* agg.). Where they exist, hedges are an important feature of the local canal corridor network. In some areas they are the only direct link between disparate habitats. Hedgerows as 'Hedgerows and Treelines' have been selected as a Key Ecological Receptor.

### **Treelines (WL2)**

A treeline is a narrow row or single line of trees that is greater than 5m in height and typically occurs along field or property boundaries. Treelines are found usually along the towpath boundary. These habitats varied in species composition. The most dominant species associated with the treelines within with the study area were Alder (*Alnus glutinosa*) Elder (*Sambucus nigra*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and Willow (*Salix* spp.). Ivy (*Hedera helix*) is a common component and at the base. Treelines as 'Hedgerows and Treelines' have been selected as a Key Ecological Receptor.

### **Recolonising Bare Ground (ED3)**

This category is used for any areas where bare or disturbed ground, derelict sites or artificial surfaces of tarmac, concrete or hard core have been invaded by colonising opportunistic herbaceous plants. This habitat was recorded within the Irish Rail compound west of Cross Guns Bridge. Species recorded in this habitat include Butterfly Bush (*Buddleja davidii*) and Red Valerian (*Centranthus ruber*).

### **Horticultural Land (BC2)**

This category includes areas of land that are cultivated and managed for the production of vegetables, fruit crops, culinary or aromatic herbs, flowers and other ornamental plants. This habitat type was associated with the community allotment garden east of the railway bridge.

### **Flowerbeds & Borders (BC4)**

This habitat was associated with landscaped areas next to houses, apartments, commercial buildings and street furniture. These areas often consist of non-native and ornamental plant species but can also provide valuable foraging resources for pollinators and birds and other species such as hedgehogs.

### **Stone Walls & Other Stonework (BL1)**

Stone Walls are common throughout the study area. The Calp Wall running from the Cabra Kayak Club building to the Coke Oven Cottages is a prime example of this habitat type (See Plate 2). Stone walls provide refuges for fauna including Common Lizard. Flora frequently recorded along this habitat included Red Valerian (*Centranthus ruber*), Smooth Sowthistle (*Sonchus oleraceus*) and Ivy-Leaved Toadflax (*Cymbalaria muralis*).



**Plate 2: Calp Wall**

### **Buildings and Artificial Surfaces (BL3)**

This broad category incorporates areas of built land. It includes all buildings as well as areas of land that are covered with artificial surfaces of tarmac, cement, paving stones, bricks or blocks (e.g. roads, car parks, pavements, runways, yards, and some tracks, paths, driveways). This classification comprises paths, roads, bridges and buildings along the canal. This habitat is of limited ecological value.

### **Buildings and Artificial Surfaces/ Amenity Grassland/ Flowerbeds & Borders Mosaic (BL3/GA2/BC4)**

This habitat is used to represent the mosaic of private dwellings with gardens, including the Coke Oven Cottages.

## **5.2 Watercourses**

The Project is located within the Royal Canal which flows into the River Liffey at Spencer Dock, approximately 3 km from the Project boundary. From there the River Liffey flows in an easterly direction before entering Dublin Bay. The River Tolka and its estuary also lies within the Zone of influence for the Project. Watercourses can act as conduits for invasive species and both a pathway and receptor for pollutants to sensitive habitats/species located downstream of the Project.

### 5.3 Flora

There were no species listed on the Flora Protection Order (FPO) recorded in the study area during the surveys. Table 5.2 below lists the species recorded during the habitat and aquatic plant surveys. The Aquatic Plant Survey report is provided in Appendix F.

**Table 5.2 Plant Species Recorded During the Surveys**

Common Name	Scientific Name
Alder	<i>Alnus glutinosa</i>
Alexanders	<i>Smyrniolum olusatrum</i>
Annual Meadow-grass	<i>Poa annua</i>
Ash	<i>Fraxinus excelsior</i>
Blackthorn	<i>Prunus spinosa</i>
Birds-foot Trefoil	<i>Lotus corniculatus</i>
Bramble	<i>Rubus fruticosus agg</i>
Branched Bur-reed	<i>Sparganium erectum</i>
Broad-leaved Dock	<i>Rumex obtusifolius</i>
Bulrush	<i>Typha latifolia</i>
Bush Vetch	<i>Vicia sepium</i>
Butterbur	<i>Petasites hybridus</i>
Butterfly Bush	<i>Buddleja davidii</i>
Canadian Waterweed	<i>Elodea canadensis</i>
Cleavers	<i>Galium aparine</i>
Common Hogweed	<i>Heracleum sphondylium</i>
Common Poppy	<i>Papaver rhoeas</i>
Common Stonewort	<i>Chara vulgaris var. papillata</i>
Cow Parsley	<i>Anthriscus sylvestris</i>
Creeping Bent	<i>Agrostis stolonifera</i>
Creeping Buttercup	<i>Ranunculus repens</i>
Creeping Cinquefoil	<i>Potentilla reptans</i>
Creeping Thistle	<i>Cirsium arvense</i>
Cuckooflower	<i>Cardamine pratensis</i>
Curled Dock	<i>Rumex crispus</i>
Daffodil	<i>Narcissus spp.</i>
Daisy	<i>Bellis perennis</i>
Dandelion	<i>Taraxacum majus</i>
Dark Stonewort	<i>Nitella opaca</i>
Dog-rose	<i>Rosa canina</i>
Elder	<i>Sambucus nigra</i>
Flag Iris	<i>Iris pseudacorus</i>

<b>Common Name</b>	<b>Scientific Name</b>
Field Forget-me-not	<i>Myosotis arvensis</i>
Field Horsetail	<i>Equisetum arvense</i>
Germander Speedwell	<i>Veronica chamaedrys</i>
Great Willowherb	<i>Epilobium hirsutum</i>
Greater Periwinkle	<i>Vinca major</i>
Gorse	<i>Ulex europaeus</i>
Hawthorn	<i>Crataegus monogyna</i>
Hazel	<i>Corylus avellana</i>
Hedge Bindweed	<i>Calystegia sepium</i>
Herb Robert	<i>Geranium robertianum</i>
Hoary Willowherb	<i>Epilobium parviflorum</i>
Hogweed	<i>Heracleum sphondylium</i>
Holly	<i>Ilex aquifolium</i>
Ivy	<i>Hedera helix</i>
Ivy-leaved Duckweed	<i>Lemna trisulca</i>
Ivy-leaved Toadflax	<i>Cymbalaria muralis</i>
Japanese Knotweed	<i>Fallopia japonica</i>
Mare's-tail	<i>Hippuris vulgaris</i>
Meadowsweet	<i>Fillipendula ulmaria</i>
Nettle	<i>Urtica dioica</i>
Nuttall's Waterweed	<i>Elodea nuttallii</i>
Oxeye Daisy	<i>Leucanthemum vulgare</i>
Pellitory-of-the-wall	<i>Parietaria judaica</i>
Pedunculate Oak	<i>Quercus robur</i>
Perennial Rye Grass	<i>Lolium perenne</i>
Ragwort	<i>Senecio jacobaea</i>
Red Clover	<i>Trifolium pratense</i>
Red Valerian	<i>Centranthus ruber</i>
Reed Sweet-grass	<i>Glyceria maxima</i>
Ribwort Plantain	<i>Plantago lanceolata</i>
Rosebay Willowherb	<i>Epilobium angustifolium</i>
Rowan	<i>Sorbus aucuparia</i>
Shepherd's-purse	<i>Capsella bursa-pastoris</i>
Silver Birch	<i>Betula pendula</i>
Smooth Sowthistle	<i>Sonchus oleraceus</i>
Snowberry	<i>Symphoricarpos albus</i>
Snow-in-summer	<i>Cerastium tomentosum</i>

Common Name	Scientific Name
Spiked Water-milfoil	<i>Myriophyllum spicatum</i>
Starworts	<i>Callitriche</i> spp.
Sycamore	<i>Acer pseudoplatanus</i>
Three-cornered Garlic	<i>Allium triquetrum</i>
Tufted Vetch	<i>Vicia cracca</i>
Weld	<i>Reseda luteola</i>
White Clover	<i>Trifolium repens</i>
Wild Angelica	<i>Angelica sylvestris</i>
Wild Teasel	<i>Dipsacus fullonum</i>
Willows	<i>Salix</i> spp.
Winter Heliotrope	<i>Petasites pyrenaicus</i>
Water Dock	<i>Rumex hydrolapathum</i>
Water Lily	<i>Nuphar lutea</i>
Yellow Iris	<i>Iris pseudacorus</i>

## 5.4 Fauna

### 5.4.1 Badger (*Meles meles*)

No evidence of Badger was recorded during the field surveys; however, it is known that badgers occur within the Study Area (pers. comm., resident of the Coke Oven Cottages). Development projects by their nature can negatively impact on Badger by creating barriers to connectivity and disturbance. This species has been included as a Key Ecological Receptor.

### 5.4.2 Otter (*Lutra lutra*)

Otter were recorded swimming between the 7<sup>th</sup> and 8<sup>th</sup> Locks during a bat activity survey on 25<sup>th</sup> May 2021. Otter activity including two active holts, three inactive holts, two couches, slides and spraints were recorded within the study area. Table 5.3 details otter holts and couches found within 150m of the Project. The location of otter breeding and resting places is provided in Appendix D (Confidential). No holts or couches were identified at areas of the canal which will be subject to dewatering. Works adjacent to and within the canal could lead to significant impacts on otter by creating barriers to connectivity and disturbance. For this reason, otter has been included as a Key Ecological Receptor.

**Table 5.3 Otter Survey Results**

Sign ID	Description	Location
Otter_010	Inactive holt under big dead oak on north bank of canal, 10 m from canal, down slope There are slides in area to canal. .	Outside the Project area, on north bank of canal, west of Ashtown Bridge, 1.5km west of nearest section of canal to be dewatered. The holt is not located within any of

		the areas that will be dewatered.
Otter_012	Inactive holt with old slide to canal. Excavation in clay under rail line with indiscernible claw marks (entrance partially collapsing).	Inside the Project area, on south bank of canal on opposite side to towpath, east of Ashtown Bridge, 1.2km west of nearest section of canal to be dewatered. The holt is not located within any of the areas that will be dewatered.
Otter_017	Inactive holt under new bridge at banktop (entrance partially collapsing)	Inside the Project on south bank of canal on opposite side to towpath, east of Lock 8, 130m east of section of canal to be dewatered west of Lock 8 and 160m west of section of canal to be dewatered west of Broombridge. The holt is not located within any of the areas that will be dewatered.
Otter_018	Holt under cotoneaster bush adjacent to bridge, south bank, 2 entrances. Slides to canal down steep open slope with well eroded paths into scrub and to water	Inside the Project on south bank of canal on opposite side to towpath, east of Lock 8, 120m west of section of canal to be dewatered west of Broombridge and 160m east of section of canal to be dewatered west of Lock 8. The holt is not located within any of the areas that will be dewatered.
Otter_022	Active holt under rail platform with slide to canal and single spraint with well eroded entrance	Inside the Project on south bank of canal on opposite side to towpath, east of Broombridge, 165m east from section of canal to be dewatered west of Broombridge and 1 km west of section of canal to be dewatered west of Lock 6. The holt is not located within any of the areas that will be dewatered.
Otter_024	Couch and slide, regular spraint site under bramble scrub on south bank of canal.	Inside the Project area, on opposite side on south bank of canal on opposite side to east of Broombridge, 330m east from section of canal to

		be dewatered west of Broombridge and 860m west of section of canal to be dewatered west of Lock 6 The couch is not located within any of the areas that will be dewatered.
Otter_025	Couch and trails to canal with potential (buried in scrub) holt on south bank of canal.	Inside the Project area, on south bank of canal on opposite side to towpath, east of Broombridge, 330m east from section of canal to be dewatered west of Broombridge and 860m west of section of canal to be dewatered west of Lock 6. The couch is not located within any of the areas that will be dewatered.

### 5.4.3 Bat species

A bat roost suitability assessment was conducted to identify built or natural features within close proximity to the construction envelope of the Project and which could provide negligible to high potential to support a bat roost. No trees or buildings with Low, Moderate or High bat potential were identified within the study area.

Two bat activity survey were undertaken on 13<sup>th</sup> and 25<sup>th</sup> May 2021 in suitable weather conditions. Details of the survey are presented in table 5.4 below.

**Table 5.4 2021 Bat Survey Details**

Date	Start Time	End Time	Temperature	Wind and rain
13 <sup>th</sup> May	21:00	23:45	10°C	No wind or rain
25 <sup>th</sup> May	21:30	12:20	11°C	No wind or rain

Four bat species were recorded during the surveys, namely Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano pipistrelle (*Pipistrellus pygmaeus*), Leisler's Bat (*Nyctalus leisleri*) and Daubenton's Bat (*Myotis daubentonii*). Bats were seen during the survey commuting and foraging over the canal and along the scrub, hedgerows and treelines bordering the towpath. Daubenton's Bat was seen feeding on the surface of the canal.

Table 5.5 below shows the number of calls recorded for each species.

**Table 5.5 2021 Bat Survey Results**

Species	No. calls (13 <sup>th</sup> May)	No. calls (25 <sup>th</sup> May)
Daubenton's Bat	4	9
Common Pipistrelle	19	216
Leisler's Bat	109	373
Soprano Pipistrelle	83	27

Six bat activity survey were undertaken between June and September 2022 in suitable weather conditions. Details of the survey are presented in table 5.6 below.

**Table 5.6 2022 Bat Survey Details**

Date	Start Time	End Time	Temperature	Wind and rain
9 <sup>th</sup> June	20:57	23:20	16	Moderate breeze, no rain.
8 <sup>th</sup> August	21:04	23:38	18	No wind or rain.
18 <sup>th</sup> August	20:57	23:20	17	Light breeze, no rain.
1 <sup>st</sup> September	20:15	22:45	16	No wind or rain.
22 <sup>nd</sup> September	19:30	21:55	15	No wind or rain.
29 <sup>th</sup> September	19:21	21:38	14	No wind or rain.

Table 5.7 below shows the number of calls recorded for each species (\* denotes one or more detectors failed to record data)

**Table 5.7 2022 Bat Survey Results**

Species	No. calls (9 <sup>th</sup> June)	No. calls (8 <sup>th</sup> August)	No. calls (17 <sup>th</sup> August)	No. calls (1 <sup>st</sup> September)	No. calls (22 <sup>nd</sup> September)	No. calls (29 <sup>th</sup> September)
Daubenton's Bat	2	2	8	1*	0*	90*
Leisler's Bat	40	4	4	3*	18*	4*
Common Pipistrelle	29	238	237	254*	11*	7*
Soprano Pipistrelle	5	586	1035	204*	168*	185*
Pipistrelle (unknown)	2	1	2	0*	13*	1*

Pipistrelle species and Leisler's bat were the most commonly recorded species and were recorded feeding over the canal and along hedgerows and treelines on all of the surveys. Daubenton's bat is a water specialist and was recorded feeding over the canal. This species is light sensitive and more vulnerable to the introduction of artificial lighting than the other species. Table 5.8 below presents the locations of Daubenton's Bat that were recorded over the course of the 2022 surveys. Daubenton's bat was recorded at all three survey locations. Ashtown has the most natural habitat, with mature trees of Ashton House bordering the Royal Canal's north Bank. Despite the built-up nature and artificial lighting present around Broombridge Station and Cross Gun's Bridge, Daubenton's were recorded in small numbers.

**Table 5.8 Locations of Daubenton's records.**

Date	Cross Bridge	Guns	Broombridge Station	Ashtown
9 <sup>th</sup> June	0		0	2
8 <sup>th</sup> August	2		1	0
17 <sup>th</sup> August	7		1	0
1 <sup>st</sup> September	1		1	0
22 <sup>nd</sup> September	0		0	0
29 <sup>th</sup> September	1		4	86

Bats may be impacted by the removal of hedgerow, treeline and scrub habitat within the site as well as the addition of artificial lighting along the canal. Bats have been included as a Key Ecological Receptor.

#### 5.4.4 Additional Mammal Species

No evidence of Pine Marten (*Martes martes*), Irish Hare (*Lepus timidus hibernicus*), Irish Stoat (*Mustela ermina hibernica*), Pygmy Shrew (*Sorex minutus*) or Hedgehog (*Erinaceus europaeus*) was recorded during field surveys. Impacts on small mammals is considered under the Key Ecological Receptor 'Hedgerows and Treelines' with regard to habitat loss and fragmentation. The site does not contain suitable habitat for Red Squirrel (*Sciurus vulgaris*). Therefore, there will be no impacts on this species as a result of the Project. Red Fox (*Vulpes vulpes*) was seen during a bat activity survey walking near the 2½ mile post on the Western Commuter Train Line west of Broombridge.

#### 5.4.5 Birds

No specific bird surveys were undertaken; however, 19 species were recorded during the multidisciplinary walkover survey (listed in Table 5.9). Grey Wagtail (*Motacilla cinerea*) appeared to be nesting at the 7<sup>th</sup> and 8<sup>th</sup> Locks during the survey. Sand Martin were seen nesting at the locks during the survey. The canal, hedgerows, treelines and scrub that border the site provides good nesting and foraging habitat for a range of species. Birds may benefit from a potential increase in the availability of food provided by the addition of native planting within the site. The removal of vegetation will result in loss and fragmentation of habitat used by nesting birds and could result in the loss of nests and chicks during the breeding season, therefore 'Birds' has been included as a Key Ecological Receptor.

**Table 5.9 Bird species recorded during walkover survey.**

Common Name	Scientific Name
Blackbird	<i>Turdus merula</i>
Feral Pigeon	<i>Columba livia domestica</i>
Great Black-backed Gull	<i>Larus marinus</i>
Greenfinch	<i>Carduelis chloris</i>
Grey Heron	<i>Ardea cinerea</i>
Grey Wagtail	<i>Motacilla cinerea</i>
Hooded Crow	<i>Corvus cornix</i>
House Sparrow	<i>Passer domesticus</i>
Magpie	<i>Pica pica</i>
Mallard	<i>Anas platyrhynchos</i>
Moorhen	<i>Gallinula chloropus</i>
Robin	<i>Erithacus rubecula</i>
Rook	<i>Corvus frugilegus</i>
Sand Martin	<i>Riparia riparia</i>
Starling	<i>Sturnus vulgaris</i>
Swallow	<i>Hirundo rustica</i>
Tufted Duck	<i>Aythya fuligula</i>
Wren	<i>Troglodytes troglodytes</i>



**Plate 3: Grey Heron (*Ardea cinerea*) near Cross Guns Bridge.**

#### 5.4.6 Invertebrates

The study area offers suitable habitat for a number of aquatic and terrestrial invertebrate taxa in the form of canal, riparian vegetation, hedgerows, treelines, and scrub and grassland habitat. Table 5.10 lists key invertebrate species recorded during the surveys.

**Table 5.10 Invertebrate species recorded during the surveys.**

Common Name	Scientific Name
Cinnabar Moth	<i>Tyria jacobaeae</i>
Common Carder Bumblebee	<i>Bombus pascuorum</i>
Holly Blue	<i>Celastrina argiolus</i>
Honeybee	<i>Apis mellifera</i>
Painted Lady	<i>Vanessa cardui</i>
Small White	<i>Pieris rapae</i>
7-spot Ladybird	<i>Coccinella septempunctata</i>



**Photo 3:** 7-spot Ladybird (*Coccinella septempunctata*) at canal bank.

#### 5.4.7 Reptiles and Amphibians

Common (Viviparous) Lizard (*Zootoca vivipara*) was not recorded during the field surveys but are assumed present within the study area. The Calp Wall and gardens adjacent to the Project provide suitable habitat for this species. Small numbers of common lizard may be present in the construction footprint. However, the loss of a small number of individuals will not be significant in the context of the local population and this species' conservation status of 'Least Concern' in Ireland (King et al., 2011). Common Lizard is not included as a Key Ecological Receptor for this site.

Common Frog (*Rana temporaria*) and Smooth Newt (*Lissotriton vulgaris*) may occur in wet grassland, canal and fringing vegetation along the canal. These species could be impacted during the removal of vegetation and the realignment of the north bank of the canal. However, the loss of a small number of individuals will not be significant in the context of the local population and the conservation status of both Common Frog and Smooth Newt are classified as 'Least Concern' in Ireland (King et al., 2011). Amphibians are not included as a Key Ecological Receptor for this site.

#### Invasive Species

Three species subject to restrictions as listed on the Third Schedule of the Birds and Natural Habitats Regulations were recorded within the study area, namely, Japanese Knotweed (*Fallopia japonica*) (See Plate 4), Three-cornered Garlic (*Allium triquetrum*) and Nuttall's Waterweed (*Elodea nuttallii*). The location of these species within the site boundary is provided in Appendix E.

Three distinct stands of Japanese Knotweed were recorded within the study area within 50m west of the 6<sup>th</sup> Lock. The details of each stand are as follows:

- Stand Ref JK01 consists of three stems on canal bank.

- Stand Ref JK02 is a single stem on canal bank.
- Stand Ref JK03 consists of five stems located between 2m and 5m behind the calp wall.

One stand of Three-cornered Garlic was recorded was recorded on the canal bank directly west of the 7<sup>th</sup> Lock.

Nuttall's Waterweed was recorded within the canal at the following locations:

- Occasionally between 6<sup>th</sup> and 7<sup>th</sup> Locks.
- Occasionally between 7<sup>th</sup> and 8<sup>th</sup> Locks.
- Directly west of the 8<sup>th</sup> Lock.

Invasive plant species not subject to restrictions, recorded during the field survey include Butterfly Bush (*Buddleja davidii*), Snowberry (*Symphoricarpos albus*) and Winter Heliotrope (*Petasites pyrenaicus*). Invasive Species pose a threat to biodiversity and could inadvertently be further spread within and from the site of the Project through construction activities. Therefore, 'Invasive Species' has been included as a Key Ecological Receptor.



Plate 4: Japanese Knotweed (*Fallopia japonica*) on canal bank.

## 5.5 Ecological Corridors

Article 10 of the Habitats Directive recognises the importance of ecological networks as corridors and stepping stones for wildlife, including for migration, dispersal and genetic exchange of species of flora and fauna. The Directive requires that ecological connectivity and areas of ecological value outside the Natura 2000 network are

maintained, and it recognises the need for the management of these areas through land use planning and development policies.

Ecological corridors are important in connecting areas of local biodiversity with each other and with nearby designated sites and in preventing habitat fragmentation/the creation of isolated islands of habitat. Ecological corridors include linear features such as treelines, hedgerows, railway lines, rivers, streams, canals and ditches as stepping stones for wildlife moving within their range. They are particularly important for mammals, especially bats, and small birds.

The canal, hedgerows, treelines and scrub habitat are examples of potential ecological corridors in the Zone of Influence. The protection of Ecological Corridors has been incorporated into the Key Ecological Receptors, and their mitigation measures.

## 6. KEY ECOLOGICAL RECEPTORS

This section of the report provides details of the Key Ecological Receptors that were identified during the desk study and the subsequent field survey. The Key Ecological Receptors identified are described in detail in Table 6.1 and an ecological valuation for each Key Ecological Receptor is also provided.

### 6.1 Key Ecological Receptors Identified During the Surveys

**Table 6.1 Key Ecological Receptors Identified During the Surveys**

Key Ecological Receptor	Description	Importance/Ecological Valuation (TII/NRA, 2009b)
KER 1 Royal Canal pNHA	The Royal Canal is designated as a proposed Natural Heritage Area (pNHA) The entire canal provides an important wildlife corridor for species such as otter and Daubenton's Bat.	<b>National Importance</b> on the basis the canal is proposed as a Natural Heritage Area and supports habitats and species listed on Annexes II and IV of the Habitats Directive and Annex I of the Birds Directive. In addition, canal provides important habitat connectivity between the inland habitats and Dublin Bay.
KER 3 Scrub	Scrub has been selected as Key Ecological Receptor for the Project as it forms an integral part of the local network of wildlife corridors.	<b>Local Importance (Higher Value)</b> on the basis that these habitats support species of conservation of importance and provide local corridors for wildlife between areas of higher ecological value.
KER 2 Hedgerows & Treelines	Hedgerows & Treelines have been selected as Key Ecological Receptors for the Project as they form an integral part of the local network of wildlife corridors.	<b>Local Importance (Higher Value)</b> on the basis that these habitats support species of conservation of importance and provide local corridors for wildlife between areas of higher ecological value.
KER 4 Badger	Badger are known to occur within the study area. Badgers are vulnerable to disturbance.	<b>Local Importance (Higher Value)</b> as this species is protected under the Wildlife Act and there is suitable habitat for this species within the study area.
KER 5 Otter	Two active otter holts and couches are present in the study area. Otters could be impacted through disturbance and barriers to connectivity as well as contamination of the of the river.	<b>Local Importance (Higher Value)</b> as this species is listed on Annexes II and IV to the Habitats Directive and protected under the Wildlife Act and there is evidence that the species commutes through the study area.
KER 6 Bats	Bats were recorded foraging along the canal, hedgerows and treelines within the study area. Bats may be impacted through the loss of foraging habitat.	<b>Local Importance (Higher Value)</b> on the basis that bats are listed on Annex IV to the Habitats Directive and protected under the Wildlife Act and are present within the study area.

Key Ecological Receptor	Description	Importance/Ecological Valuation (TII/NRA, 2009b)
KER 7 Birds	The study area supports a number of breeding bird species. Bird populations are sensitive to disturbance and habitat loss.	<b>Local Importance (Higher Value)</b> on the basis that birds protected under the Wildlife Act are present within the study area.
KER 8 Invasive Alien Species (IAS)	Invasive plants have been selected as a Key Ecological Receptor because of the presence of Japanese Knotweed, Nutall's Waterweed and Three-cornered Garlic within the footprint of the Project. These species can impact negatively on the biodiversity, preventing the regeneration of native species and leading to soil erosion.	Invasive alien species have the potential to impact negatively on native species diversity and structures.

## 6.2 Impacts on Key Ecological Receptors

### 6.2.1 General Impacts on Key Ecological Receptors

#### 6.2.1.1 *Habitat Loss*

The Project will include widening of the existing towpath into the canal in some sections and the consequential loss of canal bed habitat. A total of 2,500 m<sup>2</sup> of canal habitat will be permanently lost to accommodate the Project as shown in Project Drawings. This is considered to be a minor loss of canal bed habitat in context of the entire Royal Canal which measures in excess of 1.5 million m<sup>2</sup>. There will be minor loss of riparian habitat during the widening of the towpath. The canal bank will be restored following construction and vegetation will regrow and recover over time (as detailed in section 6.2.1.7 Habitat Restoration and Creation).

The Project will also result in the loss of scrub, hedgerow and treeline habitat, along the towpath, which will be cut back or removed in order to facilitate construction of the cycleway. Dead and dangerous trees along the route will be felled. These dead and felled trees will be logged into 2m lengths and stacked as log piles along the existing and proposed boundaries. Vegetation clearance could result in the loss of nesting bird habitat and habitat degradation. However, this vegetation removal will correspond to a temporary loss as replacement native hedges and will be planted across the length of the Project (as detailed in section 6.2.1.7 Habitat Restoration and Creation). These habitats do not represent rare or protected vegetative communities/associations and do not support important populations of rare or protected species at the local level or higher. Therefore, the loss or damage of these habitats is not considered to be significant. Table 6.2 details the loss of canal, scrub, treeline and hedgerow habitat along the route of the Project.

**Table 6.2 Habitat Loss**

Habitat	Total Loss
Canal	2,500 m <sup>2</sup>
Scrub	512 m
Hedgerows & Treelines	140 m

### 6.2.1.2 *Habitat Fragmentation*

Habitat fragmentation and barrier effect may occur if bats, otter, fish and other aquatic species are not able to migrate between the Royal Canal and surrounding habitats including the River Liffey downstream.

The loss of canal, scrub, hedgerow and treeline habitats in addition to works along the canal will result in habitat fragmentation which could lead to the displacement of wildlife from the area. Fragmentation of habitats will prevent the movement of fauna such as small mammals around the site. Works within and adjacent to the canal may also create barriers to connectivity for otter. The proposed Project could potentially inhibit the movement of bats between areas of foraging habitat and roosts.

### 6.2.1.3 *Displacement/Disturbance of Fauna*

Construction of the Project will result in temporary noise, vibration, lighting and visual disturbance and will affect species both within outside the construction footprint. Some displacement of species may be caused during the construction phase. However, it is anticipated that these disruptions will be temporary in nature.

Excessive artificial lighting of the construction area also presents the risk of light disturbance for both aquatic and terrestrial species. Prolonged or repetitive disturbances have the potential to cause barriers to connectivity for species moving upstream and downstream past the construction area.

Aspects of the operation of the Project with the potential to cause disturbance include the presence of artificial lighting and increased human presence.

### 6.2.1.4 *Dredging Impacts*

Where dredging is undertaken, there will be a short-term loss of aquatic vegetation. The species recorded within the project area are common and widespread within the Royal Canal and so can be expected to re-establish over the course of a few years. Dredging of the canal has been shown to benefit species of conservation interest, e.g. Opposite-leaved Pondweed.

### 6.2.1.5 *Water Quality Impacts*

Construction activities within and adjacent to surface waters, e.g. canals, can negatively impact water quality. The construction of the Project, if not properly managed, has the potential to impact on water quality in the Royal Canal as follows.

Surface water run-off from construction activities can contain high levels of suspended sediments and other pollutants. Such run-off, if not attenuated and treated prior to discharge, has the potential to cause significant ecological impacts. Large amounts of fine sediment deposition can smother benthic habitats, leading to changes in biological composition. High levels of sediment can cause shading, which negatively affects plant photosynthesis. Suspended sediment is unlikely to reach waterbodies downstream as it will settle out in the slow-moving canal habitat.

During construction, construction materials or other pollutants may spill directly into the local environment or be washed into the water in construction site run-off. Many of these materials are highly deleterious to aquatic life, e.g. cementitious materials are highly alkaline and, consequently, can drastically alter the pH of the receiving water body. This can lead to very significant ecological impacts and can affect the condition of habitats.

Vehicles, plant and equipment which will be used during construction rely on hydrocarbons such as diesel, petrol and lubricating oils. Leaks from poorly maintained vehicles, plant, equipment or storage tanks risk the input of hydrocarbons into the environment. In the absence of appropriate mitigation, hydrocarbons from the construction site may be washed into surface waters in construction site run-off. This has the potential to cause negative ecological impacts on freshwater habitats. Hydrocarbons can have direct toxic effects, including reducing the ability of organisms to absorb water and nutrients. Hydrocarbon spills can reduce oxygen levels within aquatic environment therefore effecting growth of aquatic plants. A significant hydrocarbon spill could effect downstream sections of the canal that may still support Opposite-leaved Pondweed. Hydrocarbons can also alter the nutrient balance and microbiota in soil and water, which can benefit some species while detrimentally affecting others. Such changes have the potential to alter the ecological community structures and ecological integrity of habitats.

Inadequate treatment of wastewater from on-site toilets and washing facilities also provides for potential water quality impacts which could lead to ecological effects. Faecal contamination can alter the nutrient balance in soils and water, causing significant changes in microbial communities and reductions in oxygen levels. This can have significant effects on the biological composition of receiving habitats.

#### **6.2.1.6 Dispersal of Invasive Alien Plant Species**

Japanese Knotweed was recorded within the footprint of the Project. Japanese Knotweed is a threat in open and streamside areas. It can spread rapidly to form dense stands, excluding native vegetation and reducing species diversity. Once stands become established, they are extremely persistent and difficult to remove. This plant has the ability to grow through tarmac and concrete (in some cases within dwellings). Failure to manage Japanese Knotweed on a development site may result in eventual structural damage.

Three-cornered Garlic was recorded along the canal bank. This species is known to rapidly colonise and dominate waste ground, outcompeting native vegetation (Booy, et al., 2015).

Nuttall's Waterweed was recorded within the canal. This species is widespread in canals and other waterways in Ireland (NBDC, 2021), and is spread by vegetative fragments (Preston et al., 1997). This method of reproduction means that small plant fragments attached to vehicles, equipment or clothing can be carried to an unaffected waterbody and begin a new population. Given that the species is widespread within the Royal Canal, the main threat is fragments of the plant being moved to other, currently uninfected waterbodies.

Construction activities could aid the spread of invasive species within the site. In the absence of control measures, there is a possibility that these species may be inadvertently spread during construction, through the movement of equipment and contaminated soil to, from, or within the site.

### 6.2.1.7 **Habitat Restoration and Creation**

The landscaping plan (BSM, 2021) details planting across the length of the Project.

The canal bank is to be relocated and reshaped. The existing growth is to be lifted in a sod or turf with a sufficient root zone then stored on site locally in a wet bed situation. The sods will be reinstated as soon as works to the bank are completed. In certain sections, marginal planting including Sweet Reed Grass and Reed Canary grass will be used to enhance the re-established canal bank. The biodiversity value of the marginal planting will be low at first but will improve with time as the plants grow and aquatic and riparian vegetation becomes established.

The landscape plan includes the replacement of trees and hedgerow which will be lost during the construction phase. Native Irish tree and hedge species will be planted along the route include Alder, Downy Birch, Scot's Pine, Hawthorn, Holly and Guelder-rose among other native species. Replacing lost vegetation will ensure sources of pollen and nectar for food; habitats for breeding and overwintering, as well as corridors and pathways to travel across the landscape are retained along the canal in the long term.

### 6.2.2 **Impacts on Key Ecological Receptors**

Table 6.3 below describes the impacts on each of the Key Ecological Receptors

**Table 6.3 Impacts on Key Ecological Receptors**

<b>KER</b>	<b>Construction-phase Impacts</b>	<b>Operational-phase Impacts</b>	<b>Ecological Significance if Unmitigated</b>
KER 1 Royal Canal pNHA	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Habitat degradation</li> <li>• Habitat fragmentation</li> <li>• Dredging impacts</li> <li>• Pollution of watercourses</li> <li>• Disturbance</li> <li>• Spread of IAS</li> </ul>	<ul style="list-style-type: none"> <li>• Habitat fragmentation and barrier effect</li> <li>• Disturbance</li> </ul>	<p>The direct loss of habitat and fragmentation associated with the Project is not considered to be significant as it involves only the degradation and habitat loss of a very small area (2,500 m<sup>2</sup>) of the receptor. This is considered to constitute a <b>Permanent Slight Negative</b> Impact over a very small area of a receptor of National Importance. The impact will alter the character of the environment in this area but will not affect its sensitivities.</p> <p>The potential for habitat fragmentation and barrier effects is considered to constitute a <b>Permanent Slight-Moderate Negative</b> Impact as it applies to the sensitive species such as Otter that are likely to use the watercourse for commuting to wider areas within their ranges.</p> <p>The risk of pollution of the canal and impact of dredging during the construction phase is considered to constitute a <b>Potential Temporary Significant Negative</b></p>

KER	Construction-phase Impacts	Operational-phase Impacts	Ecological Significance if Unmitigated
			<p>Impact as, if it were to occur, it would have the potential to impact sensitive receptors such as European Eel over a short period of time.</p> <p>The Project will result in a <b>Temporary Moderate Negative Impact</b> at the local level in respect of disturbance the potential spread of IAS.</p>
KER 2 Scrub	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Habitat degradation</li> <li>• Habitat fragmentation</li> </ul>	<ul style="list-style-type: none"> <li>• Net habitat gain over time</li> </ul>	<p>The Project will result in a <b>Short-term Slight Negative Impact</b> at the local level in respect of habitat loss, degradation and fragmentation.</p>
KER 3 Hedgerows & Treelines	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Habitat degradation</li> <li>• Habitat fragmentation</li> </ul>	<ul style="list-style-type: none"> <li>• Net habitat gain over time</li> </ul>	<p>The Project will result in a <b>Short-term Moderate Negative Impact</b> at the local level in respect of habitat loss, degradation and fragmentation.</p>
KER 4 Badger	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Habitat fragmentation and barrier effect</li> <li>• Disturbance</li> </ul>	None	<p>The Project will result in a <b>Short-term Moderate Negative Impact</b> at the local level in respect of habitat loss and fragmentation. The Project will result in a <b>Temporary Moderate Negative Impact</b> at the local level in respect of habitat degradation and disturbance.</p>
KER 5 Otter	<ul style="list-style-type: none"> <li>• Habitat Loss</li> <li>• Habitat fragmentation and barrier effect</li> <li>• Pollution of watercourses</li> <li>• Disturbance to otter breeding and resting places.</li> </ul>	None	<p>The potential for habitat fragmentation and barrier effect during the construction phase is considered to constitute a <b>Temporary Slight-Moderate Negative Impact at the local level</b> as Otter are present throughout the canal.</p> <p>The potential for pollution of the canal during the construction phase is considered to constitute a potential <b>Temporary Slight Negative Impact</b> as it has the potential to alter a sensitive receptor over a short period of time.</p> <p>Construction of the Project may lead to disturbance related impacts to otter and their breeding and resting places. This is considered to be a <b>Temporary</b></p>

KER	Construction-phase Impacts	Operational-phase Impacts	Ecological Significance if Unmitigated
			<p><b>Moderate Negative impact</b> at the local scale.</p>
<p>KER 6 Bats</p>	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Habitat fragmentation and barrier effect</li> <li>• Net gain in foraging habitat over time</li> <li>• Increased prey availability</li> </ul>	<p>The loss of canal, scrub, hedgerow and treeline habitat is considered to be a <b>Permanent Slight Negative Impact at the local level</b>. This loss is unavoidable but is considered to be minor given the small area of habitat involved. Disturbance during the construction phase, particularly from artificial lighting, is considered to be a <b>Short-term Slight Negative Impact at the local scale</b>.</p> <p>The potential for habitat fragmentation and barrier effects during the operational phase due to artificial lighting is considered to constitute a <b>Permanent Significant Negative Impact at the local level</b>.</p> <p>The Project will result in a <b>Long-term Moderate positive Impact</b> in respect to increased foraging habitat and prey availability.</p>
<p>KER 7 Birds</p>	<ul style="list-style-type: none"> <li>• Habitat Loss</li> <li>• Habitat fragmentation and degradation</li> <li>• Disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Net gain in nesting habitat over time</li> <li>• Increased prey availability</li> </ul>	<p>The Project will result in a <b>Short-term Moderate Negative Impact</b> at the local level in respect of habitat loss, fragmentation and degradation.</p> <p>Construction of the Project may lead to disturbance related impacts. This is considered to be a <b>Temporary Moderate Negative impact</b> at the local scale.</p> <p>The Project will result in a <b>Long-term Moderate positive Impact</b> in respect to increased nesting habitat and prey availability.</p>
<p>KER 8 Invasive Alien Species (IAS)</p>	<ul style="list-style-type: none"> <li>• Spread of IAS</li> </ul>	<p>None</p>	<p>Construction of the development may lead to the spread of invasive alien species. This is considered to be a <b>Long-term Significant Negative Impact at a local scale</b>.</p>

<b>KER</b>	<b>Construction-phase Impacts</b>	<b>Operational-phase Impacts</b>	<b>Ecological Significance if Unmitigated</b>
			Impacts as a result of invasive alien species at National or County Level are not anticipated.

## 7. MITIGATION

### 7.1 Mitigation by Design

- The Project predominantly utilises existing built surfaces, pathways and roadways. The majority of the 4.2km route is on the existing towpath and roadways. This inherently avoids ecologically sensitive areas. The design has followed the basic principles outlined below to eliminate the potential for ecological impacts on KERs where possible and to minimise such impacts where total elimination is not possible.
- As of March 2023, Dublin City Council is funding trials to survey the impact of public lighting on bat behaviour on the Royal Canal. Public lighting poles and ducting will be installed as part of the Project; however, the final lighting regime including timing, colour and lux levels, will be informed by the results of lighting trials and concurrent surveys of bat activity to be undertaken in Summer 2023. The preferred lighting regime will be agreed with DCC public lighting in consultation with the National Parks and Wildlife Service prior to being commissioned.
- A landscape plan (BSM, 2022) has been prepared for the Project. It includes the following measures:
  - Reinstatement of canal bank following construction.
  - Replacement of hedges and trees lost during the construction phase.
  - Planting will be undertaken in accordance with the Pollinator Friendly Planting Code in the All-Ireland Pollinator Plan 2021-2025.

#### 7.1.1 Non-Specific Mitigation Measures

The following is an overview of the non-specific mitigation measures that will be employed to avoid or minimise significant impacts on the ecological receptors within the Zone of Influence.

- The Contractor will prepare a Construction Method Statement detailing how the works will be carried out. The Site Foreman shall read, sign and abide by the Construction Method Statement. A signed copy will be submitted to the District Conservation Officer of the NPWS. The Works Team will be inducted on the ecological considerations listed in the Construction Method Statement by the Site Foreman.
- Construction erosion and sediment control measures will be included in respect of the construction phase of the project as an intrinsic part of works. The potential for run off of pollutants during the construction phase of the development will be fully managed with impacts on significant receptors avoided where possible.
- An Ecological Clerk of Works (ECoW) shall be appointed by DCC prior to the commencement of works. It shall be their responsibility to supervise and provide recommendations on the execution of any and all works which have the potential to give rise to negative effects on biodiversity/ecological integrity. The ECoW shall be a member of the Chartered Institute for Ecology and Environmental Management (CIEEM) and have at least five years similar experience.
- A pre-construction survey will be undertaken 2-3 weeks prior to construction to ensure that protected species such as Otter and Badger have not taken up residence within the construction envelope. The survey will cover the footprint of the Project and a 150m buffer. Should any protected species shelters (e.g. setts) be found, the ECoW will advise DCC and the Contractor in this regard.

- During construction, the use of artificial lighting on site will be minimised in terms of the area required to be illuminated and the length of time for which any lighting is switched on. Light spillage will be prevented as far as reasonably practicable. Artificial lighting will be shut off at night when not in use or when works cease at the end of the day in order to minimise the effects of light pollution and disturbance to crepuscular and nocturnal species.
- Impacts on breeding birds will be avoided by carrying out tree felling and hedge cutting outside the breeding season March 1<sup>st</sup> to August 31<sup>st</sup>. If vegetation removal is required within the breeding season, the area shall be checked by an experienced ecologist for nesting birds. If nesting birds are found, the works will be postponed until the chicks have fledged.
- Areas of vegetation to be removed will be delineated prior to clearance.

### 7.1.2 Specific Mitigation Measures

In addition to the general mitigation measures described above, specific measures are described in relation to individual Key Ecological Receptors in the following sections.

#### Royal Canal pNHA (KER 1)

This mitigation is provided to ensure that the construction of the Project does not impact significantly on the water quality of the Royal Canal or waterbodies downstream of the canal.

All works in and near to the Royal Canal shall follow the best practice guidance in the following documents: *Guidelines for Crossing Watercourses during the Construction of National Road Schemes* (TII/NRA, 2008) and *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (IFI, 2016). Contractors will be in possession of, and familiar with the contents of: "*Control of water pollution from construction sites - Guidance for consultants and contractors*" published by the Construction Industry Research and Information Association (CIRIA 2001).

The following measures will be included within the construction contract and monitored and enforced by the Employer's Representative:

- The project team will continue to liaise with DCC Parks and Biodiversity, and the NPWS in relation to *Myxas* and *Tolypella*. If these species are confirmed within the areas proposed for dewatering, appropriate advice will be sought to minimise negative effects on these populations.
- The Contractor shall apply in writing to the Employers Representative and the Inland Fisheries Ireland at least 4 weeks in advance of any proposed works in or over the canal channel for approval to commence work. Approval will be subject to the agreement of Inland Fisheries Ireland and Waterways Ireland by the Contractor. The application shall include full method statement, layout drawings including minimum horizontal and vertical clearance, areas of channel that are proposed to be destocked, fabrication drawings, design calculations for temporary works, proposed Construction sequence.
- Soil storage areas will be sited away from drains and appropriate measures put in place to ensure siltation does not enter the drainage network.
- Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice.
- Fuelling and lubrication of equipment will be carried out in a bunded area and will not be carried out close to the canal.

- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or recycling.
- Throughout all stages of the construction phase of the project the contractor shall ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the canal environment and the requirement to avoid pollution of all types.
- All machinery and plant used will be regularly maintained and serviced and will comply with appropriate standards to ensure that leakage of diesel, oil and lubricants is minimised. Such maintenance will be carried out in areas remote from watercourses.
- Foul drainage from site compound etc. will be removed to a suitable treatment facility or discharged to a septic tank system constructed in accordance with EPA guidelines.
- An incident response plan shall be established by the Contractor (and approved by the Local Authority) to deal with incidents or accidents during construction that may give rise to pollution within the canal. This will include means of containment in the event of accidental spillage of hydrocarbons or other pollutants.

The Contractor shall carry out works in accordance with the Fisheries Consolidation Act 1959 as amended and by the Local Government (Water Pollution) Act 1977 as amended. Where an area is to be dewatered, it shall be destocked of fish by electrofishing in advance of dewatering. Electrofishing shall be carried out by the Contractor in liaison with Waterways Ireland and Inland Fisheries Ireland. Notice of the intention to electrofishing shall be provided at least 4 weeks in advance of the activities commencing on site by the Contractor. The Contractor shall submit with this notice a method statement for damming, electrofishing and dewatering together with design calculations for the temporary dams. The proposals shall be subject to the approval of the Employer's Representative.

### **Scrub (KER 2)**

Existing scrub habitat along the canal is to be retained and protected except at specific locations where vegetation removal is necessary to facilitate the Project. Where scrub is removed to facilitate the Project, it will be replaced by planting of native hedge species

### **Hedgerows and Treelines (KER 3)**

The existing hedgerows and treelines along the canal are to be retained and protected in accordance with the objectives of the Draft Dublin City Biodiversity Action Plan (2021-2025) including Action 3.2: *Implement recommendations of the Dublin City Hedgerow Survey 2020 to conserve hedgerows*, except at specific locations where vegetation removal is necessary to facilitate the Project.

### **Badger (KER 4)**

Although there are no active badger setts in the vicinity of the proposed works, badger may still be impacted by construction activities. To reduce the impacts on badger, the following measures will be included in the Construction Method Statement:

- Any excavations greater than 1 m deep will be securely covered at night or a ramp provided to enable animals to escape should they fall in.
- Similarly, any temporarily exposed open pipe system will be capped to prevent Badger from gaining access when contractors are off site.

- Usage of artificial lighting during the construction phase will be limited to the works areas.

### **Otter (KER 5)**

Otter activity including two active holts, three inactive holts, two couches, slides and spraints were recorded within the study area.. Given the proximity of the Project to holts and couches, there is potential for the project to disturb Otter resting places. A derogation licence will be required from the NPWS in advance of any works in these areas. To reduce the impacts on otter, the following measures should be included in the Construction Method Statement:

- A preconstruction otter survey will be carried out at least one month prior to the works to confirm the level of activity at the potential otter holt, and to ascertain if any new holts or couches have been created within the study area.
- If a holt is found to contain young otter, no works will be undertaken with 50m of the holt until such a time as the pups are independent or advised by the NPWS.
- Dewatering will be carried out one section at a time, and a section will not be dewatered until the preceding section has been fully reinstated.
- Any excavations greater than 1m deep should be securely covered at night or a ramp provided to enable otter to escape should they become trapped.
- Ramps will be provided in dewatered sections to enable otter to escape should they become trapped.
- Similarly, any temporarily exposed open pipe system will be capped to prevent Otter from gaining access when contractors are off site.
- Usage of artificial lighting during the construction phase will be limited to the works areas. There will be no lighting directed onto the holts or the canal during construction.
- Riparian buffers will be reinstated following construction to ensure, in so far as is possible, maintenance of a vegetated wildlife corridor along the cycleway and canal.

### **Bats (KER 6)**

Bats were recorded foraging along the canal, hedgerows, treelines and scrub habitat within the study area. To reduce the impacts on bats, the following measures will be included in the Construction Method Statement:

- During the construction phase the use of artificial lighting will be limited to the works area. Light spill outside this area will be prevented, as much as possible.

### **Birds (KER 7)**

Site clearance will take place outside the nesting bird season (1<sup>st</sup> March- 31<sup>st</sup> August inclusive). If site clearance is required during the nesting bird season, the area will be checked by a suitably qualified ecologist. If nesting birds are found to be present, the site clearance works will be postponed until the chicks have fledged.

### **Invasive Species (KER 8)**

The Project could result in spread of invasive species within and outside the site. The following measures are recommended:

- The Contractor will liaise with Waterways Ireland regarding the presence of invasive species within the Project prior to construction.
- A preconstruction invasive species survey will be carried out at least one month prior to the works.
- A site-specific biosecurity plan will be produced by the contractor in advance of the works.

At a minimum, this should include:

- All areas affected by Japanese Knotweed and Three-cornered Garlic will be fenced and isolated from activities to avoid potential for further spread within the infested area. An area including an appropriate perimeter from the above ground visible stems will be isolated where possible taking into account limitations of existing walls and structures.
- Signs will be erected to alert the Contractor that the area is contaminated with Japanese Knotweed and Three-cornered Garlic.
- No material will leave the site from the isolated Japanese Knotweed and Three-cornered Garlic areas.
- No new materials will be stored adjacent to Japanese Knotweed and Three-cornered Garlic isolated areas.
- No movement of Japanese Knotweed or Three-cornered Garlic contaminated material will occur across the site unless on designated haul routes, avoiding Japanese Knotweed and Three-cornered Garlic isolated areas. All personnel on the site will attend a 'toolbox talk' as part of the site induction. The toolbox talk will include the identification of Japanese Knotweed, Three-cornered Garlic and Nuttall's Waterweed.
- In areas where works are taking place within the canal, disinfection station(s) will be set up where all staff will clean and disinfect their boots and any tools used during the operations. All heavy machinery used during the works will be power-washed before leaving the site.
- If soil/substrate needs to be imported to the site for the purposes of the Project, the Contractor shall ensure that the imported soil/substrate is free from invasive species.

The recommended measures set out in this plan are valid for the construction phase of the Project.

It is recommended that Dublin County Council in conjunction with Waterways Ireland and Irish Rail prepare a coordinated plan for the eradication of these species along the entire canal and adjacent lands. Any actions short of a coordinated management plan will be temporary and re-infestation from plants surrounding the area is inevitable.

## 7.2 Residual Impacts

**Table 7.1 Residual Impacts on Key Ecological Receptors**

<b>Key Ecological Receptor</b>	<b>Pre-mitigation Impacts</b>	<b>Ecological Significance Following Mitigation</b>
KER 1 Royal Canal pNHA	It is considered that the Project has the potential to result in a Permanent Slight Negative Impact, a Permanent Slight-Moderate Negative and a Temporary Significant Negative on this KER at the local level.	The loss of canal habitat cannot be mitigated for as a small area falls within the footprint of the Project. The impact of this habitat loss will be a Permanent Slight Negative Impact at the local scale.  Following the inclusion of the mitigation measures in Section 7 above, the probability of impacts on water quality arising from the construction of the Project are very low and the significance of any such impacts, if they were to occur, would be slight to imperceptible. The probability and significance of any such impacts arising from the operation of the proposed development are lower still.
KER 2 Scrub	It is considered that the Project has the potential to result in a Short-term Slight Negative Impact Negative Impact on this KER at the local level.	No residual impacts on this KER at County, National or International or local scale.
KER 3 Hedgerows & Treelines	It is considered that the Project has the potential to result in a Short-term Moderate Negative Impact on this KER at the local level.	No residual impacts on this KER at County, National or International or local scale.
KER 4 Badger	It is considered that the Project has the potential to result in a Short-term Moderate Negative Impact and a Temporary Moderate Negative Impact on this KER at the local level.	No residual impacts on this KER at County, National or International scale. Minor negative impacts on this KER within the site as a result of habitat loss.
KER 5 Otter	It is considered that the Project has the potential to result in a Temporary Slight-Moderate Negative Impact, Temporary Slight Negative Impact, Temporary Moderate Negative impact on this KER at the local level.	No residual impacts on this KER at County, National or International or local scale.

Key Ecological Receptor	Pre-mitigation Impacts	Ecological Significance Following Mitigation
KER 6 Bats	It is considered that the Project has the potential to result in a Permanent Significant Negative Impact, Short-term Slight Negative Impact and Long-term Moderate Positive Impact on this KER at the local level.	No residual impacts on this KER at County, National or International scale. Minor negative impacts on the KER within the site as a result of habitat loss. Positive impact at a local scale due to potential for increased foraging habitat and prey availability.
KER 7 Birds	It is considered that the Project has the potential to result in a Short-term Moderate Negative Impact, a Temporary Moderate Negative Impact and a Long-term Moderate Positive Impact on this KER at the local level.	No residual impacts on this KER at County, National or International scale Positive impact at a local scale due to potential for increased nesting habitat and prey availability.
KER 8 Invasive Alien Species (IAS)	It is considered that the Project has the potential to result significant spread of invasive alien species at least the Local level.	No significant residual impact on this KER.

## 8. CONCLUSIONS

Following consideration of the residual impacts (post mitigation) it is concluded that the Project will not result in any significant impacts on any of the identified Key Ecological Receptors.

No impacts on receptors of International Importance were identified. The potential for impacts on European designated sites is excluded in the Screening for Appropriate Assessment. This concluded, in view of best scientific knowledge and on the basis of objective information that the Project, either individually or in combination with other plans or projects, would not result in likely significant effects on European designated sites.

One Key Ecological Receptor (Royal Canal pNHA) will be affected by the Project as a result of direct habitat loss within the footprint of the Project. However, given the small area of loss within the entire pNHA this impact is not considered to be significant.

Other than the identified Key Ecological Receptors, the ecological impacts on flora and fauna of Local Importance (Lower Value) are not considered to be significant in the short, medium or long term.

It is considered that, with the implementation of the mitigation measures set out in this EclA, the construction and operation of the Project will not have a significant negative impact on biodiversity in the Zone of Influence.

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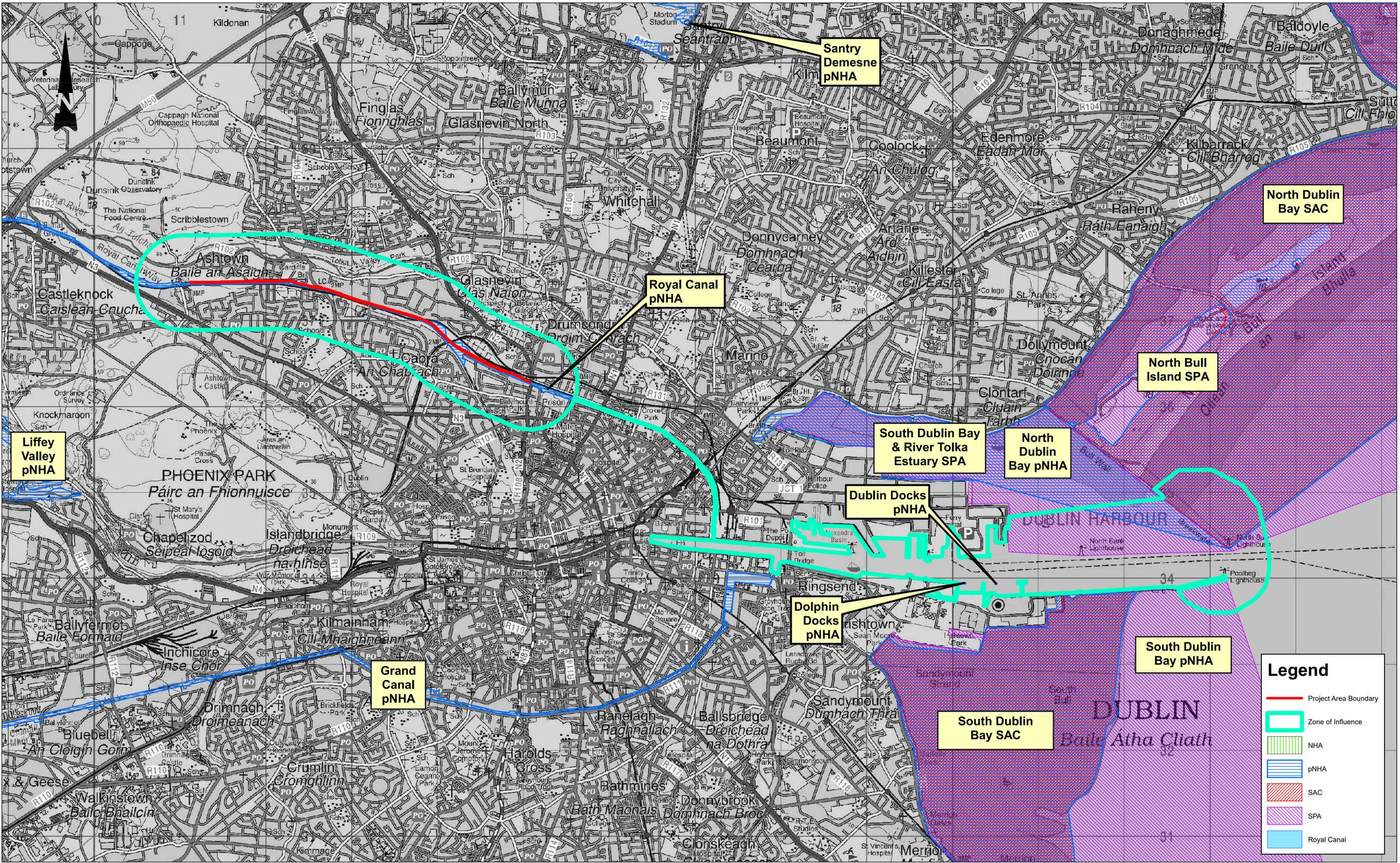
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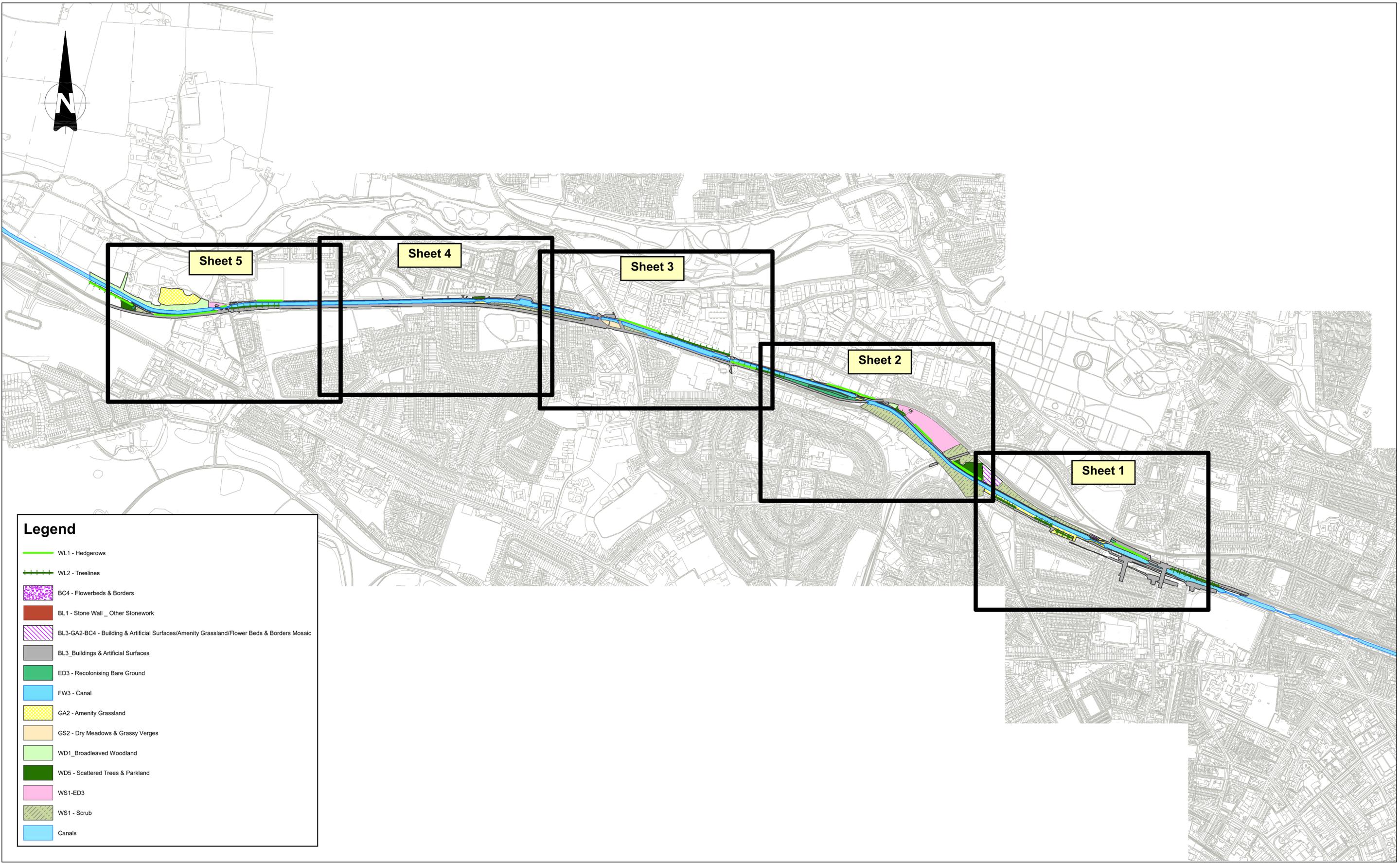
## **APPENDIX A**

### **Zone of Influence**



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## **APPENDIX B HABITAT MAP**



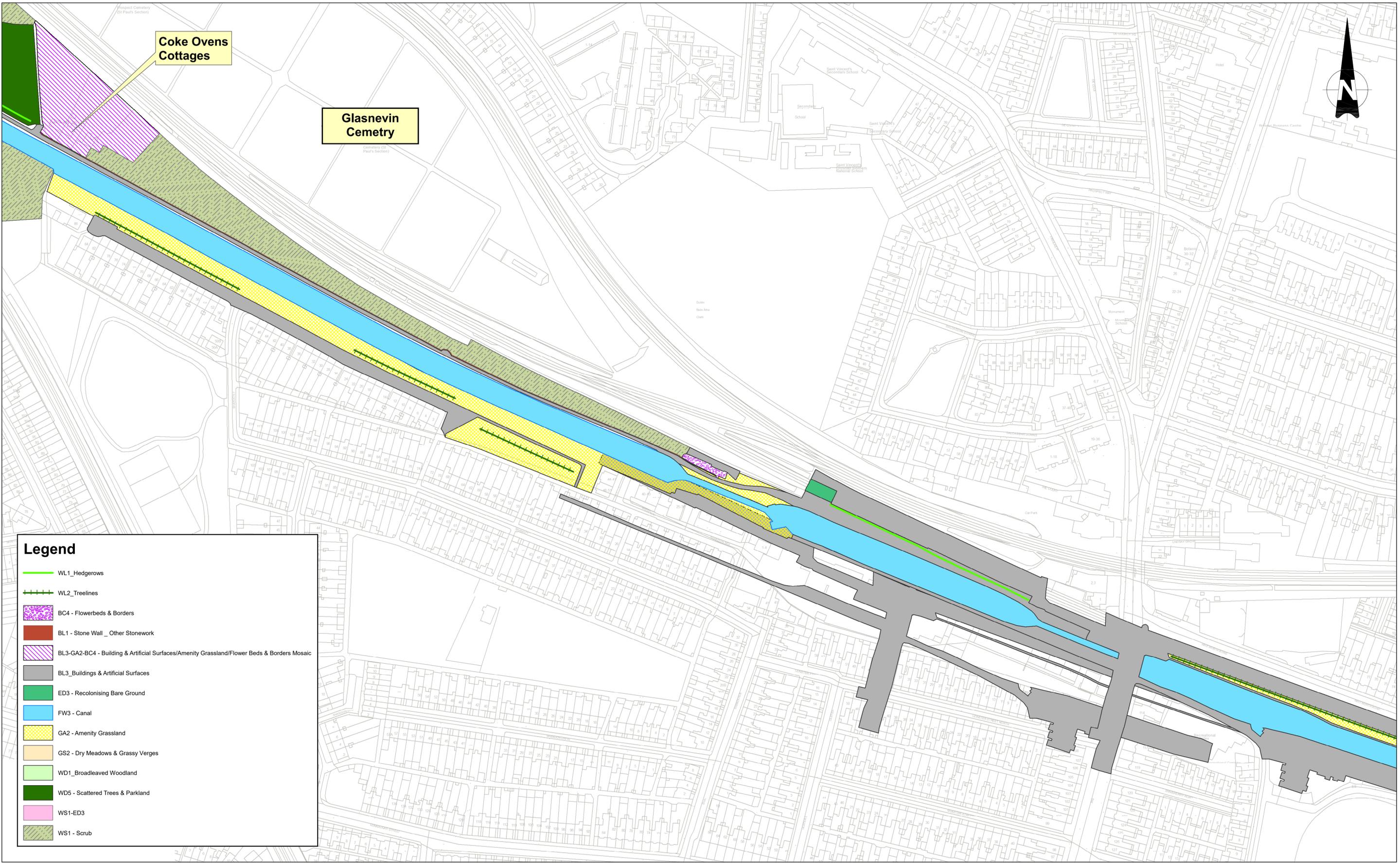
**Legend**

- WL1 - Hedgerows
- + + + WL2 - Treelines
- BC4 - Flowerbeds & Borders
- BL1 - Stone Wall \_ Other Stonework
- BL3-GA2-BC4 - Building & Artificial Surfaces/Amenity Grassland/Flower Beds & Borders Mosaic
- BL3\_Buildings & Artificial Surfaces
- ED3 - Recolonising Bare Ground
- FW3 - Canal
- GA2 - Amenity Grassland
- GS2 - Dry Meadows & Grassy Verges
- WD1\_Broadleaved Woodland
- WD5 - Scattered Trees & Parkland
- WS1-ED3
- WS1 - Scrub
- Canals

			<b>AECOM - Roughan &amp; O'Donovan Alliance</b> 				ROUGHAN & O'DONOVAN CONSULTING ENGINEERS ARENA HOUSE, ARENA ROAD, SANDYFORD, DUBLIN 18 D18 V8P6, IRELAND	Project Title: Royal Canal Premium Cycle Route Phase 4B - Phibsborough to Ashtown  Drawing Title: Habitat Mapping - Overview
			Drawn: MMC   Designed: KM   Checked: PO'S   Approved: BC   Status:	Drawing Number: RCP4 - RODA - ENV - ROUT - DR - V - Fig. 3.1 Scale (A1): 1:7,500   Date: April 2021   Job No: 18-152   Rev: V1.0				

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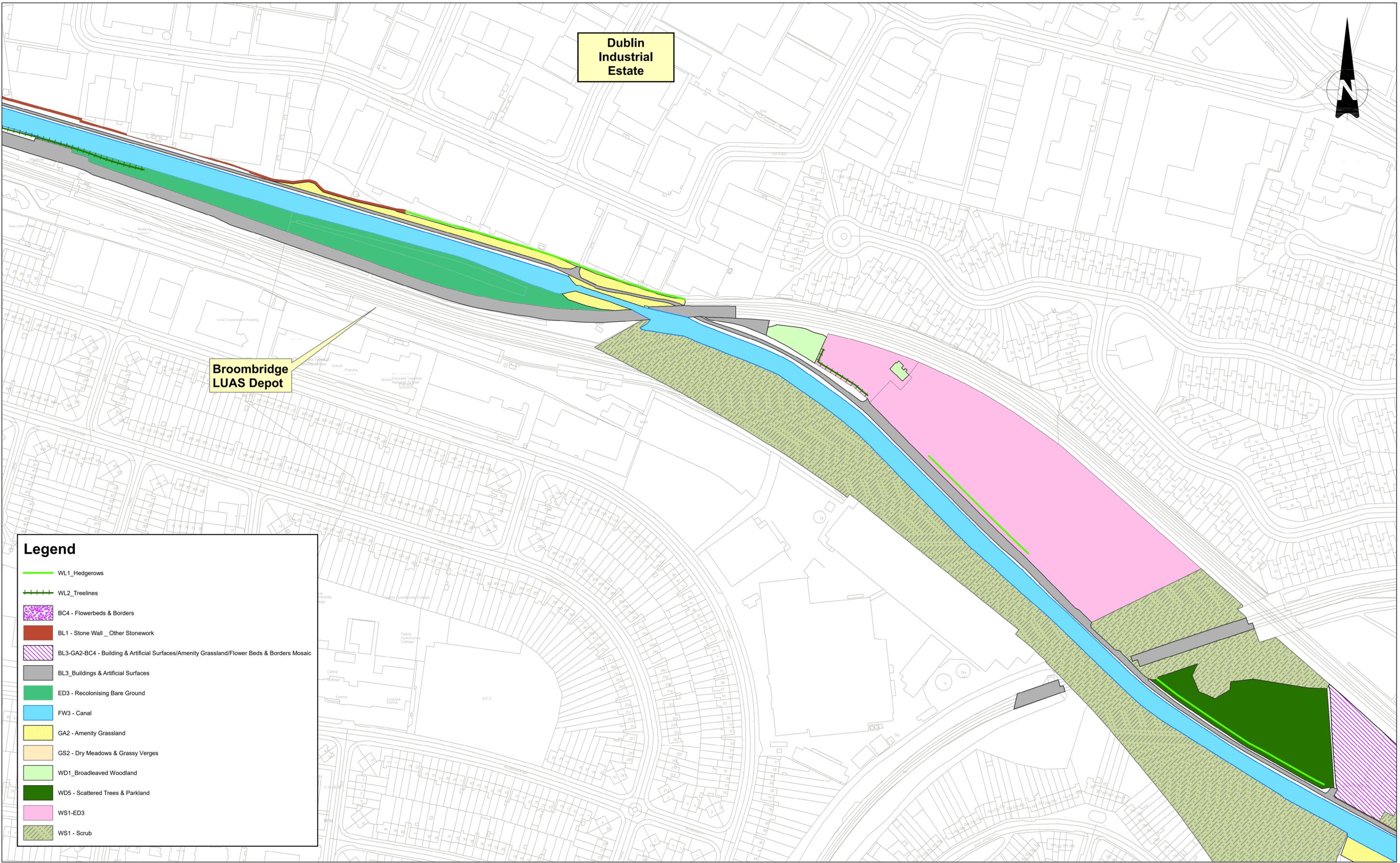
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**Legend**

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- WS1 - Scrub

 <p>Project Ireland 2040 Building Ireland's Future</p>	 <p>Comhairle Cathrach Bhaile Átha Cliath Dublin City Council</p>	 <p>NTA Údarás Náisiúnta Iompair National Transport Authority</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No.</th> <th>Revision</th> <th>Date</th> <th>By</th> <th>Chk'd</th> <th>App'd</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	No.	Revision	Date	By	Chk'd	App'd																			<p>AECOM - Roughan &amp; O'Donovan Alliance</p>  <p>ROUGHAN &amp; O'DONOVAN CONSULTING ENGINEERS ARENA HOUSE, ARENA ROAD, SANDYFORD, DUBLIN 18 D18 V8P6, IRELAND</p>	<p>Project Title: Royal Canal Premium Cycle Route Phase 4B - Phibsborough to Ashtown</p> <p>Drawing Title: Habitat Mapping - Sheet 1 of 5</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Drawing Number</th> <th>Project</th> <th>Originator</th> <th>Volume</th> <th>Location</th> <th>Type</th> <th>Role</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td>RCP4</td> <td>- RODA</td> <td>- ENV</td> <td>- ROUT</td> <td>- DR</td> <td>- V</td> <td>- Fig. 3.4</td> <td> </td> </tr> </tbody> </table> <p>Scale (A1): 1:1,250    Date: April 2021    Job No: 18-152    Rev: V1.0</p>	Drawing Number	Project	Originator	Volume	Location	Type	Role	Number	RCP4	- RODA	- ENV	- ROUT	- DR	- V	- Fig. 3.4	
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Dublin Industrial Estate

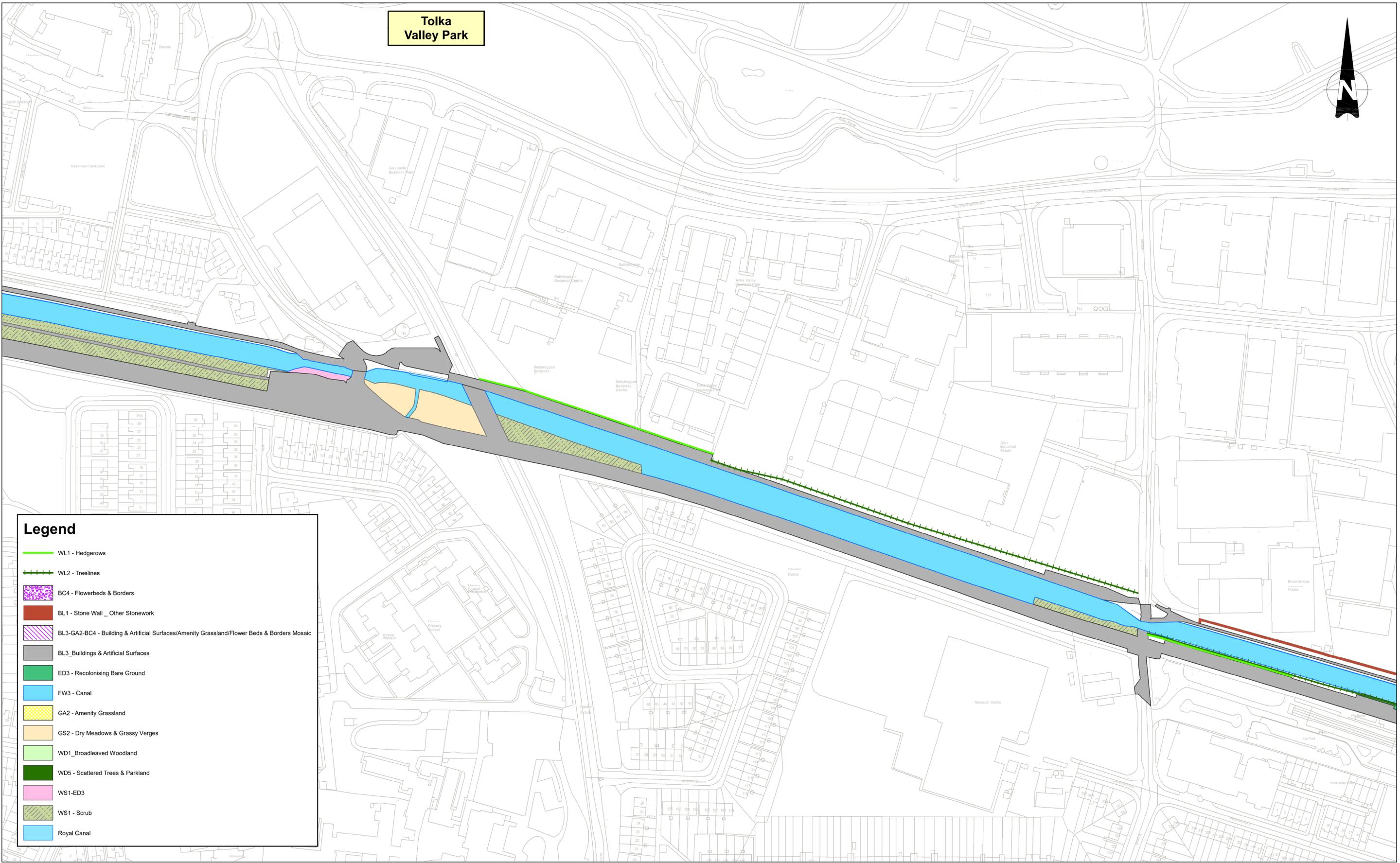
Broombridge LUAS Depot

### Legend

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- WS1 - Scrub

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**Tolka Valley Park**

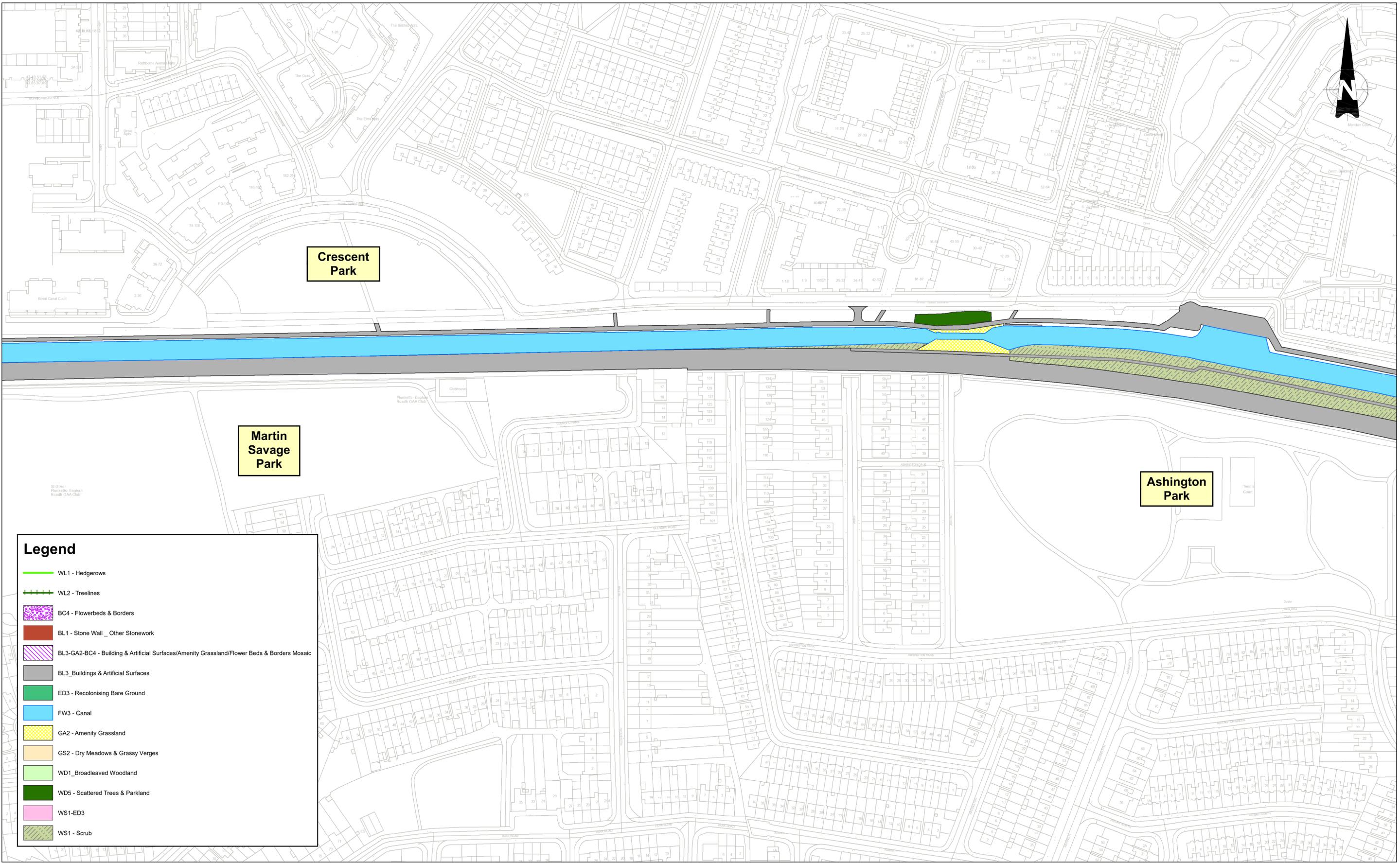


**Legend**

- WL1 - Hedgerows
- |—|—|— WL2 - Treelines
- BC4 - Flowerbeds & Borders
- BL1 - Stone Wall \_ Other Stonework
- BL3-GA2-BC4 - Building & Artificial Surfaces/Amenity Grassland/Flower Beds & Borders Mosaic
- BL3\_Buildings & Artificial Surfaces
- ED3 - Recolonising Bare Ground
- FW3 - Canal
- GA2 - Amenity Grassland
- GS2 - Dry Meadows & Grassy Verges
- WD1\_Broadleaved Woodland
- WD5 - Scattered Trees & Parkland
- WS1-ED3
- WS1 - Scrub
- Royal Canal

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**Crescent Park**

**Martin Savage Park**

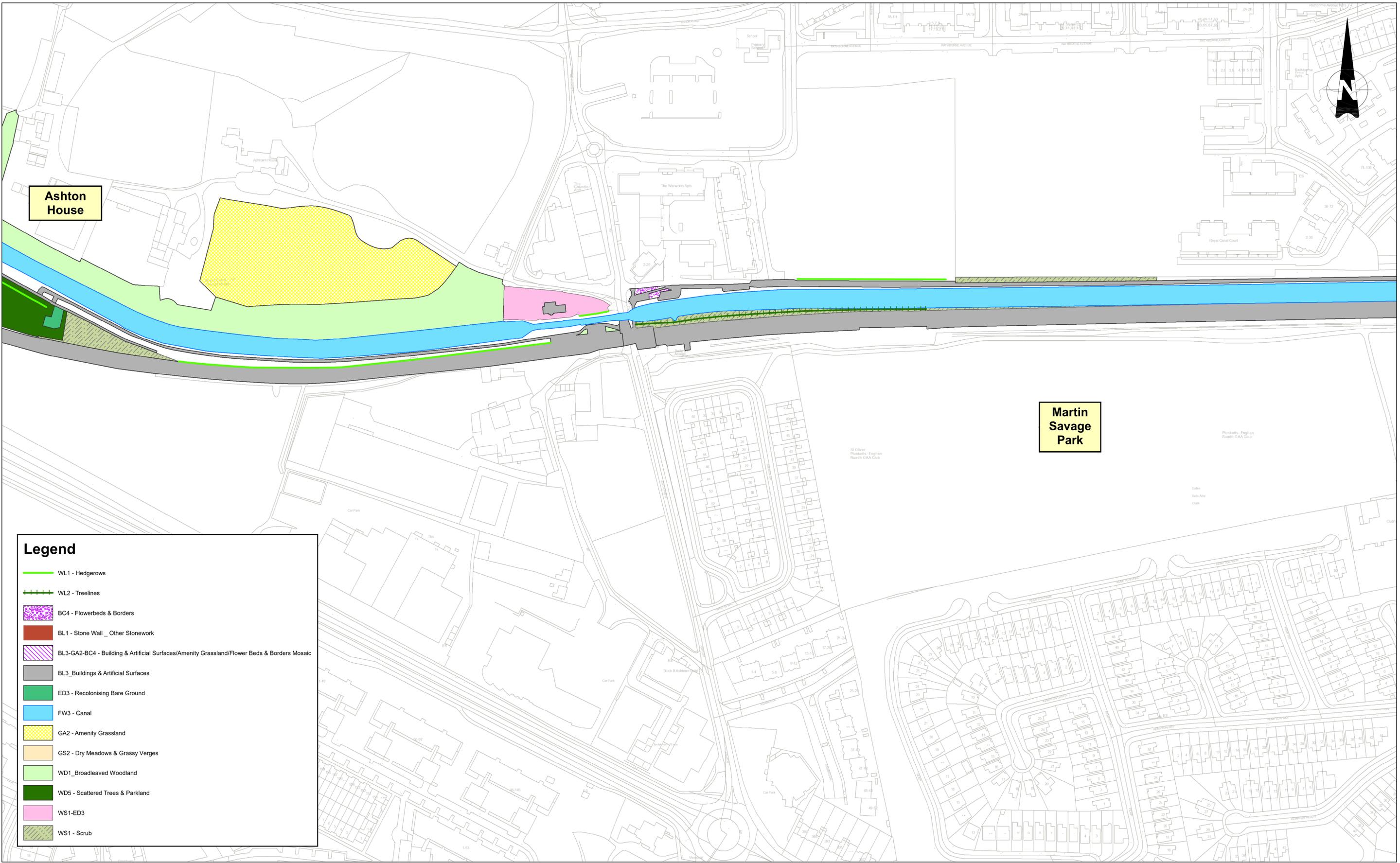
**Ashington Park**

**Legend**

-  WL1 - Hedgerows
-  WL2 - Treelines
-  BC4 - Flowerbeds & Borders
-  BL1 - Stone Wall \_ Other Stonework
-  BL3-GA2-BC4 - Building & Artificial Surfaces/Amenity Grassland/Flower Beds & Borders Mosaic
-  BL3\_Bldings & Artificial Surfaces
-  ED3 - Recolonising Bare Ground
-  FW3 - Canal
-  GA2 - Amenity Grassland
-  GS2 - Dry Meadows & Grassy Verges
-  WD1\_Broadleaved Woodland
-  WD5 - Scattered Trees & Parkland
-  WS1-ED3
-  WS1 - Scrub

	 <p>Comhairle Cathrach Bhaile Átha Cliath Dublin City Council</p>	 <p>Údarás Náisiúnta Iompair National Transport Authority</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No.</th> <th>Revision</th> <th>Date</th> <th>By</th> <th>Chk'd</th> <th>App'd</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No.	Revision	Date	By	Chk'd	App'd							<p><b>AECOM - Roughan &amp; O'Donovan Alliance</b></p>  <p>ROUGHAN &amp; O'DONOVAN CONSULTING ENGINEERS ARENA HOUSE, ARENA ROAD, SANDYFORD, DUBLIN 18 D18 V8P6, IRELAND</p>	<p>Project Title: Royal Canal Premium Cycle Route Phase 4B - Phibsborough to Ashtown</p> <p>Drawing Title: Habitat Mapping - Sheet 4 of 5</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Project</th> <th>Originator</th> <th>Volume</th> <th>Location</th> <th>Type</th> <th>Role</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td>RCP4</td> <td>RODA</td> <td>ENV</td> <td>ROUT</td> <td>DR</td> <td>V</td> <td>Fig. 3.7</td> </tr> </tbody> </table> <p>Scale (A1): 1:1,250    Date: April 2021    Job No: 18-152    Rev: V1.0</p>	Project	Originator	Volume	Location	Type	Role	Number	RCP4	RODA	ENV	ROUT	DR	V	Fig. 3.7
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Ashton House

Martin Savage Park

### Legend

- WL1 - Hedgerows
- WL2 - Treelines
- BC4 - Flowerbeds & Borders
- BL1 - Stone Wall \_ Other Stonework
- BL3-GA2-BC4 - Building & Artificial Surfaces/Amenity Grassland/Flower Beds & Borders Mosaic
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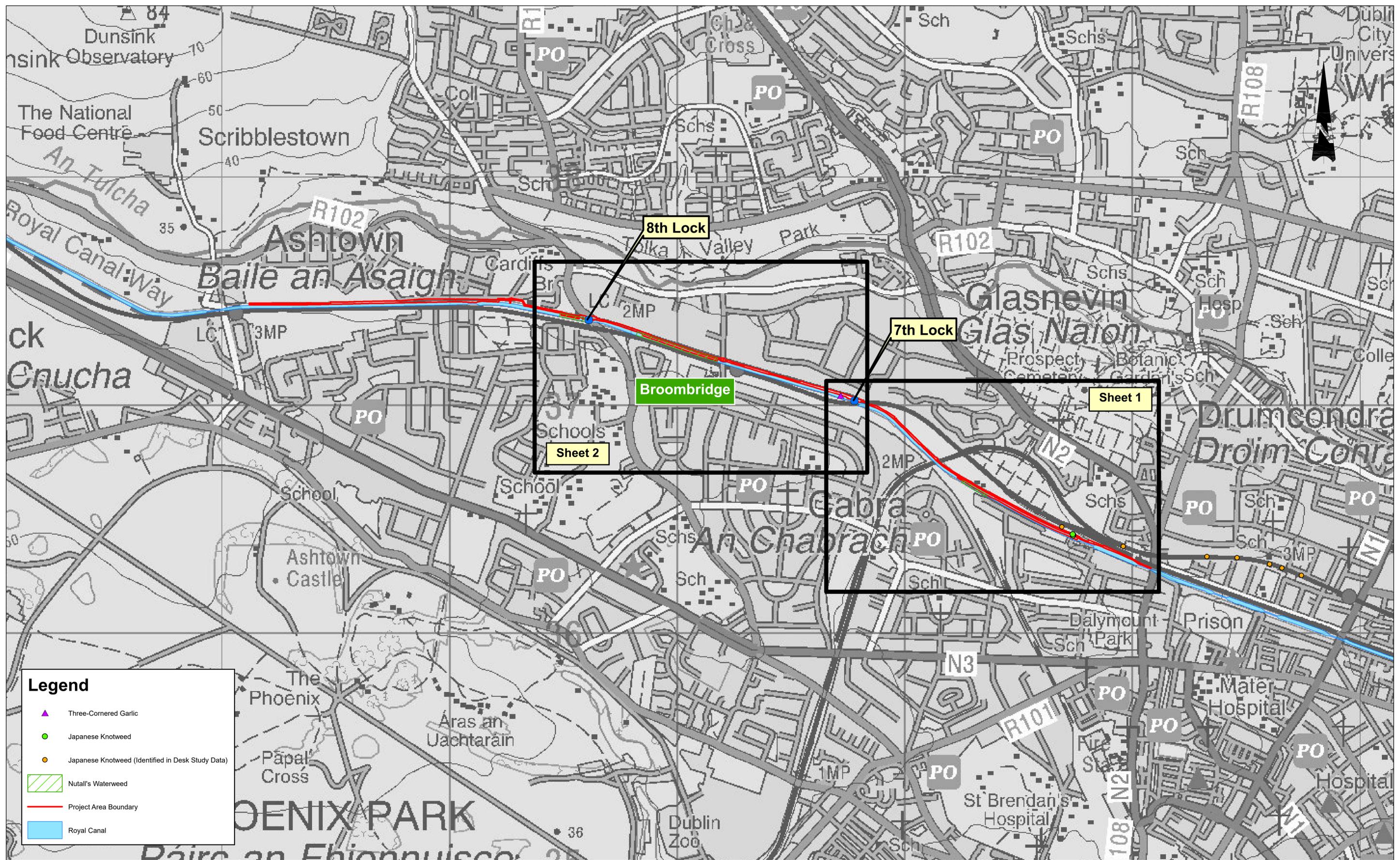
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**APPENDIX C  
OTTER SURVEY REPORT  
(CONFIDENTIAL)**

**APPENDIX D**  
**OTTER BREEDING AND RESTING LOCATIONS DRAWING**  
**(CONFIDENTIAL)**

## **APPENDIX E IAPS MAP**

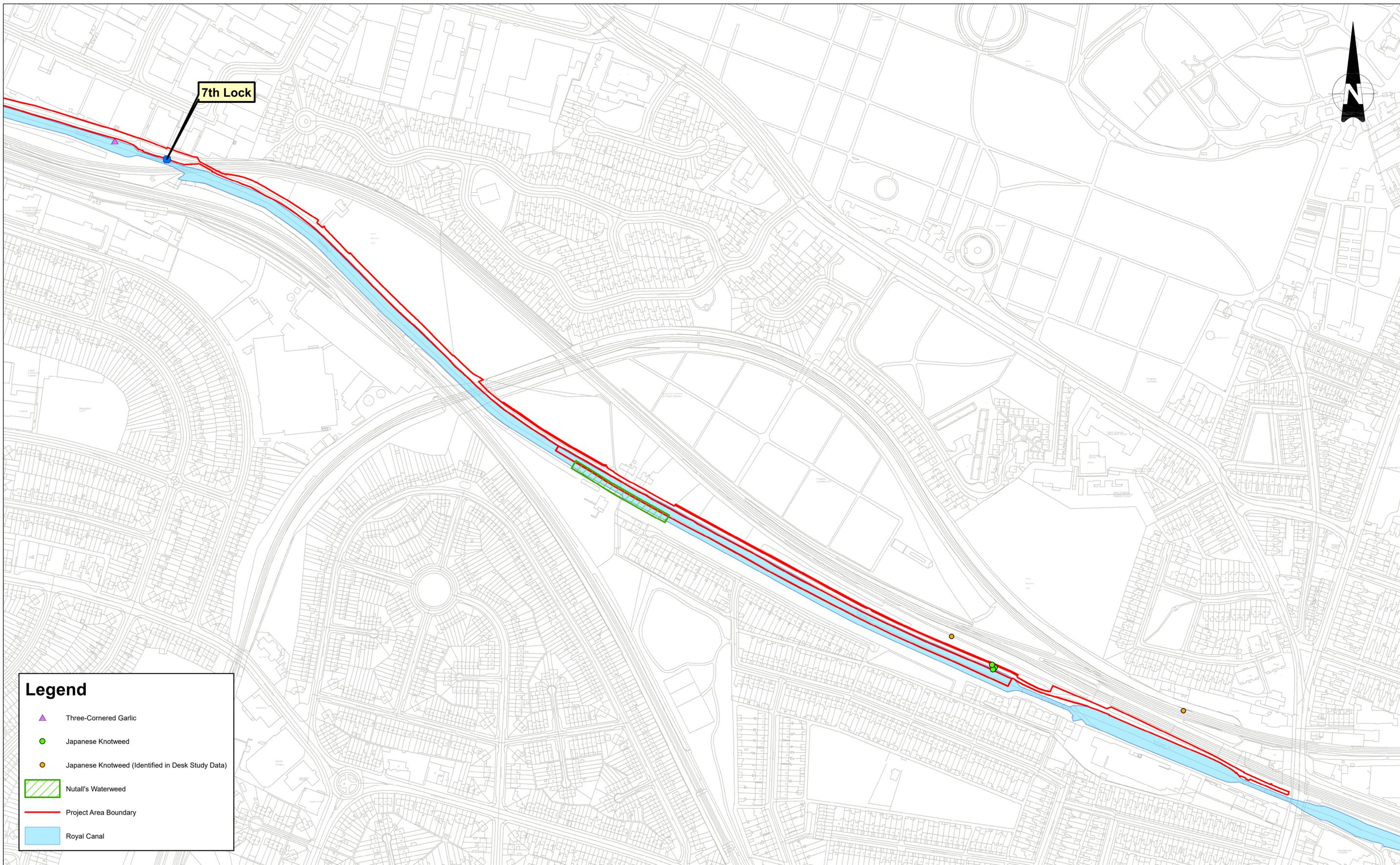


**Legend**

- ▲ Three-Cornered Garlic
- Japanese Knotweed
- Japanese Knotweed (Identified in Desk Study Data)
- Nuttall's Waterweed
- Project Area Boundary
- Royal Canal

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						Drawing Title Location of Invasive Alien Plant Species - Overview		Drawing Number RCP4 - RODA - ENV - ROUT - DR - V - Fig. 4.0																																					
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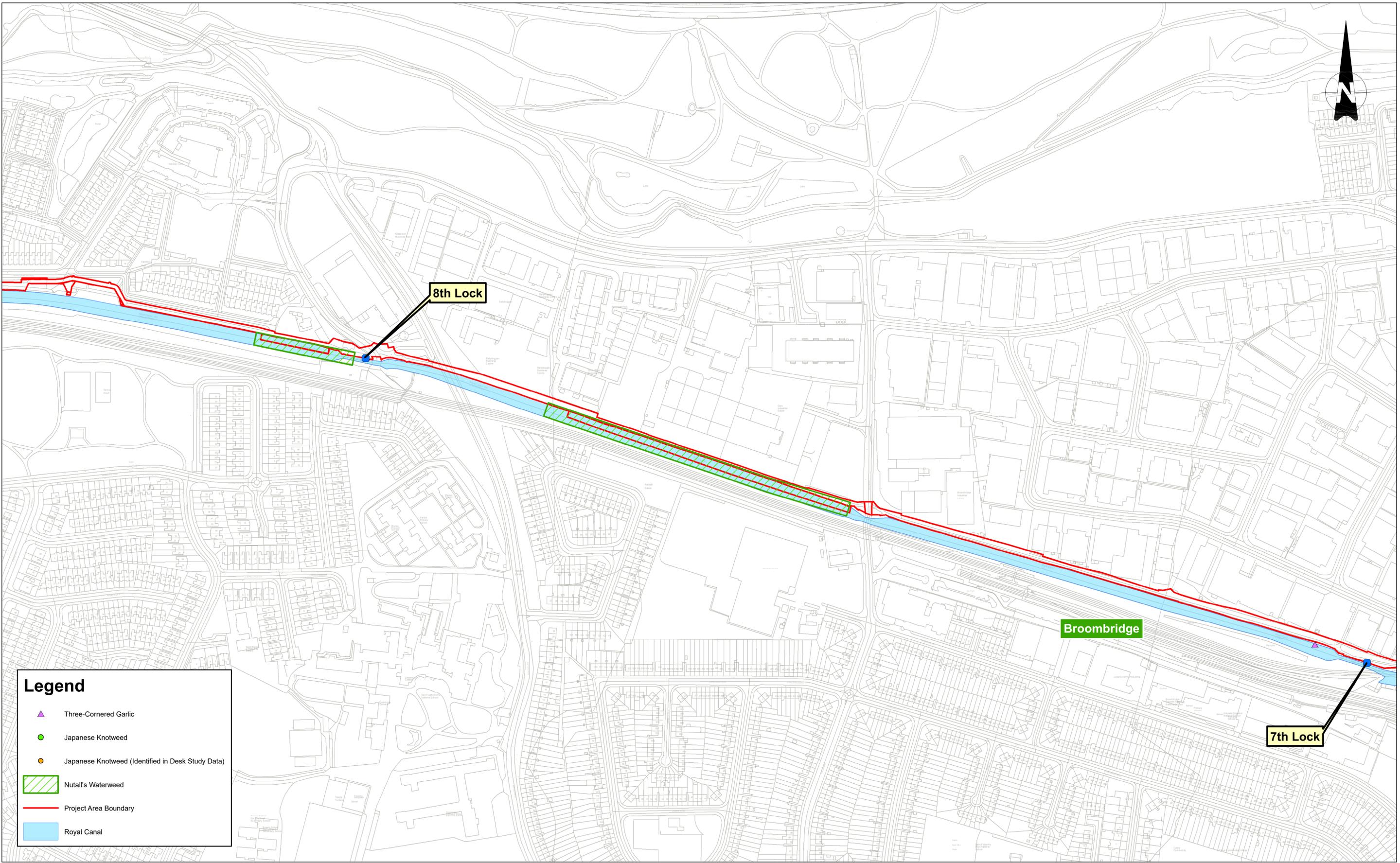


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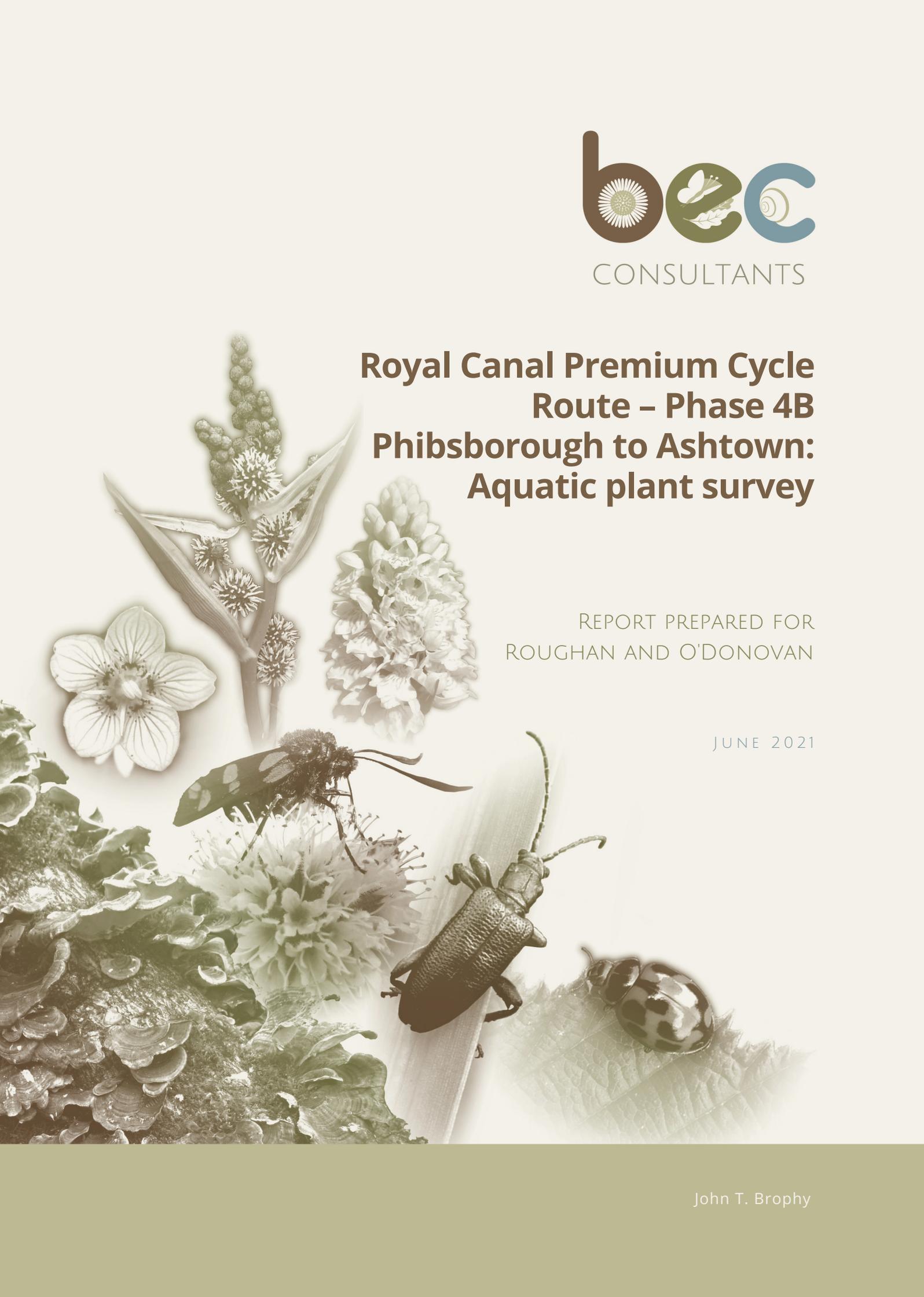
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<p>Project Ireland 2040 Building Ireland's Future</p>			<p>AECOM - Roughan &amp; O'Donovan Alliance</p>				<p>ROYAL CANAL PREMIUM CYCLE ROUTE PHASE 4B - PHIBSBOROUGH TO ASHTOWN</p>																															
<p>ORDNANCE SURVEY IRELAND LICENCE NO EN 0006517 © ORDNANCE SURVEY IRELAND/GOVERNMENT OF IRELAND</p>			<p>ROYAL CANAL PREMIUM CYCLE ROUTE PHASE 4B - PHIBSBOROUGH TO ASHTOWN</p>				<p>ROYAL CANAL PREMIUM CYCLE ROUTE PHASE 4B - PHIBSBOROUGH TO ASHTOWN</p>																															

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## **APPENDIX F AQUATIC PLANT SURVEY**

A detailed collage of aquatic life is overlaid on the page. It includes various types of flowers and plant stems, such as a tall spike of small white flowers, a cluster of larger white flowers, and a single large white flower with five petals. In the foreground, there are several insects: a dark butterfly with white spots on its wings, a large dark beetle with long antennae, and a smaller spotted beetle. The background is a light, textured greenish-brown.

**Royal Canal Premium Cycle  
Route – Phase 4B  
Phibsborough to Ashtown:  
Aquatic plant survey**

REPORT PREPARED FOR  
ROUGHAN AND O'DONOVAN

JUNE 2021



## DOCUMENT CONTROL SHEET

<b>Client</b>	Roughan and O'Donovan
<b>Project title</b>	Royal Canal Premium Cycle Route – Phase 4B Phibsborough to Ashtown
<b>Project number</b>	PRJ309
<b>Document title</b>	Royal Canal Premium Cycle Route – Phase 4B Phibsborough to Ashtown: Aquatic plant survey
<b>Citation</b>	Brophy, J.T. (2021) Royal Canal Premium Cycle Route – Phase 4B Phibsborough to Ashtown: Aquatic plant survey. Unpublished Report by BEC Consultants Ltd.

<b>Author(s)</b>	<b>Reviewed by</b>	<b>Approved by</b>	<b>Version</b>	<b>Issue date</b>
John T. Brophy B.A. (Hons), M.Sc., CEcol, MCIEEM	Simon Barron B.Sc. (Hons), CEnv., MCIEEM	Jim Martin B.Sc. (Hons), M.Sc., Ph.D., MCIEEM	DRAFT	01/06/2021
JTB	SB	JM	FINAL	02/06/2021

## Table of contents

Executive summary .....	1
1 Introduction.....	2
2 Study area .....	2
3 Project description.....	2
3.1 Project background .....	2
3.2 Project Overview .....	3
3.2.1 General Layout.....	3
4 Methodology.....	3
5 Receiving environment.....	3
5.1 8 <sup>th</sup> Lock.....	3
5.2 7 <sup>th</sup> – 8 <sup>th</sup> Lock.....	4
5.3 6 <sup>th</sup> – 7 <sup>th</sup> Lock.....	4
6 Assessment of likely effects .....	5
6.1.1 Dredging impact on aquatic plants.....	5
6.1.2 Dredging impact on FPO species .....	5
6.1.3 Loss of habitat .....	5
6.1.4 Spread of alien invasive species.....	5
6.1.5 Pollution of waters/sediment .....	5
7 Mitigation measures .....	6
7.1.1 Dredging impact on aquatic plants.....	6
7.1.2 Dredging impact on FPO species .....	6
7.1.3 Loss of habitat .....	6
7.1.4 Spread of alien invasive species.....	6
7.1.5 Pollution of waters/sediment .....	6
8 Residual effects.....	7
9 ‘Do nothing’ scenario.....	7
10 References .....	8
Appendix I – Maps .....	9
Appendix II – Plates .....	11

## Executive summary

An aquatic plant survey targeting Floral Protection Order, 2015 (FPO) species and Alien Invasive Species (AIS) was carried out along sections of the Royal Canal between the 6<sup>th</sup> Lock and just upstream of the 8<sup>th</sup> Lock, in relation to proposed works as part of the Royal Canal Premium Cycle Route – Phase 4B Phibsborough to Ashtown project. The survey was carried out using a bathyscope and small boat to observe the canal bed. No FPO species were recorded within the study area. Nuttall's Waterweed (*Elodea nuttallii*) was the only AIS recorded and was found amongst the dense Canadian Waterweed (*Elodea canadensis*) beds, which dominated the submerged aquatic plant community within the study area.

There will be no negative impact on any aquatic FPO species as a result of the proposed dredging and limited infilling of the canal bank, due to their absence.

The presence of the AIS Nuttall's Waterweed means there is the potential for a moderate negative effect associated with its transfer to another, uninfected waterbody. This risk will be addressed by biosecurity measures to prevent fragments of the plant from being carried off-site.

The risk of a pollution event associated with the operation of plant and machinery affecting the aquatic plant community is considered a moderate negative impact, which will be mitigated by the implementation of suitable control measures.

## 1 Introduction

BEC Consultants Ltd has been contracted by Roughan and O'Donovan to carry out a survey for protected and invasive alien aquatic plant species along sections of the Royal Canal, Co. Dublin in relation to the proposed Royal Canal Premium Cycle Route – Phase 4B Phibsborough to Ashtown. Protected plant species in this context are those listed on the Flora Protection Order (FPO) 2015 (S.I. 356 of 2015), while alien invasive species are those listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011), as amended by S.I. 355 of 2015.

The FPO species Opposite-leaved Pondweed (*Groenlandia densa*) was first recorded on the Royal Canal in the early 1990s, on Levels 1, 3 and 4 (Doogue *et al.*, 1998). Tubridy & Hickey (2010) carried out a bathyscope survey for Opposite-leaved Pondweed on the Royal Canal from Level 1 through to Level 7 in advance of proposed dredging works, in addition to a visual inspection from the bank following partial de-watering, and recorded no Opposite-leaved Pondweed plants. Opposite-leaved Pondweed has been recorded from the Royal Canal on Levels 1-4 by Barron (2010; 2011; 2012a; 2013), though was not found on Level 5 or 6.

## 2 Study area

The study area was the Royal Canal in Dublin and comprised an 80 m section upstream of the 8<sup>th</sup> Lock, a 360 m section between the 7<sup>th</sup> and 8<sup>th</sup> Lock, upstream from Broom Bridge, and a 100 m section between the 6<sup>th</sup> and 7<sup>th</sup> Lock alongside the Coke Oven Cottages on the north bank (Appendix I, Figure A1).

## 3 Project description

### 3.1 Project background

Dublin City Council proposes to develop a high-quality cycle route for the Royal Canal Greenway along the banks of the Royal Canal from Sheriff Street in the City Centre to Ashtown. This will form part of the 165km Royal Canal Premium Cycle Route between Mullingar and Dublin.

Planning approval has previously been secured for a high-quality cycleway along the full 7.5km length of the Royal Canal within the Dublin City Council area. This is being developed in four phases. While the approved scheme will deliver a significant enhancement to the existing facility, the National Transport Authority and Dublin City Council have identified opportunities for further enhancements and ancillary works to increase the benefits to the local and wider communities.

Phase 4 of the scheme commences at Cross Guns Bridge on Phibsborough Road continuing along the Royal Canal to the Village Centre at Ashtown, and is approximately 4.3km in length, following along the northern bank of the Royal Canal. There is an existing shared cycleway pedestrian facility already in operation along the towpath of the canal, which is used for both access and amenity purposes. It is the objective of the scheme to provide a premium cycle and pedestrian facility with environmental enhancements along the route. The existing towpath corridor interfaces with existing road and rail infrastructure.

This project proposes to widen the canal towpath route, where required, to ensure quality of service and safety considerations, and to upgrade it with a new pavement, public lighting, CCTV for security, and to remove existing kissing gate barrier restrictions at access points, which are restrictive to cyclists, buggies, and wheelchair users.

## 3.2 Project Overview

The project will involve the construction of a cycle route that will link from Cross Guns Bridge in Phibsborough to Ashtown.

### 3.2.1 General Layout

- Construction of 4.2 km of new 4.5 m wide cycle and walking route.
- Royal Canal to be narrowed by up to 2 m. Verges will be planted with grass seed to match the existing surroundings.
- Run-off from the cycle and pedestrian route will drain over the edge into grass verge.
- Removal of vegetation adjacent to the existing towpath; and
- Public lighting and CCTV to be installed along cycle route.
- Complimentary planting works.

Works with potential to cause environmental effects include:

1. Dredging affected sections of the canal to remove surplus silt;
2. Lower water levels between locks in the narrowed sections of the canal;
3. Removal of vegetation along the canal side through the proposed dredging areas;
4. Preparation of ground for installation of additional fill material;
5. Filling canal edge with large stones to narrow canal;
6. Installation of puddle clay to seal canal around new structure; and
7. Installation of topsoil and planting to restore original character of canal.

It is likely that the construction will last approximately 12 months and may be phased over 2 years.

## 4 Methodology

The survey was carried out by John Brophy and Simon Barron of BEC Consultants on 18<sup>th</sup> May 2021. The sections of canal were surveyed using a bathyscope from a small boat. This allowed the surveyor to view the aquatic plants growing on the bottom of the canal. Three passes were made to ensure full coverage of the canal within the study area. The location of any species of interest was recorded on a hand-held GPS to allow for later mapping. While a full aquatic plant survey was not carried out, species present within each of the survey areas were recorded to provide context.

## 5 Receiving environment

No FPO species were recorded in the course of the survey. One AIS was recorded: Nuttall's Waterweed (*Elodea nuttallii*), which is listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011), as amended.

### 5.1 8<sup>th</sup> Lock

This survey area is an 80 m section upstream from the 8<sup>th</sup> Lock where narrowing of the canal is proposed (Appendix II, Plate 1). The shallow sections close to the bank include the stonewort *Chara vulgaris* var. *papillata*, with some emergent Bulrush (*Typha latifolia*), while the centre of the canal

included Water Lily (*Nuphar lutea*), Canadian Waterweed (*Elodea canadensis*), Nuttall's Waterweed and the stonewort *Nitella opaca*. A small amount of Ivy-leaved Duckweed (*Lemna trisulca*) was noted floating on the surface.

## **5.2 7<sup>th</sup> – 8<sup>th</sup> Lock**

This survey area is a 360 m section between the 7<sup>th</sup> and 8<sup>th</sup> Lock, running upstream from Broom Bridge where narrowing of the canal is proposed (Appendix II, Plate 2). Emergent vegetation within the survey area was dominated by Branched Bur-reed (*Sparganium erectum*) with some Reed Sweet-grass (*Glyceria maxima*) and patches of Yellow Iris (*Iris pseudacorus*). The emergent vegetation is more developed on the railway side of the canal. There are occasional, relatively large patches of Mare's-tail (*Hippuris vulgaris*). The benthos is dominated by Canadian Waterweed, with occasional Nuttall's Waterweed. There is an abundant growth of filamentous green algae on bottom, covering much of the benthic vegetation. Water Lily is present, as is Ivy-leaved Duckweed.

## **5.3 6<sup>th</sup> – 7<sup>th</sup> Lock**

This survey area is a 100 m section between the 6<sup>th</sup> and 7<sup>th</sup> Lock, alongside the Coke Oven Cottages where narrowing of the canal is proposed (Appendix II, Plate 3). The emergent vegetation along this section is sparse, and dominated by Yellow Iris with Reed Sweet-grass. The benthos is dominated by Canadian Waterweed, with occasional Nuttall's Waterweed (and starworts (*Callitriche* spp.)). There are occasional patches of Spiked Water-milfoil (*Myriophyllum spicatum*). Ivy-leaved Duckweed is also present, while there is limited cover of filamentous green algae in this section.

## **6 Assessment of likely effects**

### **6.1.1 Dredging impact on aquatic plants**

Where dredging is undertaken, there will be a short-term loss of aquatic vegetation. The species recorded within the project area are common and widespread within the Royal Canal and so can be expected to re-establish over the course of a few years. For this reason, this impact is assessed as slight negative.

### **6.1.2 Dredging impact on FPO species**

No FPO species were recorded within the project area. Opposite-leaved Pondweed is the FPO species most likely to occur, given the previous records from downstream of the project area, but none was found. Studies on the effects of dredging and translocation on the occurrence of Opposite-leaved Pondweed have suggested that dredging can have a positive effect on the distribution and occurrence of the plant, while translocation shows poor success (Barron, 2010; 2011; 2012a; 2012b; 2013; 2014; 2015; Henry & Amoros, 1996). Opposite-leaved Pondweed is an early coloniser and benefits from the removal of other, more competitive plants, such as waterweeds. This presents the opportunity for Opposite-leaved Pondweed to colonise areas before the plant community recovers and develops back towards a climax community. Given that no FPO species were recorded in the course of the survey, there will be no negative impact on this group. There is the potential for a positive effect if Opposite-leaved Pondweed can become established post-dredging before the rest of the plant community recovers.

### **6.1.3 Loss of habitat**

The proposed cycleway will include widening the existing towpath into the canal in some sections and the consequential loss of canal bed habitat. Given the length of canal habitat present that supports aquatic vegetation communities when compared to the area lost, this impact is assessed as a slight negative.

### **6.1.4 Spread of alien invasive species**

The aquatic alien invasive species Nuttall's Waterweed was recorded within the study area. This species is widespread in canals and other waterways in Ireland (NBDC, 2021), and is spread by vegetative fragments (Preston *et al.*, 1997). This method of reproduction means that small plant fragments attached to vehicles, equipment or clothing can be carried to an unaffected waterbody and begin a new population. Given that the species is widespread within the Royal Canal, the main threat is fragments of the plant being moved to other, currently uninfected waterbodies, and this is assessed as a moderate negative impact

### **6.1.5 Pollution of waters/sediment**

The operation of plant and machinery along the canal, and disturbance to sediment, has the potential to impact on the aquatic plant community. High levels of sediment can cause shading, which negatively affects plant photosynthesis, while hydrocarbon spills can also have negative effects by reducing oxygen levels and growth. A significant hydrocarbon spill could impact on the Royal Canal within the study area and downstream into sections that may still support Opposite-leaved Pondweed. Suspended sediment poses less of a risk, settling out in the slow-moving canal habitat. Given the low risk of a significant pollution event, this impact is assessed as moderate.

During the operation of the proposed walking route, dog fouling is likely to result in surface water runoff being polluted. The surface water drainage will be to the grassy verges on either side of the path, so there is potential for nutrient-enriched water to enter the canal and impact negatively on water quality. Increased nutrients can increase the growth rate of less sensitive plant species, and also

green algae, making the area less suitable for more sensitive species, such as Opposite-leaved Pondweed. This is considered a slight negative impact.

## **7 Mitigation measures**

### **7.1.1 Dredging impact on aquatic plants**

The impact of dredging on aquatic plants will be minimised by restricting the dredging to the minimum area necessary.

### **7.1.2 Dredging impact on FPO species**

As no FPO species were recorded in the course of the survey, no mitigation measures are required.

### **7.1.3 Loss of habitat**

The loss of habitat for aquatic plants will be minimised by limiting the footprint of the area infilled to the minimum necessary.

### **7.1.4 Spread of alien invasive species**

Biosecurity measures will be implemented on-site to ensure that no alien invasive species (notably Nuttall's Waterweed) are spread to other waterbodies. Prior to the commencement of the construction phase, the successful Contractor shall finalize a Biosecurity Protocol in accordance with the TII guidelines, *The Management of Invasive Alien Plant Species on National Roads – Standard (2020a)* and the corresponding technical guidance document (2020b), as well as the *Dublin City Invasive Alien Species Action Plan 2016 – 2020 (DCC, 2016)*. The finalised Biosecurity Protocol shall incorporate, at a minimum, the following basic measures:

- Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g. Nuttall's Pondweed, Himalayan Balsam, Japanese Knotweed, etc.) by thoroughly washing vehicles prior to leaving any site.
- All plant and equipment employed on the construction site (e.g. barges, piling equipment, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species.
- All washing must be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the Construction Environmental Management Plan.

### **7.1.5 Pollution of waters/sediment**

Negative effects associated with pollution from the proposed works will be avoided/minimised by implementing both preventative and containment measures. Relevant measures from the *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Water (IFI, 2016)* will be implemented to protect water quality in the canal during the works. This will include the following:

- Plant and machinery will be well-maintained and checked regularly for leaks.
- Refuelling will take place off-site and away from any watercourses.
- Spill kits and staff trained in their use will be available at any active work sites.

In order to reduce the risk of dog fouling contaminated surface water run-off entering the canal, the canal bank vegetation along stretches where the canal is to be narrowed will have sods removed and stored, before being reinstated post-construction. As there are some areas of terrestrial alien invasive plant species within the works footprint (Japanese Knotweed), some areas will need to be cleared and

new material put in. Native seed mixes with typical canal species and low-growing grass and flowering species will be used along stretches of new verge. The grass verge will be maintained in line with the All Ireland Pollinator Plan, with the developed vegetation slowing down the run-off and capturing nutrients before they reach the canal.

## **8 Residual effects**

With the implementation of the proposed mitigation measures, the impact of the proposed works on the aquatic vegetation of the Royal Canal will be limited to the slight negative impacts associated with the dredging of sections of the canal and the infilling where required to widen the towpath.

## **9 ‘Do nothing’ scenario**

In the event that the proposed project does not go ahead, it is assumed the current management regime of regular maintenance through cutting of vegetation and spot-dredging to facilitate boat traffic will continue, together with infrequent major dredging events. As such there would be no change from the current situation.

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## **Appendix I – Maps**

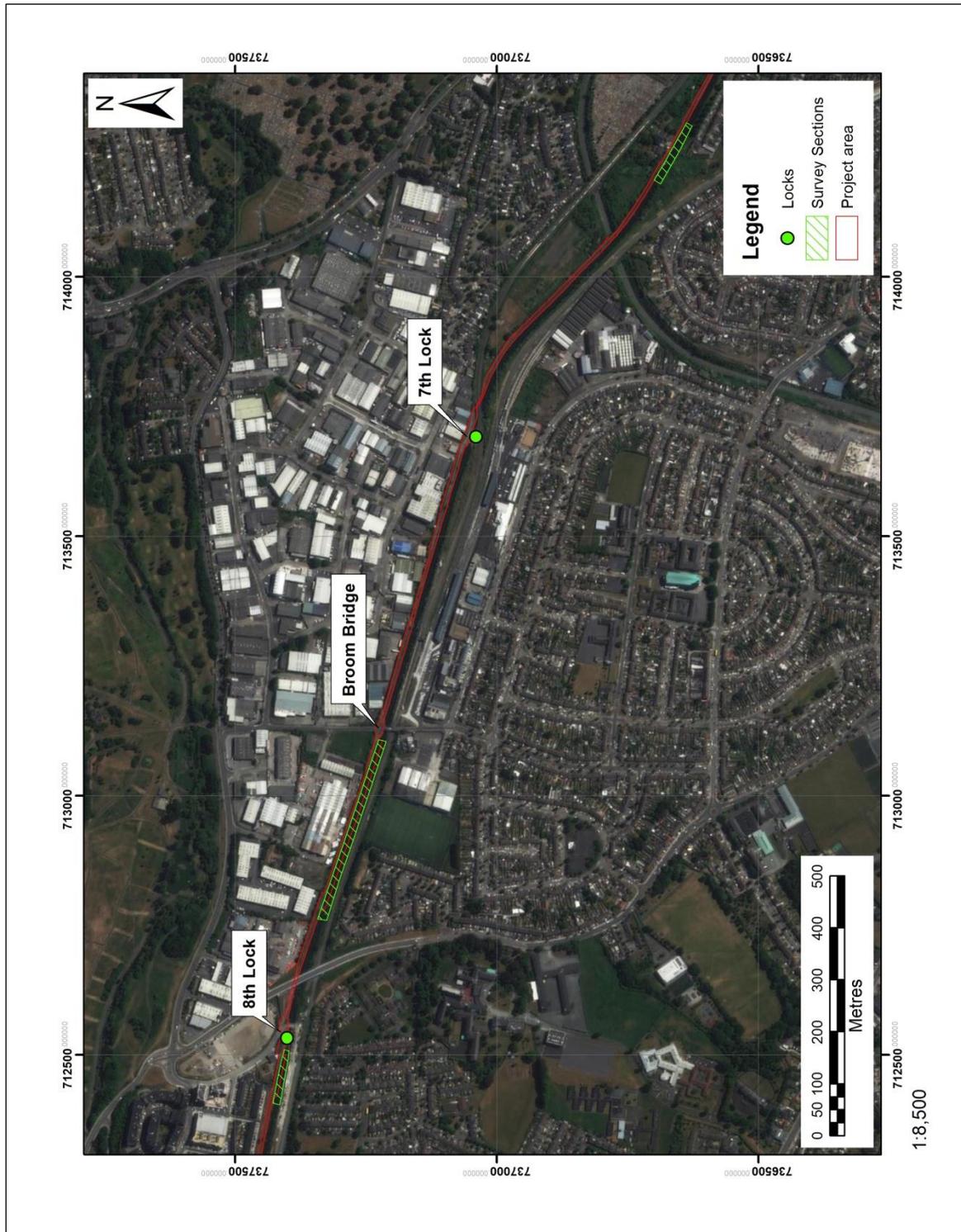


Figure A1. Map of survey sections along the Royal Canal between the 6<sup>th</sup> and 8<sup>th</sup> locks, Dublin.

## **Appendix II – Plates**

	
<p><b>Plate 1.</b> Section upstream of the 8<sup>th</sup> Lock</p>	<p><b>Plate 2.</b> Section between 7<sup>th</sup> – 8<sup>th</sup> Lock, upstream of Broom Bridge</p>
	
<p><b>Plate 3.</b> Section between 6<sup>th</sup> – 7<sup>th</sup> Lock, alongside cottages</p>	