Clifton Scannell Emerson Associates

Hazelhatch Bridge to 12th Lock - Grand Canal Greenway

Part 8 Preliminary Design Report

Comhairle Contae Átha Cliath Theas
South Dublin County Council

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1 Introduction and Background

1.1 Introduction & Background

South Dublin County Council appointed Clifton Scannell Emerson Associates (CSEA) to provide consulting engineering services associated with the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme.

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme is located within the existing townlands of Ballymakaily, Gollierstown, Coolscuddan, Brownstown, Mullauns, Loughtown Lower, Stacammy Cottage, Balscott and Hazelhatch respectively. The proposed scheme is primarily located along the existing northern tow path attributed to the Grand Canal and traverses in an east to west direction for approximately 4.6km in total length.

From the most eastern commencement location of the proposed scheme, access to the northern towpath is gained from the R120 Regional Road located adjacent to the existing 12th Lock. Access from the most western point of the scheme is gained from the existing Hazelhatch public house premises which is located adjacent to the existing Hazelhatch Road/Bridge. Internal site access to both the northern and southern towpaths attributed to the Grand Canal is provided by the existing Gollierstown Bridge. Access at this location of the proposed scheme is predominately utilised by local landowners/farmers. Furthermore, a small portion, approximately 0.48km, of the proposed scheme traverses through County Kildare lands with the remaining footprint located within County Dublin lands.

1.2 Scheme Description

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme is primarily located along the northern tow path of the existing Grand Canal.

The proposed Grand Canal Greenway – Hazelhatch Bridge to 12th Lock will include the following features:

- 4.6km of shared walking and cycling Greenway along the existing northern Grand Canal towpath.
- Path widths will vary from 2.5m to 3.5m in width. Widths will be dictated by existing on site features.
- Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust or Asphalt Tarmac depending on local conditions for pedestrian and cyclists use.
- Provision of access controls such as pedestrian and cycle friendly gates along the route.
- Underground utilities and services including: Power ducting, telecom ducting, Public Lighting ducting & CCTV ducting.
- All associated ancillary works and integrated landscape plans.

1.3 Objectives and Benefits

As per the Department of Transport, Tourism and Sports July 2018 publication 'Strategy for Future Development of National and Regional Greenways, a Greenway is defined as a recreational or pedestrian corridor for non-motorised journeys, developed in an integrated manner which enhances both the environment and quality of life of the surrounding area.

With the above in mind, it is envisaged that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway will be designed and developed for commuter cyclists and pedestrians functioning and operating in Grange Castle Business Park and the surrounding areas. Furthermore, the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway will also be designed and developed to cater for wheelchair users, children in buggies as well as people on all types of bicycles. Moreover, it will additionally provide a recreational walking and cycling route which is integrated into a national cycle network, public transport, heritage sites, employment centres and local amenities.

The main objectives of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme are to:

- Provide an attractive and functional pedestrian and cycle route;
- Encourage a larger modal shift (from private to public transport) and promote physical activity, health and wellbeing among Grange Castle Business Park residents and local communities;
- Increase pedestrian and cycle activity in Celbridge, Adamstown, Peamount and Lucan villages
- Provide access to scenic areas normally inaccessible to mobility impaired users.
- Improves access to Hazelhatch and Adamstown Train stations.
- Provide a recreational amenity that can be recognised locally, nationally and internationally as a first-rate tourist attraction.
- Contributes a small section of the overall Greenway Strategy from the Grand Canal Dock in Dublin to Shannon Harbour.

1.4 Need for Scheme

The success of the recently opened Waterford Greenway and the Great Western Greenway in Mayo, opened in 2010, clearly demonstrates the potential of Greenways as economic contributors to rural communities through increased tourism. In addition, the benefits for the health and wellbeing of local communities through the use of Greenways as recreational amenities are significant.

Market research carried out on behalf of Fáilte Ireland demonstrated that, along with the already existing growth in cycling and walking activities, there is great tourism potential for Greenways, particularly where the right type of infrastructure can be developed in the right places for the right people.

Furthermore, Greenways can assist in attracting visitors away from the busy traditional tourist centres and into rural communities. The associated job creation potential in local tourism and hospitality businesses is significant.

With regards to the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme, this will not only attract tourists but will also provide a commuter route that will service not only Grange Castle Business Park (GCBP) but the wider community who reside in close proximity of the proposed development. Furthermore, the residents of GCBP and the local area will ultimately profit from the health and wellbeing benefits that a scheme of this nature has already contributed and delivered,

prime example of which would be the existing Waterford Greenway and the Great Western Greenway.

1.5 Study Area

A study area was established by taking into account the general requirement to continue the Greenway along the Grand Canals northern towpath from 12th Lock to Hazelhatch Bridge (Please refer to drawing 18_065 _00_1405 and figure 1 below). Engineering and Environmental constraints were ultimately identified and assessed within the proposed study area, findings of which will be discussed in the proceeding chapters.

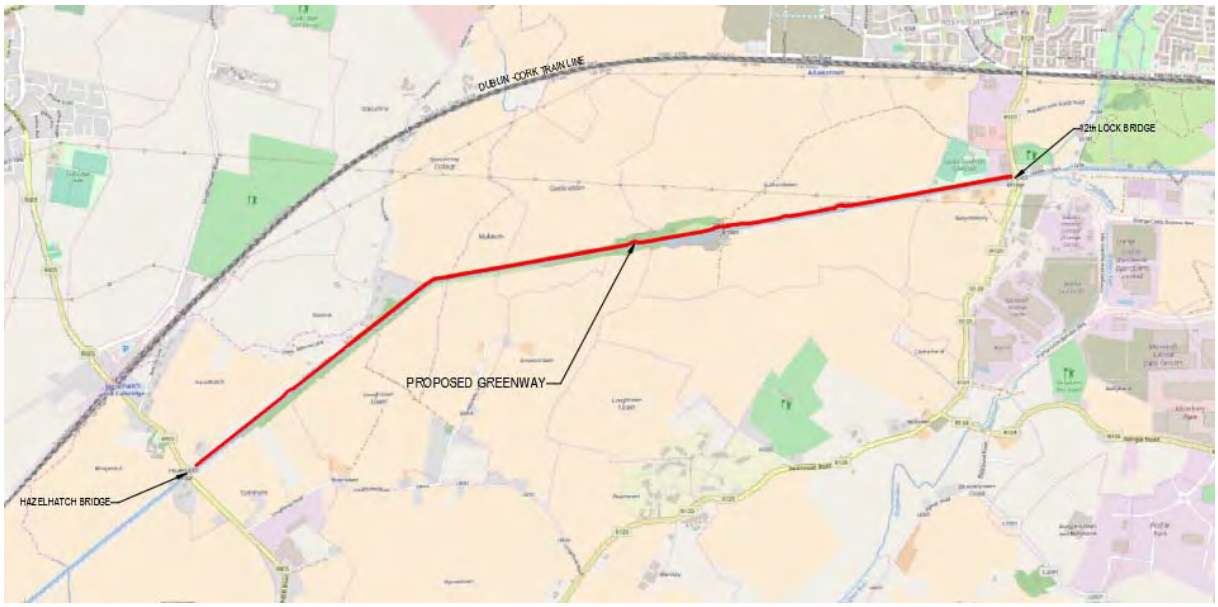

Figure 1 - Proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway Study Area.

2 Environmental Constraints

2.1 Habitats Directive Stage 1 Screening for Appropriate Assessment

Doherty Environmental Consultants (DEC) were commissioned by Clifton Scannell Emerson to undertake a Statement in support of Screening for Appropriate Assessment for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme. For further details regarding the full Screening Statement for Appropriate Assessment, please refer to **Appendix A** of this report.

This statement in support of Screening for Appropriate Assessment (i.e. Screening exercise) is being undertaken in order to comply with the requirements of Article 6(3) of the Habitats Directive and Article 42 of the European Communities (Birds and Natural Habitats) Regulations. Section 42(1) of these regulations requires a Public Authority to carry out a screening for appropriate assessment of a project which it wishes to undertake. The screening for Appropriate Assessment is required to assess the project individually or in combination with another plan or project for its potential to result in a likely significant effect on a European Site(s), in view of best scientific knowledge and in view of the conservation objectives of relevant European Site(s).

The function of the Screening exercise is to identify whether or not the proposal will have the potential to result in likely significant effect on European Sites. In this context "likely" refers to the presence of doubt with regard to the absence of significant effects (ECJ case C-127/02) and "significant" means not trivial or inconsequential but an effect that has the potential to undermine the site's conservation objectives (English Nature, 1999; ECJ case C-127/02 &). In other words, any effect that compromises the conservation status of a European Sites and interferes with achieving its conservation objectives would constitute a significant effect.

The nature of the likely interactions between the project and the conservation status of European Sites will depend upon the sensitivity of these sites and their reasons for designation to potential impacts arising from the project; the current conservation status of the features for which European Sites have been designated; and any likely changes to key environmental indicators (e.g. habitat structure; vegetation community) that underpin the conservation status of European Sites, in combination with other plans and projects.

This Screening exercise has been undertaken with reference to respective National and European guidance documents: Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (DEHLG 2010) and Assessment of Plans and Projects Significantly Affecting Natura 2000 sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats directive 92/43/EEC and relevant European and National case law. The following guidance documents were also of relevance during this Screening Assessment:

- A guide for competent authorities. Environment and Heritage Service, Sept 2002. Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (2010). DEHLG.
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats Directive 92/42/EED. European Commission (2001).
- Managing Natura 2000 Sites – The provisions of Article 6 of the Habitats directive 92/43/EEC. European commission (2000). (To be referred to as MN 2000).

The EC (2001) guidelines outline the stages involved in undertaking a Screening exercise of a project that has the potential to have likely significant effects on European Sites. The methodology adopted for this Screening exercise is informed by these guidelines and was undertaken in the following stages:

1. Describe the project and determine whether it is necessary for the conservation management of European Sites;
2. Identify European Sites that could be influenced by the project;
3. Where European Sites are identified as occurring within the sphere of influence of the project identify potential effects arising from the project and screen the potential for such effects to negatively affect European Sites identified under Point 2 above; and
4. Identify other plans or projects that, in combination with the project, have the potential to affect European Sites.

2.2 Conclusion

During the Screening of the proposed greenway it was found that five European Sites occur within a 15km radius of the project site and an additional four European Sites occur at a greater distance (i.e. approximately 20km or more downstream). The nearest European Site (Rye Water Valley SAC) to the project site is located approximately 4km to the northeast. The five European Sites occurring within a 15km radius of the project site, along with South Dublin Bay SAC (located downstream at Dublin Bay) were not identified as occurring within the zone of influence of the project and were screened out from further consideration at an early stage of this screening exercise.

The remain three European Sites occurring at Dublin Bay were identified as occurring within the zone of influence of the project by virtue of the presence of a hydrological pathway linking the project site to these European Sites.

The potential for the hydrological pathway that, links the project to these European Sites, to function as an impact pathway was assessed as part of this screening exercise. This assessment was completed by considering all aspects of the proposed project that could result in the emission of potentially polluting material to the Grand Canal and other surface watercourses draining lands adjacent to the project.

This assessment found that the three European Sites downstream at Dublin Bay are not deemed to be at risk of likely significant effects from the project due to:

- The low risk of significant impacts posed by the project to the water quality of the Grand Canal, the Tubbermaclugg Stream and Skinkeen Stream flowing under the Grand Canal;
- The low volumes of water runoff discharging to the receiving Grand Canal, Tubbermaclugg Stream and Shinkeen Stream flowing under the Grand Canal, from the project site which will facilitate dilution of any potentially polluting surface water runoff locally within these waterbodies;
- The minor fraction of freshwater flows that the Grand Canal, Tubbermaclugg Stream and Shinkeen Stream flowing under the Grand Canal contribute to the overall freshwater flows to the Liffey Estuary and Dublin Bay. This minor ratio will facilitate thorough dilution of any potentially polluting surface water entering the Grand Canal or the Tubbermaclugg Stream downstream at Dublin Bay; and

- The known potential for waters at Dublin Bay to rapidly mix and assimilate pollutants.

For the reasons outlined above it is considered that the proposed greenway along the Grand Canal from the 12th Lock to Hazelhatch will not present a risk to the Conservation Objectives of European Sites downstream at Dublin Bay. As such this screening exercise concludes that an Appropriate Assessment is not required for this project.

2.3 Ecological Impact Assessment

2.3.1 Assessment Aims

The aim of the EcIA is to detail the status of known or potential ecological receptors to the construction and/or operation of the proposed greenway, and to identify potential impacts and mitigation requirements to ensure compliance with relevant national and European statutory requirements for ecological protection. The report provides an assessment of the potential impacts of the proposed development on the biodiversity supported by the surrounding area. Please refer to **Appendix B** of this report for further details and information.

2.3.2 Legislative Requirements

Flora and fauna in Ireland are protected at a national level by the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000 and the Flora (Protection) Order, 1999 (SI 94/1999). They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC).

The transposition of the EU Habitats Directive by the European Communities (Natural Habitats) Regulations 1997 – 2011 (referred to as the Habitat Regulations) provides the legal basis for the protection of habitats and species of European importance in Ireland.

The legislative protection of habitats and species provided by the Habitats Directive has been implemented in Ireland and throughout Europe through the establishment of a network of designated conservation areas known as the Natura 2000 (N2K) network (with individual sites being referred to as Natura 2000 Sites). The N2K network includes sites designated as Special Areas of Conservation (SACs), under the EU Habitats Directive and Special Protection Areas (SPAs) designated under the EU Birds Directive. SACs are designated in areas that support habitats listed on Annex I and/or species listed on Annex II of the Habitats Directive. SPAs are designated in areas that support: 1% or more of the all-Ireland population of bird species listed on Annex I of the EU Birds Directive; 1% or more of the population of a migratory species; and more than 20,000 waterfowl. Under the National Habitat Regulations all designated Natura 2000 Sites are referred to as European Sites.

The Wildlife Act 1976 (as amended) also provides for the statutory designation of nature conservation areas. These areas are referred to under the Wildlife Acts as Natural Heritage Areas and are designated in areas that support habitats and/or species of national importance.

Other relevant national legislation concerning the protection of flora, fauna and fisheries include the:

- Planning Act 2010;
- European Communities (Quality of Salmonid Waters) Regulations, 1988;
- The Freshwater Fish Directive 1978 (78/659/EEC);
- The Surface Water Regulations, 2009; and

- Flora Protection Order, 2009

2.3.3 Guidelines

Guidance relevant to biodiversity aspects of the environment were referred to as follows:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2016). Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009a).
- Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009a).
- Environmental Impact Assessment of National Road Schemes: A Practical Guide (NRA, 2009b).
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002).
- Guidelines for Ecological Report Writing (CIEEM, 2017).

2.3.4 Designated Conservation Areas

The proposed greenway is not located within or bounding any European Sites. Only one European Site, the Rye Water Valley/Carton SAC, is located within the 5km zone of influence of the project site. The boundary of this SAC is located approximately 4km to the north of the project site. No NHAs are located within 5km of the proposed greenway.

The proposed greenway is entirely located within the Grand Canal pNHA. The Liffey Valley pNHA is located approximately 2.8km to the north, while the Royal Canal pNHA is located approximately 4.5km to the north of the proposed greenway.

A brief synopsis of each of these conservation areas are provided in the following sub-sections. In addition to these four conservation areas an additional four European Sites occur downstream of the proposed greenway at Dublin Bay. These sites are the South Dublin Bay River Tolka Estuary SPA; North Bull Island SPA; South Dublin Bay SAC; and North Dublin Bay SAC. These four sites are located approximately 20km downstream of the proposed greenway and occur while outside the defined zone of influence of this project. Nevertheless, a full account of these European Sites, their qualifying features of interest and an assessment of the project's potential to result in likely significant effects to their Conservation Objectives is provided in the Screening Statement in support of Appropriate Assessment for the project.

2.3.5 Grand Canal pNHA

The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. The Grand Canal Natural Heritage Area (NHA) comprises the canal channel and the banks on either side of it. The canal system is made up of a number of branches - the Main Line from Dublin to the Shannon, the Barrow Line from Lowtown to Athy, the Edenderry Branch, the Naas and Corbally Branch and the Milltown Feeder. The Kilbeggan Branch is dry at present, but it is hoped to restore it in the near future. Water is fed into the summit level of the canal at Lowtown from Pollardstown Fen, itself an NHA.

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 Guelder-rose (Viburnum opulus) are present. The vegetation of the

towpath is usually dominated by grass species. 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.

The diversity of the water channel is particularly high in the eastern section of the Main Line - between the Summit level at Lowtown and Inchicore. Arrowhead (Sagittaria sagittifolia) and Watercress (Nasturtium officinale) are more common in this stretch than on the rest of the system. All sites for Hemlock Water-dropwort (Oenanthe crocata) on the Grand Canal system are within this stretch. The aquatic flora of the Corbally Extension of the Naas Branch of the canal is also very diverse, with a similar range of species to the eastern Main Line.

Otter spraints are found along the towpath, particularly where the canal passes over a river or stream. The Common Newt breeds in the ponds on the bank at Gollierstown in Co. Dublin. The Rare and legally protected Opposite-leaved Pondweed (Groenlandia densa) (Flora Protection Order 1987) is present at a number of sites in the eastern section of the Main Line, between Lowtown and Ringsend Basin in Dublin.

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. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.

2.3.6 Conclusion

Following consideration of the residual impacts (post mitigation) it is noted that the proposed Greenway development will not result in any significant impacts to the Grand Canal pNHA or the key ecological receptors that occur along the canal. Provided all mitigation is implemented no potential for residual impacts on receptors of International, National or County Importance were identified. Other than the identified Key Ecological Receptors, the ecological impacts on floral and faunal receptors of Local Importance (Lower Value) are not considered to be significant. Provided design, best practice and mitigation measures that have been outlined in this EcIA are implemented in full, significant impacts on ecology are not anticipated at the international, national county or local scales or on any of the identified Key Ecological Receptors.

2.4 Archaeological and Architectural Heritage Constraints

Courtney Deery Heritage Consultancy were commissioned by Clifton Scannell Emerson Associates (CSEA) to provide an archaeological, architectural heritage and cultural heritage appraisal for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway Scheme (Figure 2).

The above referenced report examines the cultural heritage potential for the proposed Grand Canal Greenway Extension, from the 12th Lock Bridge to Hazelhatch Bridge in Co. Dublin. It aims to establish the potential significance and sensitivity of the existing cultural heritage environment along the Grand Canal and to identify the issues this potential presents for the proposed scheme.

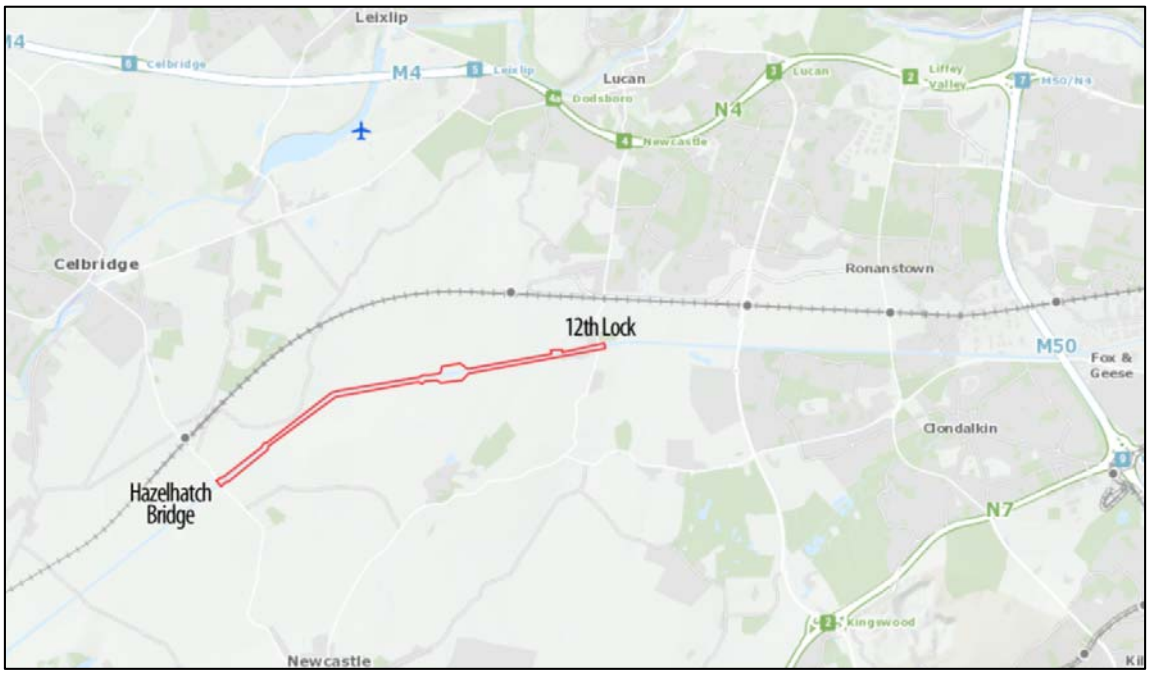

Figure 2 - Site Location and Proposed Archaeological Study Area.

2.4.1 Archaeological Constraints

Given the level of disturbance required to construct the canal in the 18th century, any earlier archaeological deposits would not survive intact within its bounds. While the canal itself and its associated infrastructure are a feature of our industrial archaeological heritage, they will not be negatively impacted by the proposed Greenway Extension.

2.4.2 Architectural Heritage Constraints

There are a number of protected structures and NIAH sites located along the Grand Canal, including the structures focused around the 12th Lock and Hazelhatch Bridge, as well as Gollierstown Bridge. With the exception of the bridges and the lock itself, all of the structures are set back from the canal, at the side of the tow path. No works are proposed at 12th Lock (Leck) Bridge.

The assessment also identified seven undesignated sites of built and industrial heritage interest, all of which are depicted on the first edition OS map (BH 1 to BH 7, Figure 3). None of these sites will be negatively affected by the proposed Greenway Extension.

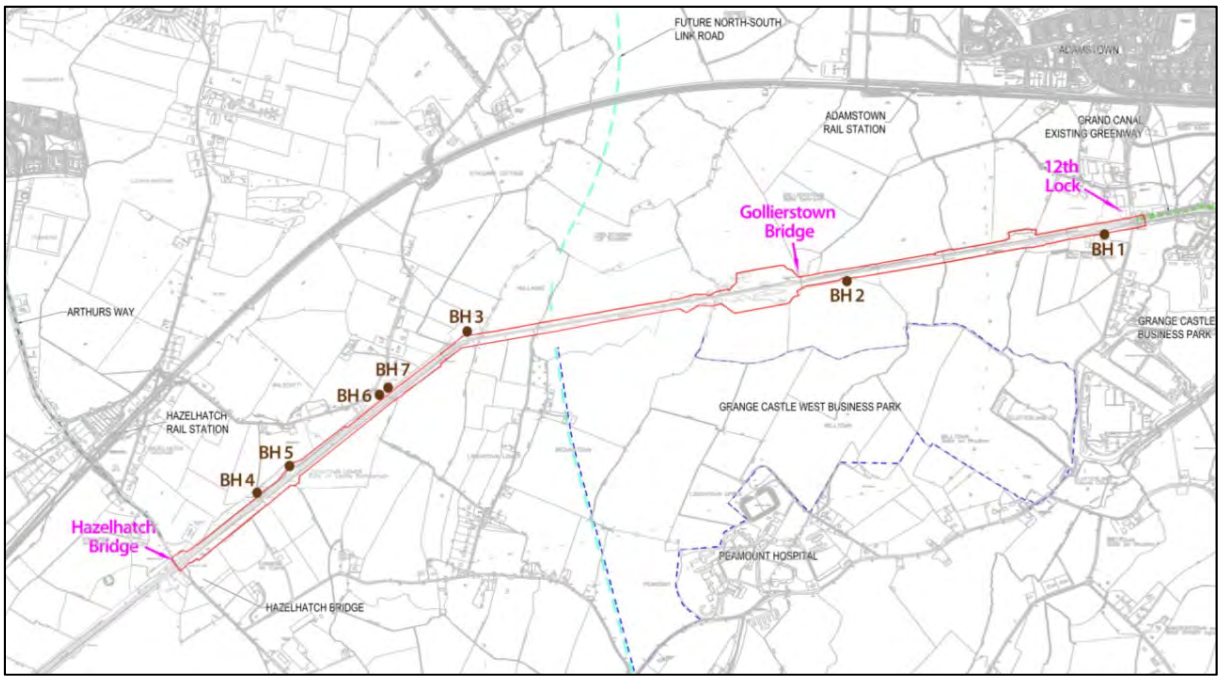

Figure 3 - Location of Built and Cultural Heritage Sites

2.4.2.1 Gollierstown Bridge

Gollierstown Bridge is a protected structure (RPS No. 131). The setting of this canal bridge is idyllic, with a remote location in a lush natural environment. The vistas along the canal to and from the bridge are significant and it is important that they remain undisturbed by any modern intrusions (e.g. a new bridge structure to carry services across the canal). For this reason, the proposed services crossing will utilise an engineering solution (e.g. directional drilling), thus avoiding a negative impact on the setting of the protected structure.

There will be no proposed works to the existing bridge structure. However, ramp access is to be provided on all approaches to the existing bridge.

2.4.2.2 Hazelhatch Bridge

Hazelhatch Bridge is a protected structure (RPS No. 168). The 18th century canal bridge forms the focal point of the historic setting at Hazelhatch, which is enhanced by the varied group of 18th and 19th century buildings that cluster around it (Figure 4). The majority of these buildings are also protected structures, including McEvoy's Pub, with its stables and rear courtyard (RPS No. 164), the boundary walls of which line the canal towpath. The derelict canal company warehouse and attached outbuilding which stand in the rear yard of McEvoy's are listed in the National Inventory of Architectural Heritage (NIAH Ref. 11207015, Regional Rating) and front onto the canal (the canal front is overgrown, obscuring the buildings).

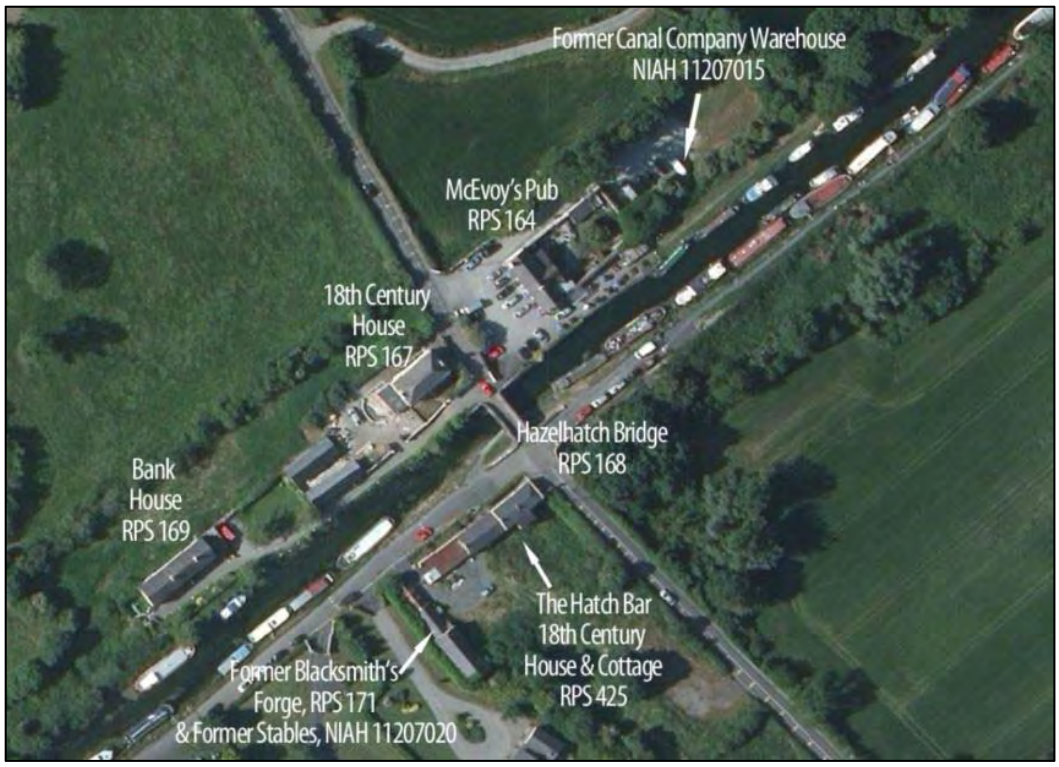

Figure 3 - Location of Architectural Heritage Constraints at Hazelhatch

While there are some distant views along the canal of the bridge, the canal boats that line the banks on the northeast side of the bridge partly obscure views of it the farther along the towpath one travels and the bridge is best experienced in its more immediate setting. This should be borne in mind for any future development proposed in proximity to the bridge.

The works proposed in the current planning application will not adversely affect Hazelhatch Bridge or the surrounding protected structures.

For further details regarding the proposed schemes Archaeological and Architectural Heritage constraints, conclusions and recommendations, please refer to **Appendix C** of this report.

2.5 Flooding Constraints

In order to ascertain whether flooding and drainage is a critical issue within the Hazelhatch Bridge to 12th Lock Grange Canal Greenway study area, CSEA carried out a Strategic Flood Risk Assessment. The main watercourses that come into direct contact within the proposed study area is the Lucan (Tobermaclugg) stream and an assumed tributary of the existing Shinkeen stream. The Lucan (Tobermaclugg) stream has a total catchment area of approximately 486 hectares and ultimately discharges into the River Liffey. The Lucan (Tobermaclugg) stream flows in a south to north direction.

Upon inspection of the fluvial 'Lucan to Chapelizod' flood extent map, it is suggested that the Lucan (Tobermaclugg) stream is not susceptible to flooding for the 10% (1 in 10), 1% (1 in 100) or 0.1% (1 in 1000) fluvial AEP events.

With regards to the node ID labels displayed in **Figure 4** below, the following two and most notable (nodes 09TOWN00392 & 09TOWN00442 represents the closest available water level data attributed to the proposed scheme) information has been yielded from said fluvial 'Lucan to Chapelizod' flood extent map which is tabulated below as follows;

Node Label	Water Level (10% AEP)	Flow (m3/s) 10% AEP	Water Level (1% AEP)	Flow (m3/s) 1% AEP	Water Level (0.1% AEP)	Flow (m3/s) 0.1% AEP
09TOWN00392	64.19	N/A	66.87	N/A	67.00	N/A
09TOWN00442	66.76	N/A	66.87	0.02	67.00	N/A

With regards to the existing topography (at crossing location) attributed to the proposed Grand Canal Greenway Northern towpath site, it has been determined that in the event that a 1 in 100 or 1 in 1000 year event was to occur, that the existing Tobermaclugg stream channel (including aqueduct - Chainage 3+750m), as displayed in **Figure 4** below, would be capable of conveying and containing raised water levels yielded from either storm event materialising presently and/or into the future.

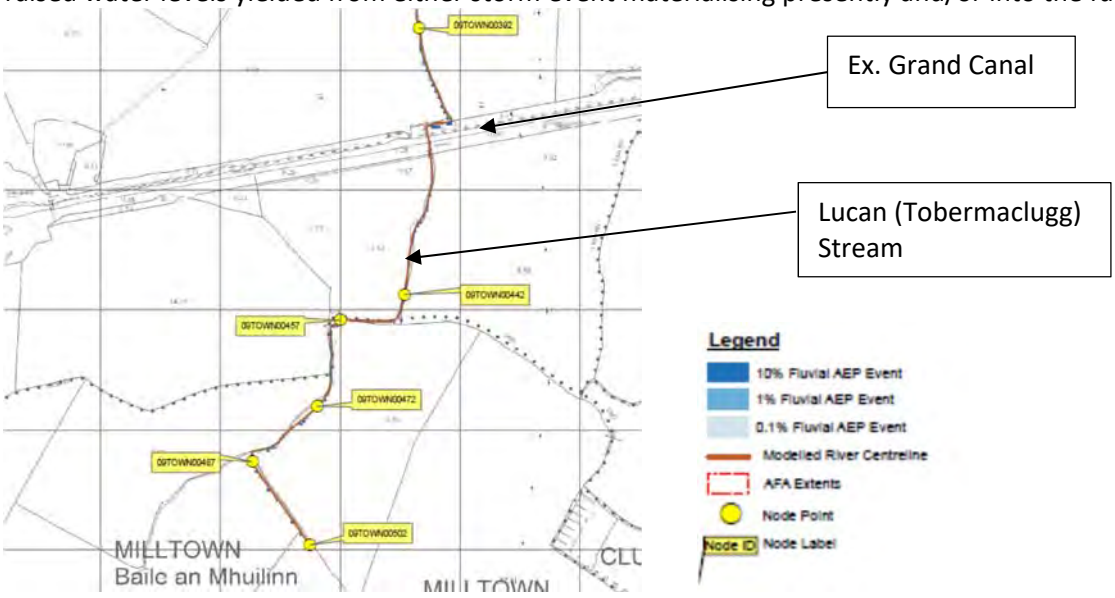

Figure 4 - Extract from 'Lucan to Chapelizod' CFRAM maps of portion of Grand Canal Greenway (northern towpath only) site

Upon inspection of the fluvial 'Hazelhatch' flood extent map and with regards to the node ID labels displayed in **Figure 5** below, the following and most notable (node 09BALS00109J represents the closest available water level data attributed to the proposed scheme - Chainage 0+495m) information has been yielded from said fluvial 'Hazelhatch flood extent map which is tabulated below as follows;

Node Label	Water Level (10% AEP)	Flow (m3/s) 10% AEP	Water Level (1% AEP)	Flow (m3/s) 1% AEP	Water Level (0.1% AEP)	Flow (m3/s) 0.1% AEP
09BALS00109J	62.38	N/A	62.78	N/A	63.22	N/A

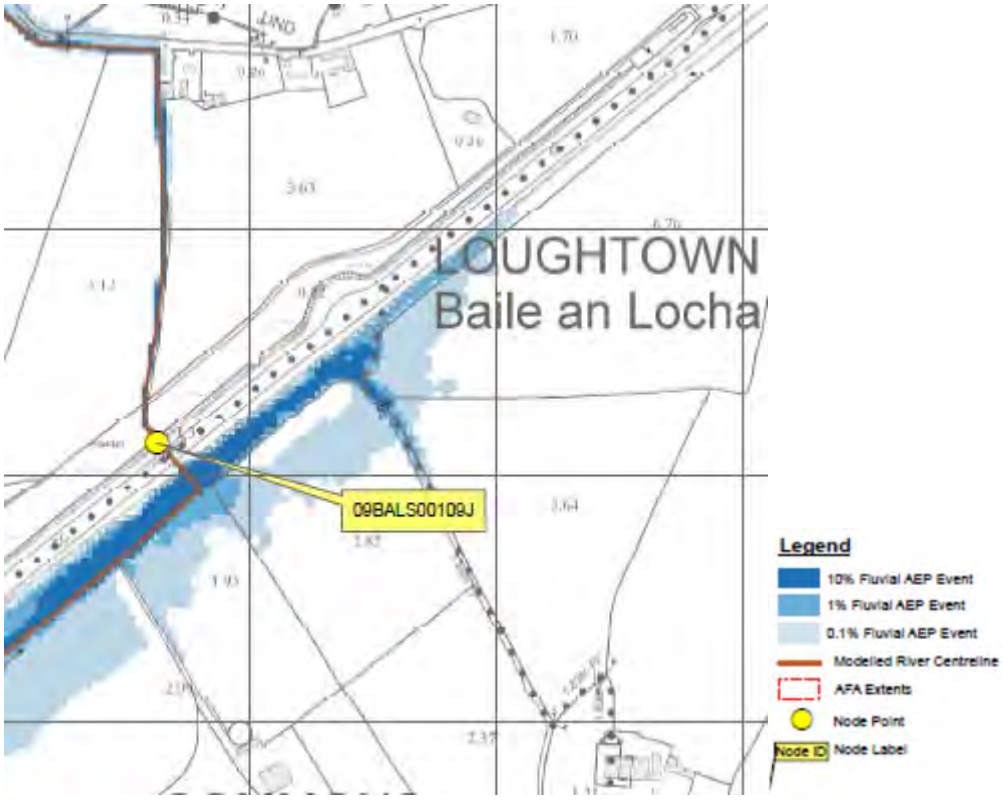

Figure 5 - Extract from 'Hazelhatch' CFRAM maps of portion of Grand Canal Greenway (northern towpath only) site

With regards to the existing topography (crossing location chainage 0+495m) attributed to the proposed Grand Canal Greenway Northern towpath site, it has been determined that in the event that a 1 in 100 or 1 in 1000 year event was to occur, that the existing stream (assumed tributary of the Shinkeen Stream) channel (including aqueduct), as displayed in **Figure 5** above, would be capable of conveying and containing raised water levels yielded from either storm event materialising presently and/or into the future. As displayed in Figure 8 above, the potential for a 10% and 1% Fluvial AEP event predominately focuses on the southern extents of the existing Grand Canal and will have no adverse effect on the Northern towpath which is anticipated to receive the proposed scheme.

Further inspections were undertaken based around RPS's Fluvial Flood Zone Mapping that was incorporated within SDCC's Strategic Flood Risk Assessment adopted within South Dublin's County Development Plan 2016-2022. Information yielded from the above referenced RPS flood zone mapping

ultimately places the existing Tobermaclugg stream and the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme outside flood Zones A & B.

An initial assessment of the flood risk for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme and catchment area is made with reference to existing published information provided by the Office of Public Works (OPW). This data is comprised of (I) Preliminary flood risk assessment mapping (PFRA) and (ii) records of historical flood events in the environs and the periphery elements of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme

The PFRA mapping is based on broad scale simple analysis and cannot be deemed accurate for any specific location. A review of Map 237 for the site environs shows that there is little or no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subjected to flooding for the 1% annual exceedance potential (AEP) event (1 in 100 year return period).

When assessing and reviewing the OPW CFRAM (Catchment Flood Risk Management Assessment and Management) Fluvial Flood Extent Maps for Baldonnel, Lucan to Chapelizod and Hazelhatch maps for the 0.1% AEP event (1 in 1000), 1% AEP Event (1 in 100) and 10% AEP event (1 in 10), it was apparent that there is no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subject to flooding.

When assessing and reviewing the OPW CFRAM Fluvial AEP Flood Depth Maps for Baldonnel, Lucan to Chapelizod and Hazelhatch maps for the 0.1% AEP event (1 in 1000), 1% AEP Event (1 in 100) and 10% AEP event (1 in 10), again it has been assessed that there is no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subject to flooding.

Upon review of the OPW 'Fluvial Risk to the Environment' for Baldonnel, Lucan to Chapelizod and Hazelhatch maps, it has been assessed that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint contains no risk to it surrounding environs.

It has also been established that no tidal/coastal flood maps were generated for the site study area under consideration and therefore no further information was available to be assessed and included in this report.

For further information pertaining the Hazelhatch Bridge to 12th Lock Grand Canal Greenway Strategic Flood Risk Assessment please refer to **Appendix D** of this report.

2.6 Planning and Landownership

2.6.1 Planning

The South Dublin County Council Development Plan 2016-2022 identifies the lands proposed to accommodate the Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme as having a zoning objective OS (To preserve and provide for open space and recreational amenities). The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme will be processed through the Part 8 Planning procedure. The timeframe for the Part 8 process is as displayed in **Figure 6** below.

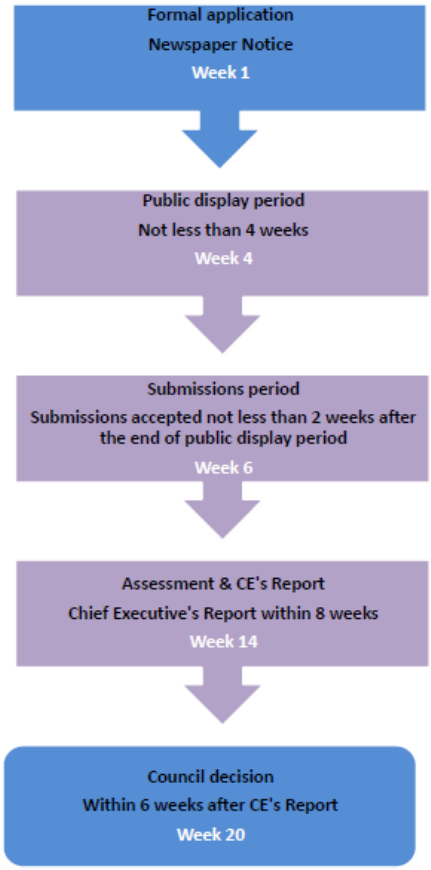

Figure 6 – Summary of Part 8 Planning Procedure

2.6.2 Land Ownership

All lands proposed to accommodate the Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme are owned and maintained by Waterways Ireland.

2.7 Planning Context - Local Level

2.7.1 South Dublin County Council Development Plan 2016 - 2022

South Dublin Council is committed to a policy of developing and improving infrastructure for cyclists throughout the county. Throughout the South Dublin County Council Development Plan 2016-2022, the SDCC has set out their objectives to enhance, and promote the Grand Canal and its surrounding areas.

2.7.1.1 Economic and Tourism Policy 6 Greenways, Trails and Loops

"To support and facilitate the development of an integrated network of Greenways and Trails (combined off road cycle and walking routes) along suitable corridors, including natural linear open spaces such as river banks and canals, with local connections to villages and attractions and to take account of the environmental sensitivities along these corridors."

***ET6 Objective 1**: "To support and facilitate the development of an integrated network of Greenways and Trails, including blueways/water trails, along suitable corridors, including the River Liffey, Dublin Mountains Way, Grand Canal, River Dodder and Slade Valley."*

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme fulfils this objective by integrating the existing Greenway at 12th Lock to Arthur's Way heritage trail at Hazel hatch Bridge.

2.7.1.2 Transport and Mobility (TM) Policy 3 walking and Cycling

"It is the policy of the Council to re-balance movement priorities towards more sustainable modes of transportation by prioritising the development of walking and cycling facilities within a safe and traffic calmed street environment."

***TM3 Objective 1**: "To create a comprehensive and legible County-wide network of cycling and walking routes that link communities to key destinations, amenities and leisure activities with reference to the policies and objectives contained in Chapter 9 (Heritage, Conservation and Landscape) particularly those that relate to Public Rights of Way and Permissive Access Routes."*

The introduction of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme will promote connectivity between Adamstown and Celbridge as well as providing a safe and traffic free route for personnel working in Grange Castle Business Park to Public Transport Hubs such as Hazelhatch and Adamstown Train Station.

2.7.1.3 Transport and Mobility (TM) Policy 3 walking and Cycling

"It is the policy of the Council to promote and develop a coherent, integrated and evolving Green Infrastructure network in South Dublin County that can connect to the regional network, secure and enhance biodiversity, provide readily accessible parks, open spaces and recreational facilities. In particular core areas such as the County's three Natura 2000 sites; proposed Natural Heritage Areas (pNHA), the Liffey Valley, Dodder River Valleys and the Grand Canal;"

***G2 Objective 10:** "To promote a network of paths and cycle tracks to enhance accessibility to the Green Infrastructure network, while ensuring that the design and operation of the routes responds to the ecological needs of each site."*

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme fulfils by providing a recreational route along one of the counties core areas i.e. the Grand Canal. As per chapter 2 below the Quarry Area located adjacent to Gollierstown Bridge is an area rich with biodiversity. The proposed Greenway will both enhance and protect this area, as well as permit the general public experience the areas natural beauty.

2.7.1.4 Heritage, Conservation and Landscapes (HCL) Policy 11 Grand Canal

"It is the policy of the Council to promote the Grand Canal as a key component of the County's Green Infrastructure network and to protect and enhance the visual, recreational, environmental, ecological, industrial heritage and amenity value of the Grand Canal (pNHA) and its towpaths, adjacent wetlands and associated habitats."

***HCL11 Objective 2:** "To facilitate the development of the Grand Canal as a recreational route for walking, cycling, nature study and water based activities including fishing, canal boating, rowing and canoeing/kayaking, subject to appropriate environmental safeguards and assessments."*

HCL11 Objective 3: *"To ensure that development along or adjacent to the Grand Canal contributes to the creation of an open and integrated network of walking and cycling routes that integrate with the Grand Canal Way Green Route."*

The introduction of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme will provide a means to enhance and protect the Grand Canal. The proposed Greenway will boost the recreational infrastructure along the Canals towpath while also enabling the general public a means of experiencing the visual, environmental, ecological and industrial heritage which the Grand Canal has to offer.

2.8 Planning Context - National Level

2.8.1 Government's Smarter Travel Initiative

In 2009 the Irish Government introduced the transport policy, 'Smarter Travel: A Sustainable Transport Future' which runs from 2009 to 2020. This policy recognises the key issues associated with the current transport network and identifies the steps required to contain the anticipated cost to society, and reduce its impact on economic growth. The policy also identifies the negative impacts on health and what an inactive lifestyle generates and promotes the use of more sustainable transport modes such as walking, cycling and public transport. Some key goals, targets and actions included in the policy are:

- "Work-related commuting by car will be reduced from a current modal share of 65% to 45%."
- Promote a "change in personal behavior will also be necessary for other travel purposes as most travel relates to non-commuting".
- "Car drivers will be accommodated on other modes such as walking, cycling, public transport and car sharing."
- "Actions aimed at ensuring that alternatives to the car are more widely available, mainly through a radically improved public transport service and through investment in cycling and walking"
- "Our vision is to create a strong cycling culture in Ireland and ensure that all cities, towns, villages and rural areas will be cycling-friendly."
- "To publish and implement a National Cycle Policy Framework to give effect to this vision. Pedestrian and cycle facilities will be most successful where they form a coherent network, place an emphasis on safety, directly serve the main areas where people wish to travel, provide priority over vehicular traffic at junctions, are free from obstructions and have adequate public lighting."

2.8.2 National Cycle Policy Framework

The National Cycle Policy Framework (NCPF) was introduced to promote a strong cycle culture in Ireland. The NCPF sets out key objectives to take place over the 12 year period to deliver a culture of safe cycling in Ireland by 2020. The chapters covered in this framework include:

- Infrastructure,
- Communication/Education,
- Financial Resources,
- Legislation and Enforcement,
- Human Resources and Coordination
- Evaluation and Effects

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme aligns with the objectives set out in this framework. For example, objective 3 aims to "Provide designated rural cycle networks especially for visitors and recreational cycling" with particular emphasis on the expansion of National Cycle Network (NCN) as follows:

"We will carry out further research and surveying work in order to expand the network to include rural recreational routes around urban areas and to connect major urban areas. We will pay special attention to the opportunities of using both the extensive disused rail network and canal / river tow path networks as cycling / walking routes."

2.8.3 National Cycle Manual 2011

The National Cycle Manual was published by the NTA in 2011 embraces the Principals of Sustainable Safety and covers the basic building blocks required for any cycling scheme from inception and planning through to route selection and appropriate type of facility. It aims to bring a standardised and more logical approach to the design of cycling facilities in Ireland and is based on the Five Needs of a Cyclist:

- Road Safety
- Coherence
- Directness
- Attractiveness
- Comfort

Another concept introduced by the Cycle Manual was Quality of Service (QoS), which is a method of measuring the degree to which the attributes and needs of the cyclist are met and ranking them from A+ to D, with A+ being a route which is designed to the highest possible standard. The development of this approach meant that designers or local authorities could target a particular Quality of Service, which would then need to be met through the fulfilment of certain criteria.

3 Environmental Impact Assessment Screening

3.1 EIA Requirement

Clifton Scannell Emerson Associates (CSEA) commissioned Doherty Environmental Ltd to prepare an Environmental Impact Assessment (EIA) screening report for the proposed Grand Canal Greenway, hereafter referred to as the proposed development. Please refer to **Appendix E** for full report details.

The proposed development relates to the provision of a Greenway Walking and Cycling route along the northern towpath of the Grand Canal, from the 12th lock to the County Kildare boundary at Hazelhatch.

This EIA screening report contains necessary information to enable the competent authority, in this case SDCC, to undertake an EIA screening assessment and determine whether an EIA is required to support the proposed development. The findings of the EIA screening assessment are presented in this report and will inform the determination by SDCC in advance of the Part 8 planning consent process.

3.2 Summary of Legislative Requirements for EIA Screening

EIA requirements derive from EU Directive 85/337/EEC (as amended by Directive 97/11/EC, Directive 2014/52/EU and S.I. 454 of 2011; S.I. 464 of 2011; S.I. 456 of 2011 and S.I. No 296 of 2018).) on the assessment of the effects of certain public and private projects on the environment. The purpose of this Environmental Impact Assessment Screening Report is to determine whether this proposed development will require full Environmental Impact Assessment.

The Directive outlines in Article 4 (1) 21 Annex 1 projects that require mandatory EIA. Article 4 (2) outlines Annex 2 projects that require consideration for EIA further to a case by case examination or through thresholds and criteria established by Member States. Projects requiring mandatory EIA are listed in Schedule 5 of the Planning and Development Regulations 2001, as amended. Where developments are under the relevant EIA threshold, planning authorities are required under Article 103 of the 2001 Regulations, as amended, to request an EIS where it considers the proposed development is likely to have a significant effect on the environment. In these cases, the significant effects of the project are assessed relative to the criteria contained in Schedule 7a of the regulations, principally:

- The projects characteristics
- Sensitivity of the project location, and
- Characterization of potential impacts.

In addition, where the development would be located on or in an area, site etc. set out in Article 103(2), the planning authority shall decide whether the development would or would not be likely to have significant effects on the environment for such site, area or land etc. the implication being that if it decides that it would be likely to have significant effects on the environment, it can invoke its powers to request an EIS.

Article 103(2) sites comprise the following:

(a) A European Site;
(b) An area the subject of a notice under section 16(2) (b) of the Wildlife (Amendment) Act, 2000;

(c) An areas designated as a Natural Heritage Area under section 18 of the Wildlife (Amendment) Act, 2000;
(d) Land established or recognised as a nature reserve within the meaning of section 15 or 16 of the Wildlife Act, 1976, as amended by sections 26 and 27 of the Wildlife (Amendment) Act, 2000; or
(e) (c) Land designated as a refuge for flora or as a refuge for fauna under section 17 of the Wildlife Act, 1976, as amended by section 28 of the Wildlife (Amendment) Act, 2000.

The proposed Greenway is located along the Grand Canal which is designated as a proposed Natural Heritage Area (site code: 002104).

The proposed development also falls under the EIA requirements of the Roads Act 1993 as amended by the Planning and Development Acts (2000-2011) and the Roads Act (2007) as well as regulations made under the Roads Acts, The European Communities (Environmental Impact Assessment) (Amendment) Regulations 1989-2001, and EC Directives 85/337/EC and 97/11/EC referenced above. A road within the 1993 act is defined to include:

(a) any street, lane, footpath, square, court, alley or passage,
(b) (b) any bridge, viaduct, underpass, subway, tunnel, overpass, overbridge flyover, carriageway whether single or multiple, pavement or footway,
(c) any weighbridge or other facility for the weighting or inspection of vehicles, toll plaza or other facility for the collection of tolls, services area, emergency, telephone, first aid post, culvert, arch, gulley, railing, fence, wall, barrier, guardrail, margin, kerb, lay-by, hard shoulder, island, pedestrian refuge, median, central reserve.

Furthermore, Cycleway is referred to in Section 68 of the 1993 Act as follows:
1. In this section "cycleway" means a public road or proposed pubic road reserved for the exclusive use of pedal cyclists or pedal cyclists and pedestrians.
2. (a) A road authority may construct (or otherwise provide) and maintain a cycleway.
(b) Where a road authority constructs or otherwise provides a cycleway it shall by order declare either – (i) the cycleway is for the exclusive use of pedal cyclists, or
(ii) that the cycleway is for the exclusive use of pedal cyclists and pedestrians.
3. any person who uses a cycleway in contravention of an order under paragraph
4. shall be guilty of an offence.

3.3 EIA Screening Conclusion

Article 4(5) of the EIA Directive states:

The competent authority shall make its determination, on the basis of information provided by the developer in accordance with paragraph 4 taking into account, where relevant, the results of preliminary verifications or assessments of the effects on the environment carried out pursuant to Union legislation other than this Directive.

The determination shall be made available to the public and:

***(a)** where it is decided that an environmental impact assessment is required, state the main reasons for requiring such assessment with reference to the relevant criteria listed in Annex III; or*

***(b)** where it is decided that an environmental impact assessment is not required, state the main reasons for not requiring such assessment with reference to the relevant criteria listed in Annex*

III, and, where proposed by the developer, state any features of the project and/or measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment.

The Grand Canal Greenway has been assessed as a sub-threshold EIA development. This EIS Screening Report has concluded that the effects of the proposed development are considered not to be of likely significance, due to the minor development footprint, the characteristics and sensitivities of the receiving environment and design and mitigation measures. The Grand Canal Greenway has been assessed as a sub-threshold EIA development. This EIS Screening Report has concluded that the characteristics of the proposed development are considered potentially not significant due to the minor development footprint.

The existence and reuse of the towpath reduces any additional land take and proposed works are minor in nature being confined to resurfacing when required, removal of some overhanging vegetation but no tree removal. The implementation of the environmental management practices (See Section 2.2) will also provide safeguards in relation to potential impacts identified in the preceding tables

The overall conclusion for this screening appraisal is that, having considered the appropriate criteria, Environmental Impact Assessment for the Grand Canal Greenway is not required.

4 Preliminary Design

4.1 The Scheme

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme is located within the existing townlands of Ballymakaily, Gollierstown, Coolscuddan, Brownstown, Mullauns, Loughtown Lower, Stacammy Cottage, Balscott and Hazelhatch respectively. The proposed scheme is located along the entire extents of the existing northern tow path attributed to the Grand Canal and traverses in and east to west direction for approximately 4.6km in total length.

The proposed Grand Canal Greenway – Hazelhatch Bridge to 12th Lock will provide the following features:

- 4.6km of shared walking and cycling Greenway along the existing northern Grand Canal towpath.
- Path widths will vary from 2.5m to 3.5m in width. Widths will be dictated by existing on site features.
- Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust or Asphalt Tarmac depending on local conditions for pedestrian and cyclists use.
- Provision of access controls such as pedestrian and cycle friendly gates along the route.
- Underground utilities and services including: Power ducting, telecom ducting, Public Lighting ducting & CCTV ducting.
- All associated ancillary works and integrated landscape plans.

From the most eastern commencement location of the proposed scheme, access to the northern towpath is gained from the R120 Regional Road located adjacent to the existing 12th Lock. Access from the most western point of the scheme is gained from the existing Hazelhatch public house premises which is located adjacent to the existing Hazelhatch Road/Bridge. Internal site access to both the northern and southern towpaths attributed to the Grand Canal is provided by the existing Gollierstown Bridge. Access at this location of the proposed scheme is predominately utilised by local landowners/farmers. Furthermore, a small portion, approximately 0.48km, of the proposed scheme traverses through County Kildare lands with the remaining footprint located within County Dublin lands.

4.2 Horizontal & Vertical Alignment

The horizontal and vertical alignment for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme has been designed in accordance with the National Cycles Manual, TII DN-GEO-03047 Rural Cycleway Design (Offline) and the Technical Guidance Document Part M of the Building Regulations.

4.3 Road Crossings and Access Controls

In order to ensure that current agricultural practices can be carried out (Gollierstown Bridge), a number of access controls or gates are to be strategically provided for the proposed scheme. These access controls are specifically designed for cyclist/pedestrian use while still providing sufficient

security to the existing farmer access at Gollierstown Bridge. Furthermore, proposed signage will be erected at the appropriate junctions and interfaces along the proposed scheme.

4.4 Proposed Services

To future proof the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme, it is proposed to install the following services;

- 1 No. Public Lighting duct
- 2 No. Security (CCTV) ducts including 8m CCTV columns and their respective sleeves
- 6 No. Telecommunications ducts and associated chambers
- 8 No. Power ducts and associated chambers

For cross sectional details please see Figure 7 below.

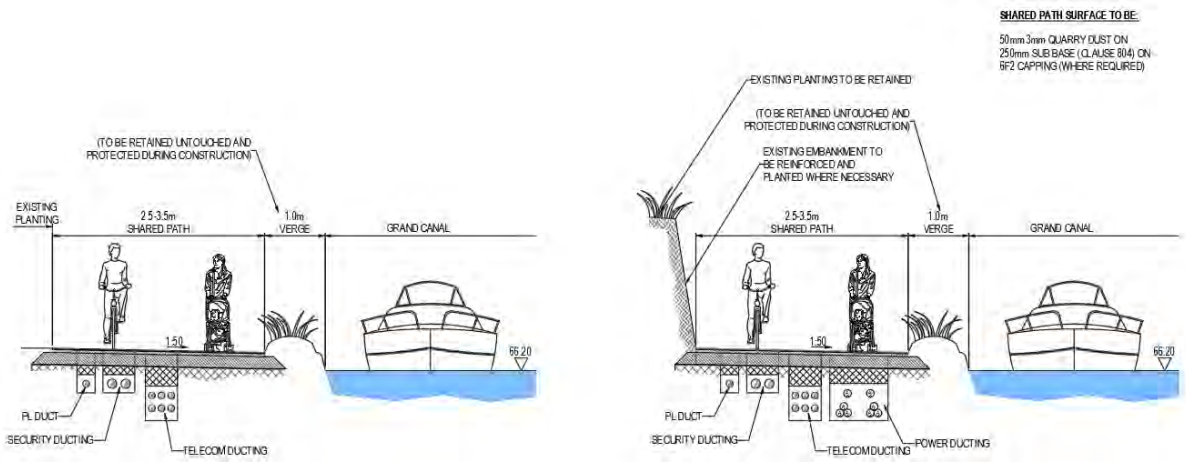

Figure 7 – Typical Cross Sections of the Proposed Greenway Scheme

4.5 Surface Finish - Rolled and Compacted Quarry Dust

The proposed surface type to be used on the proposed greenway will be an 50mm unbound surface of compacted limestone quarry stone and dust on 250mm of Clause 804 Sub Base on 6F2 Capping layer (where required. This type of finish would be environmentally friendly with minimal impact to the surrounding areas. For further details please see **Figure 7** below.

4.6 Landscaping

Landscaping proposals for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme shall be adopted to ultimately supplement the existing plant and tree species that are in-situ along the Grand Canal verges/z e banks.

5 Route Options

5.1 Introduction

As part of the route options assessment process, 6 No. feasible route options have been developed to allow an accurate comparison of the alternative options which will allow an informed decision to be made on the preferable option based on various Engineering assessment criterion.

The proposed scheme shall be designed in accordance with the National Cycles Manual, TII DN-GEO-03047 Rural Cycleway Design (Offline) and the Technical Guidance Document Part M of the Building Regulations.

5.2 Start and End Points

The proposed scheme is located along the entire extents of the existing northern tow path attributed to the Grand Canal and traverses in and east to west direction commencing at the existing 12th Lock and terminating at the existing Hazelhatch Bridge.

Drawing 18_065_00_1020 shows the location of the proposed Route Options 1 to 5 which can be viewed in **Appendix F** of this report. The following route option descriptions should be read in conjunction with this drawing.

5.3 Option 1

Route Option 1 (Red) commences on the northern side of the existing 12th Lock located adjacent to the existing R120 Regional Road and traverses in a western direction along the existing and worn Grand Canal northern towpath for an approximate length of 4,558m. The initial 400m of proposed Route Option 2, commencing at the 12th Lock, traverses over an existing bituminous surface (Access Road) which is utilised by local residents/landowners residing in close proximity of this proposed route option. The existing terrain that Route Option 1 encounters is predominately flat except for the east and western approaches to the northern extents of the existing Gollierstown Bridge. The proposed east and western approach ramps to Gollierstown Bridge will be designed in accordance with TII DN-GEO-03047 Rural Cycleway Design (Offline) and the Technical Guidance Document Part M of the Building Regulations. This would entail wider embankments to facilitate said requirements which is ultimately achievable through the introduction of earth retaining structures where required. Furthermore, the proposed alignment footprint for Route Option 1 is positioned slightly north of the existing Gollierstown Bridge so to avoid any interaction between the function of the proposed route option and Gollierstown Bridge itself which is operating as a live access route utilised by local landowner/farmers on a daily basis. Travelling in a western direction and past Gollierstown Bridge is an existing biodiversity area which proposed Route Option 1 negotiates and navigates through two prominent quarry pools (north and south of proposed alignment) prior to continuing in a western direction towards the existing Hazelhatch Bridge where proposed route option 1 ultimately terminates (existing McEvoy Public House car park). Connectivity to Arthurs Way is additionally achieved by crossing over the existing Hazelhatch Bridge to the existing southern tow path west of the existing

Hazelhatch Bridge. The proposed footprint attributed to Route Option 1 falls under one single 3rd Party landowner, Waterways Ireland, who own, operate and maintain said lands.

5.4 Option 2

Route Option 2 (Yellow) commences on the southern side of the existing 12th Lock located adjacent to the existing R120 Regional Road. The total length of proposed Route Option 2 is approximately 4,550m. Commencing at the 12th Lock, proposed Route Option 2 initially traverses for approximately 300m in a western direction over an existing bituminous surface (Access Road) which is currently utilised by local property and business owners who reside and operate at this particular location of the proposed scheme. Continuing on from this location, proposed Route Option 2 traverses in a western direction along the existing undisturbed Grand Canals southern towpath that encounters heavily overgrown and dense vegetation with extremely difficult gradients encountered along its intended path prior to approaching the southern extents of the existing Gollierstown Bridge. Recommencing at Gollierstown Bridge, proposed Route Option 2 continues west and directly through the existing Biodiversity area which entails heavily overgrown vegetation, quarry pools and several different levels of existing terrain before continuing west along its undisturbed and intended path. Difficulties in designing an approach ramp in compliance with TII DN-GEO-03047 Rural Cycleway Design (Offline) and the Technical Guidance Document Part M of the Building Regulations from the west towards Gollierstown Bridge would be ultimately encountered due to the locations of several existing quarry ponds and severe level differences observed over short distances. From this location (Biodiversity area) up to the proposed termination point at Hazelhatch Bridge, proposed route option 2 unceasingly encounters dense and heavily overgrown vegetation along its proposed route. The termination point at Hazelhatch Bridge (southern towpath) for proposed Route Option 2 lends itself favourably with regards to connectivity to Arthurs Way. The proposed footprint attributed to Route Option 2 falls under one single 3rd Party landowner, Waterways Ireland, who own, operate and maintain said lands.

5.5 Option 3

Route Option 3 (Blue) commences approximately 230m south of the existing 12th Lock Bridge and traverses in a western direction for approximately 4,573m. Proposed Route Option 3 enters existing 3rd party lands commencing from a future formed entrance taken off the existing R120 Regional Road. Proceeding in a western direction (from R120) through 3rd Party lands for approximately 1.8Km, proposed route option 3 traverses through existing farmland, 6 No. field boundaries and 1 No. stream crossing (Lucan Stream) prior to entering SDCC zoned lands located to the south east of the existing biodiversity area. From this location, proposed route option 3 continues in a south western direction through SDCC owned/zoned lands for approximately 1145m. Over the aforementioned 1.2Km, route option 3 would be required to negotiate through 4 more field/land boundaries including 1 No. farmer Access and 1 No. stream crossing (Shinkeen Stream) prior to re-entering 3rd party lands. Continuing in a western direction, route option 3 will have to negotiate 7 further farmland boundaries, a portion of County Kildare lands before re-emerging on the existing Grand Canal southern towpath approximately 100m short of the existing Hazelhatch Bridge. Similar to proposed Route Option 2, the termination point at Hazelhatch Bridge lends itself favourably with regards to connectivity to Arthurs Way. Prior to re-emerging on the existing southern tow path, proposed Route Option 3 would have to negotiate a 4m level difference between the lands directly south of the existing southern towpath at Hazelhatch

5.6 Option 4

Similar to Route Options 2 and 3, proposed Route Option 4 (Green Dash) commences on the southern side of the existing 12th Lock located adjacent to the existing R120 Regional Road. The total length of proposed Route Option 4 is approximately 4,594m. Commencing at the 12th Lock, proposed Route Option 4 initially traverses for approximately 300m in a western direction over an existing bituminous surface (Access Road) which is currently utilised by local property and business owners who reside and operate at this particular location of the proposed scheme. Proposed Route Option 4 then continues in a western direction along the existing and predominately undisturbed Grand Canals southern towpath for an approximately 1.3Km which encounters heavily overgrown and dense vegetation and difficult gradients encountered along its intended path prior to approaching the southern extents of the existing Gollierstown Bridge. Proposed Route Option 4 then utilises and crosses over the existing Gollierstown Bridge taking the proposed route from the existing and undisturbed Grand Canals southern towpath over to the existing and worn northern towpath prior to continuing in western direction towards its intended termination point at the existing McEvoy Public House carpark located adjacent to Hazelhatch Bridge. From Gollierstown Bridge to Hazelhatch Bridge, proposed Route Option 4 encounters and mirrors the same journey undertaken and as described in proposed Route Option 1. The proposed footprint attributed to Route Option 4 falls under one single 3rd Party landowner, Waterways Ireland, who own, operate and maintain said lands. Gollierstown Bridge is utilised daily by 3rd Party Landowners who farm the existing lands located north and south of the existing Grand Canal. Furthermore, and as discussed in chapter 2.3.2.1 of this report, Gollierstown Bridge is a protected structure (RPS No. 131).

5.7 Option 5

Mirroring Route Option 1, proposed Route Option 5 (Magenta Dash) commences on the northern side of the existing 12th Lock located adjacent to the existing R120 Regional Road. The total length of proposed Route Option 5 is approximately 4,587m. The existing terrain that Route Option 5 encounters is predominately flat except for the eastern approach to the northern extents of the existing Gollierstown Bridge. Proposed Route Option 5 also utilises and crosses over the existing Gollierstown Bridge taking the proposed route from the existing and disturbed Grand Canals northern towpath over to the existing and undisturbed southern towpath. From the southern side of the existing Gollierstown Bridge, proposed Route Option 5 continues in a western direction through the existing Biodiversity Area as previously discussed and described in proposed Route Option two's route description. From this location (Biodiversity area) up to the proposed termination point at Hazelhatch Bridge, proposed route option 5 unceasingly encounters dense and heavily overgrown vegetation along its proposed route. The termination point at Hazelhatch Bridge (southern towpath) for proposed Route Option 5 lends itself favourably with regards to connectivity to Arthurs Way. The proposed footprint attributed to Route Option 5 falls predominately under one single 3rd Party landowner, Waterways Ireland, who own, operate and maintain said lands. It should be noted that Gollierstown Bridge is utilised daily by 3rd Party Landowners who farm the existing lands located north and south of the existing Grand Canal. Furthermore, and as discussed in chapter 2.3.2.1 of this report, Gollierstown Bridge is a protected structure (RPS No. 131).

6 Route Selection (Engineering)

A detailed assessment of all of the route options was carried out using the following criteria;

Engineering Route Assessment Criteria	
	Criterion Elements
Technical	Comparison of technical merits in terms of: • Greenway Level of Service offered o Surface Quality / Comfort o Gradient o Continuity of Route o Directness (Waiting time at signals, detours) • Accessibility (mobility impaired)
Safety	Comparison of level of safety offered in terms of: • Interaction with live traffic & nature of traffic control facilities offered • Personal security, levels of public lighting and surveillance offered
Integration	Comparison of level of integration and inter-connectivity offered in terms of: • Connectivity to public transport (bus and rail) • Connectivity to wider cycle network • Inter-connectivity of adjacent residential communities (existing and planned) • Provision of car parking areas at access points / key amenity areas • Connectivity to adjacent recreational & amenity areas (existing and planned)
Construction Impact	Comparison on level of impact on the environment from a construction perspective.

Table 1 – Engineering Route Assessment Criteria

Each route option was accessed using the above criteria and a rating was assigned to each route option. The ratings are as follows;

Preference Type	Single Option	Multiple/All Options
Most Preferred	An option which is considered to have a positive or not material negative effect.	If multiple/all options have a positive or no material negative effect, then multiple/all options should be identified as most preferred.
Preferred	An option which is considered to have a minor negative effect.	If multiple/all options have a minor negative effect, then multiple/all options should be identified as preferred.
Acceptable	An option which is considered to have a moderate negative effect.	If multiple/all options have a moderate negative effect, then multiple/all options should be identified as most preferred.
Least Acceptable	An option which is considered to have a potentially significant negative effect.	If multiple/all options have a potentially significant negative effect, then multiple/all options should be identified as most preferred.

Table 2 – Preference Rating Table

Each option is given a rating and the route with the most "most preferred" rating is then selected as the preferred route as it is the best option of the overall process.

6.1 Route Option 1 (Red)

Option 1 - Option Evaluation Summary Evaluation Matrix		
Item	**Description**	**Preference**
Option 1		
Technical	• Proposed Route Option 1 traverses and follows the footprint of an existing and worn pathway along the Grand Canals northern towpath. • There is a requirement to remove some minor overgrown vegetation along the proposed route, but this is minimal in comparison to proposed route options 2 to 5. • Approach and departure ramps attributed to Gollierstown Bridge (northern extents) would warrant wider embankments which will be curtailed through the introduction of earth retaining structures. • Most direct route from 12th Lock to Hazelhatch Bridge with minimal impact achieved whilst traversing through the northern section of the existing Biodiversity area. • Gradient of finished shared surface will be predominately flat (matching existing terrain) and approach and departure ramps associated with Gollierstown Bridge shall be Part M compliant making the entire route accessible to the mobility impaired, children with buggies and all type of cyclist and pedestrian traffic. • Compacted Quarry Dust surface finish proposed which provides an intermediate level of comfort.	Most Preferred
Safety	• Good safety level as users are off road and do not mix with vehicular traffic apart from farm vehicular traffic utilising Gollierstown Bridge which is deemed minimal and managed through access controls and/or gates. • CCTV proposed for entire scheme. • Public Lighting is not proposed but introduction of Public Light Ducting for future use is included.	Most Preferred
Integration	• Good Integration with public transport (railway Station at Adamstown, Kishogue and Hazelhatch) with links to wider cycle networks along the Grand Canal (Inchicore to 12th Lock). • Provides linkages and connectivity with adjacent residents and Grange Castle Business Park's by providing cycle & pedestrian routes along the canal. • Excellent connectivity to recreational and amenity areas along the Grand Canal including Arthurs Way.	Most Preferred
Construction Impact	• Minor environmental effects generated during works involving the clearing, grubbing and removal of existing densely vegetated areas and the cut and fill required to construct the project. • Medium environmental effects through Gollierstown Quarry.	Preferred

6.2 Route Option 2 (Yellow)

Option 2 - Option Evaluation Summary Evaluation Matrix		
Item	**Description**	**Preference**
Option 2		
Technical	• Proposed Route Option 2 traverses under the footprint of an existing and undisturbed stretch of land located along the existing Grand Canals southern towpath. • Requirement to remove some major overgrown and dense vegetation along the proposed route including the negotiation of difficult level differences along its intended route. • Approach and departure ramps attributed to Gollierstown Bridge (southern extents) would warrant wider embankments which will be extremely difficult to achieve on the western approach to Gollierstown Bridge due to the close proximity of existing quarry ponds attributed to the Biodiversity area. • Can be categorised as a potential direct route from 12th Lock to Hazelhatch Bridge but traverses directly through the existing biodiversity area and encounters challenging level differences along its intended route. • The desired gradient of the proposed finished shared surface would be predominately flat but to achieve this it will necessitate the execution of major cut and fill earthwork operations. • Compacted Quarry Dust surface finish proposed which provides an intermediate level of comfort.	Acceptable
Safety	• Average safety level as users are off road and do not mix with vehicular traffic apart from farm vehicular traffic utilising Gollierstown Bridge which will be minimal and managed through access controls and/or gates. • Additional safety measures would need to be introduced to protect the public where route passes through the existing quarry (several quarry ponds) and Biodiversity area. • CCTV proposed for entire scheme. • Public Lighting is not proposed but introduction of Public Light Ducting for future use is included.	Acceptable
Integration	• Good Integration with public transport (railway Station at Adamstown, Kishogue and Hazelhatch) with links to wider cycle networks along the Grand Canal (Inchicore to 12th Lock). • Provides linkages and connectivity with adjacent residents and Grange Castle Business Park's by providing cycle & pedestrian routes along the canal. • Excellent connectivity to recreational and amenity areas along the Grand Canal including Arthurs Way.	Most Preferred
Construction Impact	• Major environmental effects generated during works involving the clearing, grubbing and removal of existing densely vegetated areas and the cut and fill operations required to construct the project. • Major environmental effects through Gollierstown Quarry (Biodiversity Area).	Least Preferred

6.3 Route Option 3 (Blue)

Option 3 - Option Evaluation Summary Evaluation Matrix		
Item	**Description**	**Preference**
Option 3		
Technical	• Proposed Route Option 3 traverses through several 3rd party lands over an approximate length of 4573m. • Requirement to remove some major overgrown and dense vegetation along the proposed route including the negotiation of difficult level differences along the intended route. • Proposed Route Option crosses over 2 No. existing streams (Shinkeen & Lucan Streams). • Considered the least direct route from 12th Lock to Hazelhatch Bridge with maximum environmental and engineering impact achieved whilst traversing through several existing dense hedgerows and dense tree clusters, several farmland boundaries on 3rd party lands, 1 No. Farm access, a portion of County Kildare lands and a portion of SDCC owned lands before re-emerging on the existing Grand Canal southern towpath approximately 100m short of the existing Hazelhatch Bridge. • A flat gradient with regards to the proposed finished shared surface will be challenging to achieve (value for money may not be achieved) due to the existing terrain encountered along its intended route. • Existing southern lands adjacent to the existing southern tow path at Hazelhatch Bridge is susceptible to a 10% and 1% AEP Fluvial Flooding event. • Compacted Quarry Dust surface finish proposed which provides an intermediate level of comfort.	Least Preferred
Safety	• Average safety level achieved as users are off road and will be required to mix with farm vehicular traffic and livestock. This would need to be mitigated and strategically managed through the introduction of boundary fencing and several access controls and/or gates that would need to ultimately accommodate for both the 3rd party landowners and the users of the proposed route. • CCTV proposed for entire scheme. • Public Lighting is not proposed but introduction of Public Light Ducting for future use is included.	Least Preferred
Integration	• Average Integration with public transport (railway Station at Adamstown, Kishogue and Hazelhatch) with non-attractive links to wider cycle networks along the Grand Canal (Inchicore to 12th Lock). • Provides average linkage and connectivity with adjacent residents and Grange Castle Business Park's by providing cycle & pedestrian routes. • Average connectivity to recreational and amenity areas along the Grand Canal including Arthurs Way.	Acceptable
Construction Impact	• Major environmental effects generated during works involving the clearing, grubbing and removal of existing densely vegetated areas, dense clusters of mature trees & hedgerows, 2 No. stream crossings and the severe cut and fill operations	Least Preferred

Item	Option 3 - Option Evaluation Summary Evaluation Matrix Description	Preference
	required to construct the route through several 3rd party landowner lands. • Land acquisition from 3rd party landowners. • Maximum environmental affects through 3rd party lands.	

6.4 Route Option 4 (Green Dashed)

Item	Option 4 - Option Evaluation Summary Evaluation Matrix Description	Preference
Option 4		
Technical	• Proposed Route Option 4 traverses under the footprint of an existing and undisturbed stretch of land located along the existing Grand Canal southern towpath from the 12th Lock to the southern extents of the existing Gollierstown Bridge • Requirement to remove some major overgrown and dense vegetation along the proposed route from the 12th Lock to Gollierstown Bridge that include the negotiation of difficult level differences along its intended route. • Approach and departure ramps attributed to Gollierstown Bridge would warrant wider embankments which will be curtailed through the introduction of earth retaining structures. • Not the most direct route from 12th Lock to Hazelhatch Bridge and has requirements for route to utilise and cross over the existing Gollierstown Bridge which is a protected structure. • Gradient of finished shared surface will be predominately flat (matches existing terrain except from 12th Lock to Gollierstown Bridge) and approach and departure ramps associated with Gollierstown Bridge shall be Part M compliant making the entire route accessible to the mobility impaired, children with buggies and all type of cyclist and pedestrian traffic. • Compacted Quarry Dust surface finish proposed which provides an intermediate level of comfort.	Acceptable
Safety	• Average safety level as users are predominately off road but does mix with farm vehicular traffic utilising Gollierstown Bridge which is deemed minimal and ultimately managed through access controls and/or gates. • CCTV proposed for entire scheme. • Public Lighting is not proposed but introduction of Public Light Ducting for future use is included.	Acceptable
Integration	• Good Integration with public transport (railway station at Adamstown, Kishogue and Hazelhatch) with links to wider cycle networks along the Grand Canal (Inchicore to 12th Lock). • Provides linkages and connectivity with adjacent residents and Grange Castle Business Park's by providing cycle & pedestrian routes along the canal. • Interaction with farm vehicular traffic is envisaged. • Excellent connectivity to recreational and amenity areas along the Grand Canal including Arthurs Way.	Acceptable

Item	Option 4 - Option Evaluation Summary Evaluation Matrix Description	Preference
Construction Impact	• Major environmental effects generated during works involving the clearing, grubbing and removal of existing densely vegetated areas and the cut and fill required to construct the project along the southern towpath section of proposed route option. • Works required to Gollierstown Bridge which is a protected structure • Medium environmental effects through Gollierstown Quarry.	Least Preferred

6.5 Route Option 5 (Magenta Dashed)

Item	Option 5 - Option Evaluation Summary Evaluation Matrix Description	Preference
Option 5		
Technical	• Proposed Route Option 5 traverses under the footprint of an existing and worn pathway along the Grand Canals northern towpath from 12th Lock to the northern extent of Gollierstown Bridge • There is a requirement to remove some minor overgrown vegetation along the proposed route from 12th Lock to Gollierstown Bridge (northern towpath) and some major removal of heavily overgrown and dense vegetation from Gollierstown Bridge to Hazelhatch Bridge (southern towpath). • Approach and departure ramps attributed to Gollierstown Bridge would warrant wider embankments which will be curtailed through the introduction of earth retaining structures but would entail the negotiation of the intended route through an existing Biodiversity Area attributably for the western departure ramp from Gollierstown Bridge (south). • Not the most direct route from 12th Lock to Hazelhatch Bridge and has requirement for route to utilise and cross over the existing Gollierstown Bridge which is a protected structure and also has a requirement to traverse through the existing Biodiversity area. • Gradient of finished shared surface will be predominately flat (matching existing terrain) and approach and departure ramps associated with Gollierstown Bridge shall be Part M compliant making the entire route accessible to the mobility impaired, children with buggies and all type of cyclist and pedestrian traffic. • Compacted Quarry Dust surface finish proposed which provides an intermediate level of comfort.	Least Preferred
	• Average safety level as users are predominately off road but do mix with farm vehicular traffic utilising Gollierstown Bridge which is deemed to be minimal and managed through access controls and/or gates. • Additional safety features would need to be introduced and implemented through the existing Biodiversity area which includes several quarry ponds. • CCTV proposed for entire scheme.	Least Preferred

Item	Option 5 - Option Evaluation Summary Evaluation Matrix Description	Preference
	• Public Lighting is not proposed but introduction of Public Light Ducting for future use is included.	
Integration	• Good Integration with public transport (railway Station at Adamstown, Kishogue and Hazelhatch) with links to wider cycle networks along the Grand Canal (Inchicore to 12th Lock). • Provides linkages and connectivity with adjacent residents and Grange Castle Business Park's by providing cycle & pedestrian routes along the canal. • Interaction with farm vehicular traffic is envisaged. • Excellent connectivity to recreational and amenity areas along the Grand Canal including Arthurs Way.	Acceptable
Construction Impact	• Major environmental effects generated during works involving the clearing, grubbing and removal of existing densely vegetated areas and the cut and fill required to construct the project along the southern towpath section of proposed route option. • Works required to Gollierstown Bridge which is a protected structure. • Major environmental effects through Gollierstown Quarry	Least Preferred

6.6 Route Selection (Engineering) Summary

Option Evaluation Summary Matrix					
	Option 1	**Option 2**	**Option 3**	**Option 4**	**Option 5**
Technical	Most Preferred	Acceptable	Least Preferred	Acceptable	Least Preferred
Safety	Most Preferred	Acceptable	Least Preferred	Acceptable	Least Preferred
Integration	Most Preferred	Acceptable	Acceptable	Acceptable	Acceptable
Construction Impact	Preferred	Least Preferred	Least Preferred	Least Preferred	Least Preferred

Table 4 – Route Selection (Engineering) Summary

6.7 Engineering Preference Order

The following table places each route in an order of preference based on results displayed in Table 4 above.

	Most Preferred	Preferred	Acceptable	Least Acceptable	Rank	Engineering Preference
Route Options						
Option 1	3	1	-	-	1st	Most Preferred
Option 2	-	-	3	1	2nd	Acceptable
Option 3	-	-	1	3	3rd	Least Preferred
Option 4	-	-	3	1	2nd	Acceptable
Option 5	-	-	1	3	3rd	Least Preferred

Table 5 – Engineering Preference Order

7 Route Options Cost Review

7.1 Introduction

This section of the report reviews each of the identified route options from a cost perspective. Budget costs have been prepared for each route option (including services and land-take costs) and are summarised as follows;

7.2 Cost Preference Order

	Cost (€ ex VAT)	Cost Preference
Route Options		
Option 1	**€3,543,523.39**	1st
Option 2	**€4,126,750.00**	3rd
Option 3	**€4,875,105.00**	5th
Option 4	**€4,033,155.00**	2nd
Option 5	**€4,214,295.00**	4th

Table 6 – Cost Preference Order

8 Overall Emerging Preferred Route Option

8.1 Introduction

The results of the Engineering and Cost Reviews are summarised in Table 7 below.

	Engineering Preference	Budget Cost Preference
Route Options		
Option 1	Most Preferred	1st
Option 2	Acceptable	3rd
Option 3	Least Preferred	5th
Option 4	Acceptable	2nd
Option 5	Least Preferred	4th

Table 7 – Combined Engineering and Budget Cost Preferences

8.2 Overall Preference - Conclusion

Proposed Route Option No. 1 has been deemed to be emerging route for the proposed Hazelhatch to 12th Lock Grand Canal Greenway scheme. This is based on the fact that is will be constructed upon an already worn path that is utilised by the general public on a daily basis, is requires less site clearance in comparison to route option 2 to 5, it has minimal impact with regards to the environmental aspects associated with the existing Biodiveristy area, it doesn't require the refurbishment and use of the existing Gollierstown Bridge and it obtains lowest cost for the construction of its intended route. For the above reasons, Proposed Route Option 1 has been declared as the emerging route for this particular Greenway scheme.

Appendix A – Screening Statement for Appropriate Assessment

Screening Statement for Appropriate Assessment

Grand Canal Greenway

Doherty Environmental Consultants Ltd.

December 2018

Statement in Support of Screening for Appropriate Assessment

Grand Canal Greenway

12th Lock to Hazelhatch

Document Stage	Document Version	Prepared by
FINAL	1	Pat Doherty MSc, MCIEEM

This report has been prepared by Doherty Environmental Consultants Ltd. with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for Clifton Scannell Emerson Associates Consulting Engineers on behalf South Dublin County Council and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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1.0 INTRODUCTION

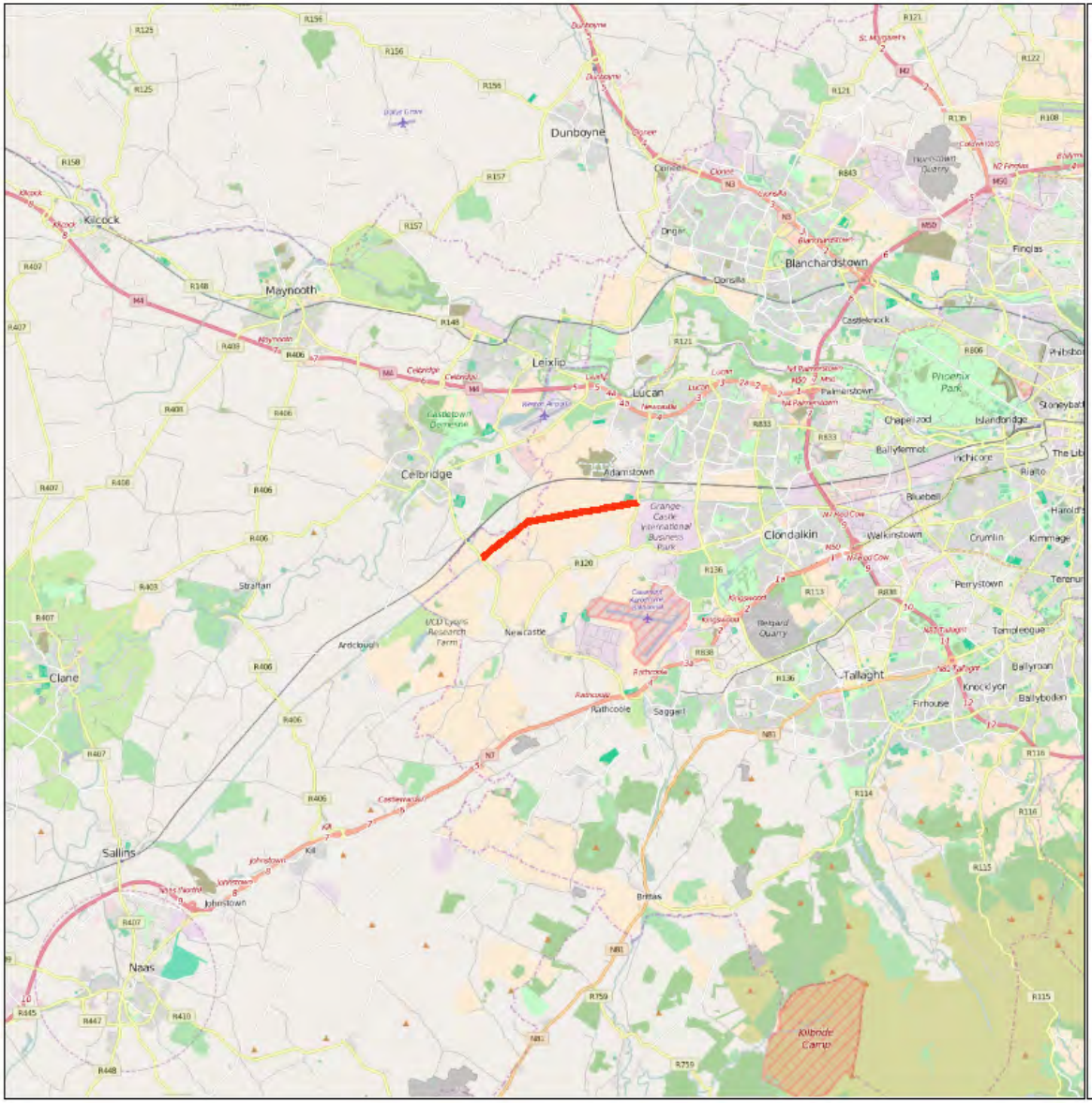
Doherty Environmental Consultants Ltd. have been commissioned by Clifton Scannell Emerson Ltd. on behalf of South Dublin County Council to undertake a Statement in support of Screening for Appropriate Assessment for the proposed Grand Canal Greenway, 12th Lock to Hazelhatch (see Figure 1.1 for location).

This statement in support of Screening for Appropriate Assessment (i.e. Screening exercise) is being undertaken in order to comply with the requirements of Article 6(3) of the Habitats Directive and Article 42 of the European Communities (Birds and Natural Habitats) Regulations. Section 42(1) of these regulations requires a Public Authority to carry out a screening for appropriate assessment of a project which it wishes to undertake. The screening for Appropriate Assessment is required to assess the project individually or in combination with another plan or project for its potential to result in a likely significant effect on a European Site(s), in view of best scientific knowledge and in view of the conservation objectives of relevant European Site(s).

The function of this Screening Exercise is to identify the potential for the project to result in likely significant effects to the Conservation Objectives of European Sites and to provide information so that the competent authority can determine whether an Appropriate Assessment is required for the project.

1.1 STAGE 1 SCREENING METHOD

The function of the Screening exercise is to identify whether or not the proposal will have the potential to result in likely significant effect on European Sites. In this context "likely" refers to the presence of doubt with regard to the absence of significant effects (ECJ case C-127/02) and "significant" means not trivial or inconsequential but an effect that has the potential to undermine the site's conservation objectives (English Nature, 1999; ECJ case C-127/02 &). In other words, any effect that compromises the conservation status of a European Sites and interferes with achieving its conservation objectives would constitute a significant effect.



Grand Canal Greenway
12th Lock to Hazelhatch

Figure 1.1

Proposed Greenway Location

Proposed Greenway

0 1 2 4 Km

N
W E
S

Drawn By	PD
Date	21/11/2018
Data Source	Bing

The nature of the likely interactions between the project and the conservation status of European Sites will depend upon the sensitivity of these sites and their reasons for designation to potential impacts arising from the project; the current conservation status of the features for which European Sites have been designated; and any likely changes to key environmental indicators (e.g. habitat structure; vegetation community) that underpin the conservation status of European Sites, in combination with other plans and projects.

This Screening exercise has been undertaken with reference to respective National and European guidance documents: Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (DEHLG 2010) and *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats directive 92/43/EEC* and relevant European and National case law. The following guidance documents were also of relevance during this Screening Assessment:

- A guide for competent authorities. Environment and Heritage Service, Sept 2002. Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (2010). DEHLG.

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats Directive 92/42/EED. European Commission (2001).

- Managing Natura 2000 Sites – The provisions of Article 6 of the Habitats directive 92/43/EEC. European commission (2000). (To be referred to as MN 2000).

The EC (2001) guidelines outline the stages involved in undertaking a Screening exercise of a project that has the potential to have likely significant effects on European Sites. The methodology adopted for this Screening exercise is informed by these guidelines and was undertaken in the following stages:

1. Describe the project and determine whether it is necessary for the conservation management of European Sites;

2. Identify European Sites that could be influenced by the project;

3. Where European Sites are identified as occurring within the sphere of influence of the project identify potential effects arising from the project and screen the potential for such effects to negatively affect European Sites identified under Point 2 above; and

4. Identify other plans or projects that, in combination with the project, have the potential to affect European Sites.

2.0 PROJECT DESCRIPTION

The proposed Grand Canal Greenway – Hazelhatch to 12th Lock will include the following features:

- 4.6km of shared walking and cycling Greenway along the existing northern Grand Canal towpath.
- Path widths will vary from 2.5m to 3.5m in width. Widths will be dictated by existing on site features.
- Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust or Asphalt Tarmac depending on local conditions for pedestrian and cyclists use.
- Provision of access controls such as pedestrian and cycle friendly gates along the route.
- Underground utilities and services including: Power ducting, telecom ducting, Public Lighting ducting & CCTV ducting.
- The use of an existing temporary construction compound used for the R120 Lucan Road Upgrade located to the north of the Grand Canal, 12th Lock.
- All associated ancillary works and integrated landscape plans for the reinstatement of temporary construction footprint.

It is noted that there is no lighting or tree removal proposed as part of this application.

The detailed approach to the works to the Greenway is presented in the following sub-sections.

2.1 METHODOLOGY FOR GREENWAY CONSTRUCTION

2.1.1 General Methodology:

As outlined in the introduction, the proposal is to locate the cycleway and footway on the existing towpath of the Grand Canal between the 12th Lock and Hazelhatch. The proposal entails the upgrading of the existing towpath, the length of which is also a National Way-marked Trail along the Grand Canal.

Surface Type

A tailored surface finish shall be employed to ensure a durable and fit for purpose trail in accordance with National Trails Office Guidance. This surface will not only improve accessibility, but provide a more robust surface that will be able to withstand increased footfall and traffic. The proposed surface type to be used on the proposed greenway will be an unbound surface of compacted quarry stone and dust.

2.1.2 Trail Surface Construction Materials

Materials for construction of the trail will be imported and stockpiled at the construction compound, located along the R120 to the north of the Grand Canal and the 12th Lock (see Figure 2.1 for location). The materials to be employed shall principally consist of:

- Geotextile ground reinforcing cloth
- Granular sub-base material (NRA clause 804)
- 6mm crushed limestone dust; and
- Topsoil / grass seed

2.1.3 Construction Methodology

The first item of works to be completed on the ground prior to the commencement of the construction works will be the setting out of the construction footprint along the proposed greenway. Along the northern canal bank the construction footprint will be limited to the width of the existing towpath from its south boundary adjacent to the bankside verge to its northern boundary which is represented variously by a grassy verge, treelines, and low to high verticle banks. Once marked out on the ground the construction corridor temporary fencing will be installed. Once fencing is in place all construction plant, machinery and personnel will be restricted from encroaching into areas along the canal beyond the temporary construction fenceline.

Once the fenceline is in place the section of the canal will be closed to the public for the duration of the construction phase.

Construction materials will be transported from stockpiled areas at the construction compound along the haul road to the northern canal bank in 6-ton dumper trucks for construction of the trail and cable ducts. A total of 2 no. dumper trucks will be required throughout the duration of the construction phase.

Excavations, using one 8-tom excavator, will be required for the provision of a cable trench that will facilitate the installation of the cabling and ducts. Excavation of the existing surface will be kept to a minimum. The maximum depth of the cable trench will be 1.25m. Excavated material will be used for the reinstatement of the trench with additional surplus material being disposed of offsite. It is estimated that approximately 7,250m^3 of surplus spoil for offsite disposal will be generated during the project.

2.1.4 Construction Methodology For Surface Types

Figure 2.1: Proposed Compacted Stone and Dust

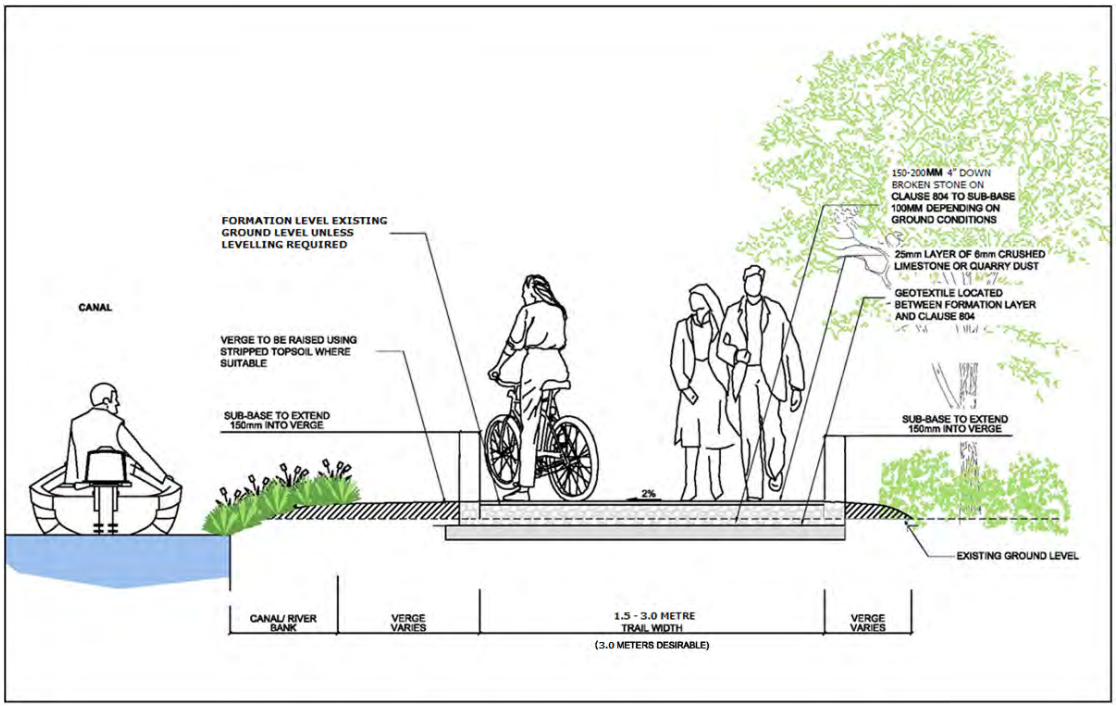


Table 2.1 Type A Compacted Stone and Dust

Compacted Stone and Dust	
LOCATIONS	MATERIAL SPECIFICATION
Along the entire stretch of the proposed greenway	Geotextile Polybrane 240 Membrane or alternative equivalent product grade Sub -Base layer 4" Down Broken Stone, then Granular sub-base, in accordance with Clause 804 of TII Specification. Surface layer 0/6mm crushed limestone or quarry dust
CONSTRUCTION SEQUENCE (Refer Figure 2.2 above) (a) Formation Tray Excavation where unavoidable (Desirable Width of 3.5m. Note width will vary from a maximum 3.5m wide and reduce to suit existing restricted access widths for example at overflow bridges) (b) Overlay to Existing Path (Desirable Path Width of 3.0m. Note width will vary from a maximum 3.0m wide and reduce to suit existing restricted access widths for example at lock houses and lock gates) Grade out irregularities to form 3.3m wide formation tray (width of formation tray to be approximately 300mm wider than the path width) to maximum depth of 100mm below ground level. (Actual depth will depend on depth of sub-base being used, which will depend on ground conditions. Where possible new construction will overlay existing). Formation tray should be rectangular in section with vertical sides and level base. Any Stripped vegetation and excavated topsoil to be stacked neatly either side of formation tray to be used for reinstatement of path shoulders.	

There would be no excavation requirements in regard to the overlay of the existing surface other than to address isolated issues with soft spots.

Geotextile Installation

Lay and secure geotextile sheet in formation tray or on top of the existing ground. Overlap joining sheets by 1.0m.

If required in soft ground - Lay and secure geogrid on top of geotextile sheet. Overlap joining sheets by 1.0m.

Sub-Base Layer

Using either a drag box or suitable excavator lay the required depth of 4" down Broken Stone upon the geotextile sheet to falls and levels, to form 1:50 (2%) camber or 1:40 (2.5%) cross-fall in maximum layer depths of 150mm – 200mm. Then 100mm Clause 804 granular sub-base. Depths of Sub-base will depend on existing ground conditions

Compact sub-base layer using a pedestrian roller taking care not to apply undue pressures to the canal bank until satisfactory compaction is achieved.

Once sub-base layer is compacted, check levels of the surface at regular intervals along the compacted sub-base layer for consistent even surface regularity. Any part of the sub-base layer deviating from the required level must be raked off or topped up with additional Clause 804 granular sub-base and re-compacted to the correct levels.

Surface Layer

Using either a drag box or suitable excavator lay 25mm depth of 6mm limestone dust to falls and levels, to form 2.5m to 3.5m wide path surface with 1:50 (2%) camber or 1:40 (2.5%) crossfall along the centre line of compacted sub-base layer.

Compact surface layer using a roller until satisfactory compaction is achieved.

Once rolling is finished, check levels of the surface at regular intervals along the compacted surface layer for consistent even surface regularity. Any part of the surface layer deviating from the required level must be raked off or topped up with additional 6mm limestone dust and re- compacted to the correct levels.

Landscaping Using available topsoil and turfs from excavations (and only if necessary, imported topsoil). Landscaped verges and edges should be finished level with path surface and taper down and away from the path surface to allow surface water to run off onto adjacent verges.

2.2 CONSTRUCTION METHODOLOGY FOR DUCTING INSTALLATION

Excavation

- Chapter 8 Approved Pedestrian barriers will be used to demark the works area and to prevent unauthorized access into the works area.
- Route of the track to be marked out.
- The excavation will commence removing the ground carefully in layers. Spoil will be loaded directly onto 6 ton dumper.
- The trench will be excavated to the required depth and width for the ducting trench.
- If required by trench depth or nature of ground, make trench safe for personnel entry by battering sides.
- Where the trench can be stepped additional trench protection will not be required.
- Where it is not practicable to batter trench sides or step, Trench protection will be used. This will be stored onsite to be used as required. This will be either trench box or sheet piles, wailers and struts dependent on the location.
- Sufficient trench protection material will be delivered to site in advance of excavation.

- Remove any groundwater from the trench using 2" sub pump if necessary and pump surface water to an onsite settlement tank. The water will then be discharged from the settlement tank over land to the north of the canal.

Duct Installation – Power Ducting

- Place lean mix bed into trench, level manually and compact with a mechanical trench compactor in line with the specification.
- Once the lean mix has been levelled place the ducts in the trench in the specified format.
- The ducts will be joined manually using the collars supplied by the ducting provider.
- Cable tie the ducts as required by the design specification.
- Manually insert the timber templates to space out the bottom row of ducts and apply the next level of lean mix over the ducts and level manually compacting in even layers using the trench compactor.
- Place the marker tape.
- Then repeat the process with another layer of ducts and template as per the design specification and compact with lean mix lean mix using a mechanical compactor.
- Apply the marker tape manually.
- Where required use shallow plating
- Backfill with leanmix stone and apply warning tape 300mm down from the surface
- All ducts must remain capped during the process until they are ready to use.
- Lubricant will be used when applying couplers.

Duct Installation – Telecom, CCTV & Public Lighting Ducting

- Place sand bed into trench, level manually and compact with a mechanical trench compactor in line with the specification.

- Once levelled place the ducts in the trench in the specified format.
- The ducts will be joined manually using the collars supplied by the ducting provider or the spigot and socket duct ends.
- Manually insert the timber templates to space out the bottom row of ducts and apply the next level of lean mix over the ducts and level manually compacting in even layers using the trench compactor.
- Place the marker tape.
- Then repeat the process with another layer of ducts and template as per the design specification and compact sand surround using a mechanical compactor.
- Apply the marker tape manually.
- Backfill with excavated material and apply warning tape 300mm down from the surface
- All ducts must remain capped during the process until they are ready to use.
- Lubricant will be used when applying couplers.

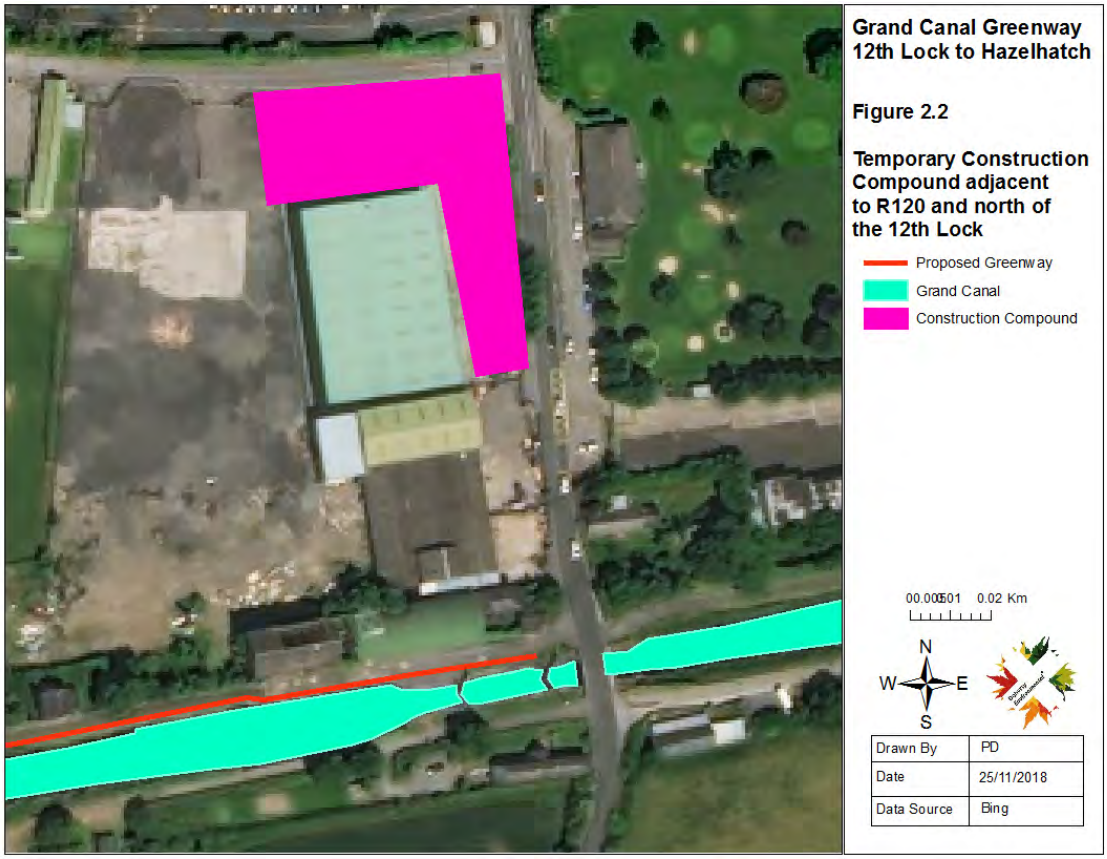
Backfilling

- Backfilling can then commence with use of the dumper directly into the trench using the required material.
- The material will then be compacted using a mechanical trench compacter in layers in line with NRA specification (Purple Book)
- Marker tape will then be used approximately 300mm from the finished surface or as per ESBN specification / design requirements.

2.3 TEMPORARY CONSTRUCTON COMPOUND

An existing temporary construction compound is located to the north of the Grand Canal at 12th lock and adjacent to the R120 (on its western side) (see Figure 2.2 for location). This temporary compound has been used for the upgrade of the R120 road.

It is proposed to retain this compound on site for use as the construction compound for the proposed greenway upgrade.



All construction materials, fuels, lubricants, plant and machinery will be stored in appropriately bunded containers and locations in this compound. All spoil material arising from the project that will be disposed of will also be stored at this compound.

2.4 OTHER MEASURES TO BE IMPLEMENTED DURING THE CONSTRUCTION PHASE

A range of other measures will be implemented during the construction phase of the greenway. These measures will form part of the approach to the construction phase and will be implemented as required during this phase of the proposed development. For the most part they are standard measures that are implemented during the construction

phase of development projects. Examples of these measures include the use of settlement tanks in the event that trench dewatering is required, the use of bunded containers for fuels, the mixing and pouring of concrete during dry weather etc. However, whilst these measures represent standard construction phase measures their primary purpose is to avoid pollution to the receiving environment. As it is not considered appropriate, at the screening stage, to take account of such measures (People Over Wind v. Coillte, 2018) they have not been relied upon during this screening for Appropriate Assessment.

A full list of these measures, the purpose of which is to avoid or reduce harmful effects to the receiving environment are outlined in associated assessments (i.e. Ecological Impact Assessment & Screening for EIAR) for the project.

3.0 DESCRIPTION OF THE PROJECT SITE

A range of ecological surveys for the section of the Grand Canal between the 12th Lock and Hazelhatch have been completed in 2015 (Roughan O'Donovan, 2016), 2016 (FERS, 2016a, 2016b) and 2018 (DEC, 2018). These surveys have mapped habitats occurring along this section of the canal and have gathered baseline information on the presence and distribution of protected species supported by this section of the canal.

The entire stretch of the north bank of the Grand Canal between the 12th Lock and Hazelhatch has been identified as an Ecologically Sensitive Area (ESA) (ROD, 2016). The ROD 2016 report describes this ESA as follows:

This ESA is identified for the diverse vegetation within the open channel and the rich diversity and zonation on the canal verge. The aquatic diversity includes Sagittaria sagittifolia swamp amongst well-developed fringe Nuphar-Potamogeton communities. The Phragmites swamp is also well developed along the canal margins between Aylmers and Golierstown Bridges.

The south canal verge is also diverse with Common Spotted Orchid (Dactylorhiza fuchsii) and many constant species of neutral and dry calcareous grassland abundant. Beyond the south canal boundary there is a mature species-rich hedgerow/woodland including Oak, Ash, Spindle, Sycamore, Willow and Beech. The scrub and woodland mosaic along the north boundary of the canal between Hazelhatch and Aylmer Bridges is also diverse.

The habitats recorded along the section of the canal between Hazelhatch and the 12th Lock are listed in Table 3.1 below along with a brief summary description.

Table 3.1: Habitats occurring along the Grand Canal pNHA between the 12th Lock and Hazelhatch

Habitat Code	Habitat Name	Summary Description	Evaluation

BL1	Stone Walls	Examples of stone wall habitat along the proposed greenway are restricted to parapet walls along Gollierstown Bridge and the stone walls associated with the 12th Lock towards the eastern end of the alignment.	Low to Moderate Value, Locally Important
BL3	Buildings and artificial surfaces	This habitat type comprises areas of existing paved or hard-core surface along the northern two-path, buildings and Gollierstown Bridge.	Low to Moderate Value, Locally Important
ED2	Spoil and bare ground	Examples of this habitat occur to the south of the canal near the 12th Lock. Areas of bare ground surround an existing shed complex at this location.	Low Value
FL8	Other artificial lakes and ponds	A number of artificial ponds occur to the west of Gollierstown Bridge on the northern and southern side of the canal. Five ponds are located to the north of the canal and the northern towpath, while three are located to the south of the canal. All ponds are likely to have arisen as a consequence of the historical quarrying activity undertaken at Gollierstown quarry.	High Value, Locally Important to Nationally Important
FS1	Reed and tall sedge swamp	This habitat fringes much of the northern and southern canal bank. This habitat is dominated by a restricted range of species and is frequently flailed, with cut debris being left in situ.	Moderate to High Value, Locally Important
FW3	Canal	The canal between the 12th Lock and Hazelhatch supports a community of	Nationally Important

		emergent aquatic vegetation that includes Charophytes, arrowhead, pondweeds, b	
GA1	Improved agricultural grassland	This habitat dominates the land cover to the north and south of the canal and pNHA boundary. It is generally intensively managed for livestock grazing.	Low Value
GA2	Amenity Grassland	Examples of this habitat occurring along the canal are restricted to the garden area of a residential dwelling towards the eastern end of the proposed greenway route.	Low Value
GS1	Dry calcareous and neutral grassland	Examples of this habitat occur in to the west and east of Gollierstown Bridge, while more discrete examples occur along the raised bank bounding the northern side of the northern towpath. Examples of this habitat are representative of the Annex 1 Habitat 6210.	High Value, Locally Important to Nationally Important
GS2	Dry meadows and grassy verges	Examples of this habitat occur along the verge of the northern towpath, particularly along the northern side of the towpath, where occasional management by mowing is undertaken.	High Value, Locally Important
TM	Towpath habitat mosaic	Towpath Mosaic is a bespoke habitat category developed by Waterways Ireland to describe the uniform habitat components that occur between open canal (FW3) and the vegetation either side of the towpath including the canal verge. This approach and habitat category is consistent with other Waterways Ireland canal surveys (see also Smith & Gittings,	Low to High Value, Locally Important

		2014). Due to the narrow bands of varying habitats along the canal bank, a towpath mosaic was used to map the transition from emergent vegetation at the edge of the canal to the semi- natural neutral/calcareous dry grassland communities found consistently throughout the canal towpath and boundary. This zonation in habitat was typically categorised as incorporating habitat types reed and large sedge swamp (FS1) to marsh (GM1) to wet grassland (GS4) and then to dry meadows and grassy verges (GS2) at the edge of the towpath. The towpath mosaic occurs over a width of approximately 2-3 m or less. Additionally, a towpath mosaic consisting of amenity grassland (GA2), spoil and bare ground (ED2), dry meadows and grassy verges (GS2) and scrub (WS1) was often a common zonation identified along the canal bank.	
WD1	Broadleaved woodland	Linear stretches of broadleaved woodland occurs along much of the northern boundary of the lands adjacent to the canal's northern boundary. Well developed examples occur towards the west of the alignment in association with areas of steep fill and also in the vicinity of Gollierstown Bridge.	High Value, Locally Important

WN5	Riparian woodland	Examples of riparian woodland, characterised by mature willows and ash occur along the banks of the canal.	High Value, Locally Important
WN6	Wet Woodland	Examples of wet woodland occur to the north of the canal in the vicinity of Hazelhatch. This woodland has developed at the base of steep embankment that formers the northern bank of the canal at this location. It is dominated by a willows and ash with some oak and alder also occurring. Beech and sycamore are also frequent in this woodland habitat.	High Value, Locally Important
WL1	Hedgerows	Hedgerows forms field boundaries along agricultural field systems to the north and south of the canal, but are restricted along the lands immediately adjacent to the canal	Low to High Value, Locally Important
WL2	Treeline	Treelines are the dominant linear woodland habitat occurring in the vicinity of the canal and they form a boundary along sections of the canal and also bound the towpath to the north.	Moderate to High Value, Locally Important
WS1	Scrub	Examples of scrub habitat occur through the lands adjacent to the canal and northern towpath.	Moderate to High Value, Locally Important

The section of the Grand Canal along the proposed greenway supports a range of flora and fauna. No protected flora has been recorded along this section of the canal.

The canal supports a population of otters, which are resident along this section of the canal. Spraints, prey remains, feeding sites, slides and couches were all recorded along this section of the canal.

A population of badgers also frequently the northern boundary of the canal and an active sett is located here.

A range of bat species rely on the canal and fringing habitats as a foraging resource. The dominant species occurring along this section of the canal are Leisler's bat, Soprano pipistrelle and Common pipistrelle. Other species occurring include Daubenton's bat, Natterer's bat, Whiskered bat, Brown long-eared bat and Nathusius pipistrelle.

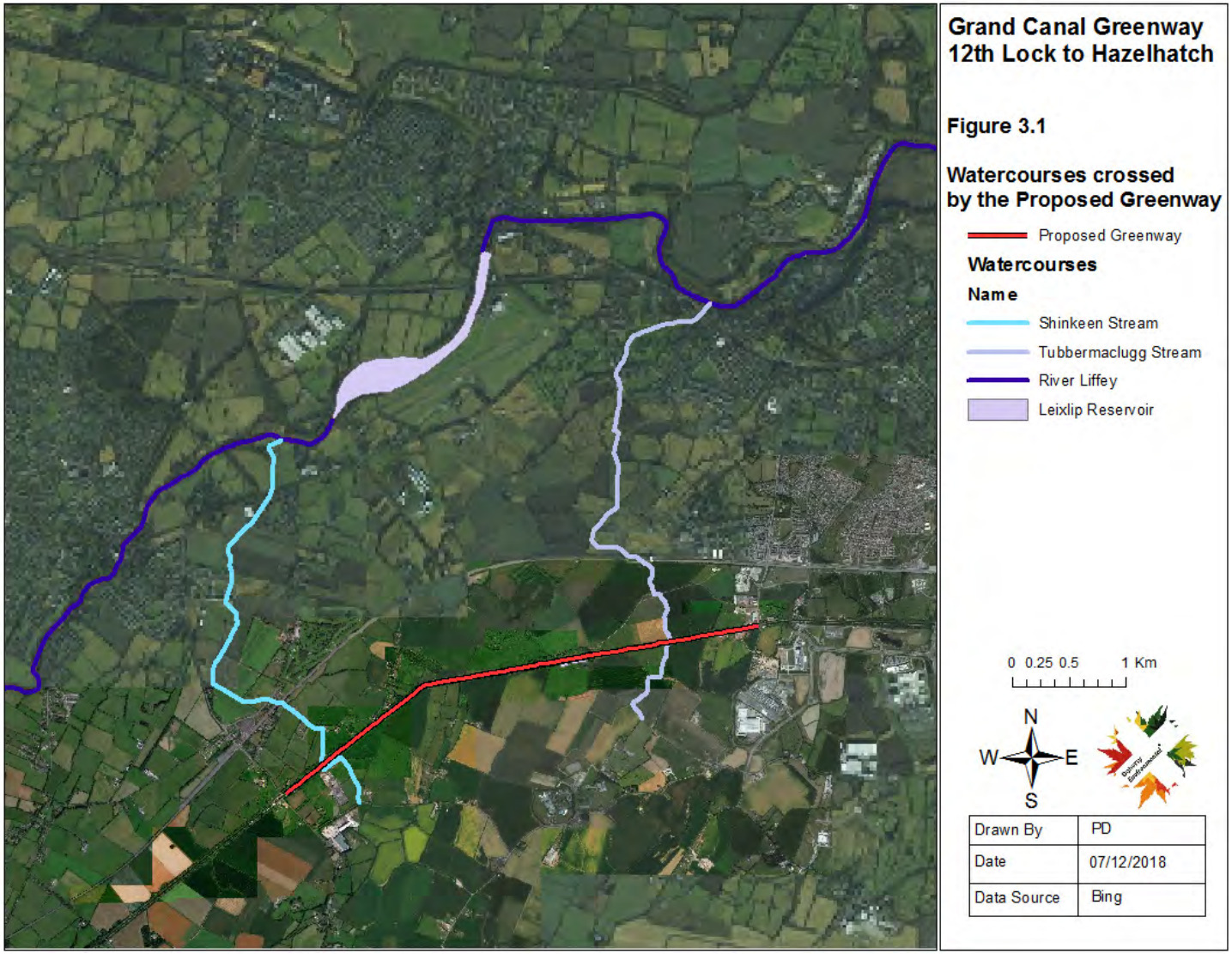
A diverse range of bird species (in excess of 20 species) were recorded along this section of the canal. Notable species observed along it include Barn Owl.

The canal supports important populations of both smooth newt and common frog.

The canal and adjacent habitats support a range of invertebrate species. An internationally important population of the Annex II listed species white-clawed crayfish are supported by the canal, while another Annex II-listed species, Vertigo moulinsiana, has been recorded to the north of the canal in the vicinity of Gollierstown Bridge. Other invertebrate species occurring include a range of odonata species (brown hawker; common hawker; variable damselfly; common blue damselfly; blue-tailed damselfly; large-red damselfly; common darter) and lepidoptera species (oblique carpet; speckled wood; large white; green-veined white; small white; common blue; small tortoiseshell; meadow brown and painted lady). A population of the anthill building species yellow meadow-ant occurs in calcareous grassland habitat to the west of Gollierstown Bridge.

The main species found within the Grand Canal are: Roach (*Rutilus rutilus*), Perch (*Perca fluviatilis*); Pike (*Esox lucius*); Tench (*Tinca tinca*); European Eel (*Anguilla anguilla*); Bream (*Abramis brama*); Rudd (*Scardinius erythrophthalmus*). Roach are the dominant species detected within the Grand Canal in terms of biomass and abundance. The Annex II listed River Lamprey (*Lampetra fluviatilis*) have been recorded at two locations on the Grand Canal, at the 11th Lock and 6th Lock.

The canal crosses two watercourses, the Tubbermaclugg Stream and the Shinkeen Stream that form part of the River Liffey Catchment. These are minor eroding watercourses that rise a short distance to the south of the canal aqueduct crossings. The location of these streams with respect to the canal and the River Liffey are shown on Figure 3.1 below.


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.1
Watercourses crossed by the Proposed Greenway
Proposed Greenway
Watercourses
Name
Shinkeen Stream
Tubbermaclugg Stream
River Liffey
Leixlip Reservoir
0 0.25 0.5 1 Km
N
W
E
S
Drawn By PD
Date 07/12/2018
Data Source Bing

4.0 EUROPEAN SITES OCCURRING WITHIN THE ZONE OF INFLUENCE OF THE PROJECT

Current guidance recommends that all European Sites occurring within 15km of project sites should be identified at the outset of an impact assessment process. A total of five European Sites have been identified in the surrounding 15km area. Table 4.1 lists these European Sites and the spatial relationship between each of these sites and the project site is shown on Figure 4.1 and Figure 4.2.

In addition to the European Sites occurring within a 15km area of the project site the DEHLG 2010 guidelines on Appropriate Assessment of Plans and Projects in Ireland also advise that where the potential exists for a hydrological pathway to occur between the project site and European Sites beyond the 15km distance, then these sites should also be included as part of the Screening Assessment. As such the European Sites hydrologically linked to the study area are also included. The River Liffey estuary, to which the Grand Canal drains, discharges to Dublin Bay, where a number of European Sites are located. A total of four European Sites are located at Dublin Bay. These European Sites are shown in Figure 4.3 and are also listed in Table 4.1.

The qualifying features of interest of the SACs and the special conservation interests of the SPAs listed in Table 4.1 below are provided in Appendix 1.

The next step of this Screening exercise is to identify which, if any of these sites, occur within the zone of influence of the proposed greenway. As the nearest European Site (Rye Water Valley SAC) is located at a remote distance (approximately 4km) from the project site, the project will not have the potential to result in direct impacts to European Sites. Thus this Screening exercise focuses on investigating whether the proposed greenway will have the potential to result in indirect effects to European Sites or affect mobile species associated with European Sites beyond the boundaries of their designated conservation areas.

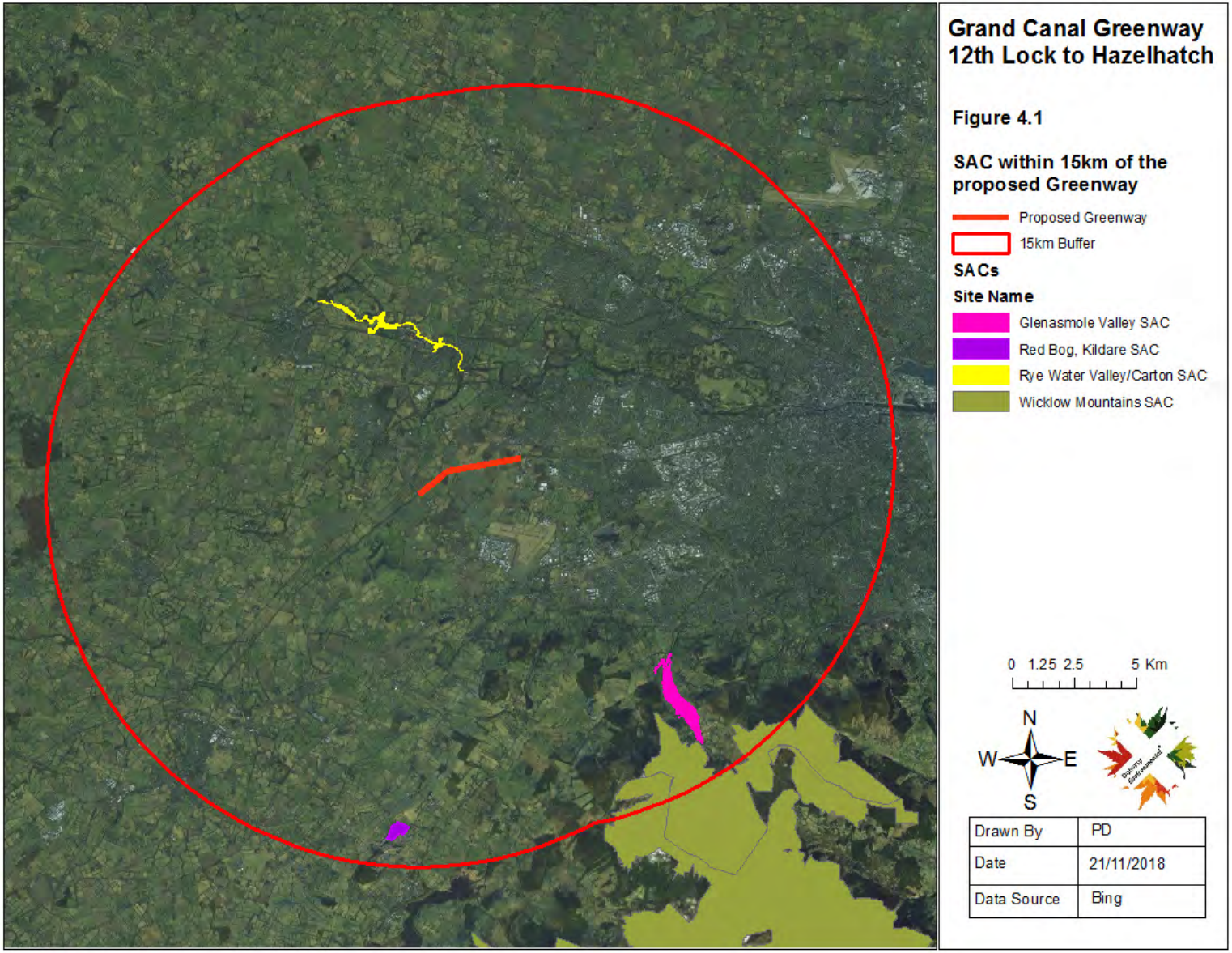
A source-pathway-receptor model has been used to establish which European Sites could occur within the zone of influence of potential indirect impacts. Under such a model the project, as described above, represents the source.

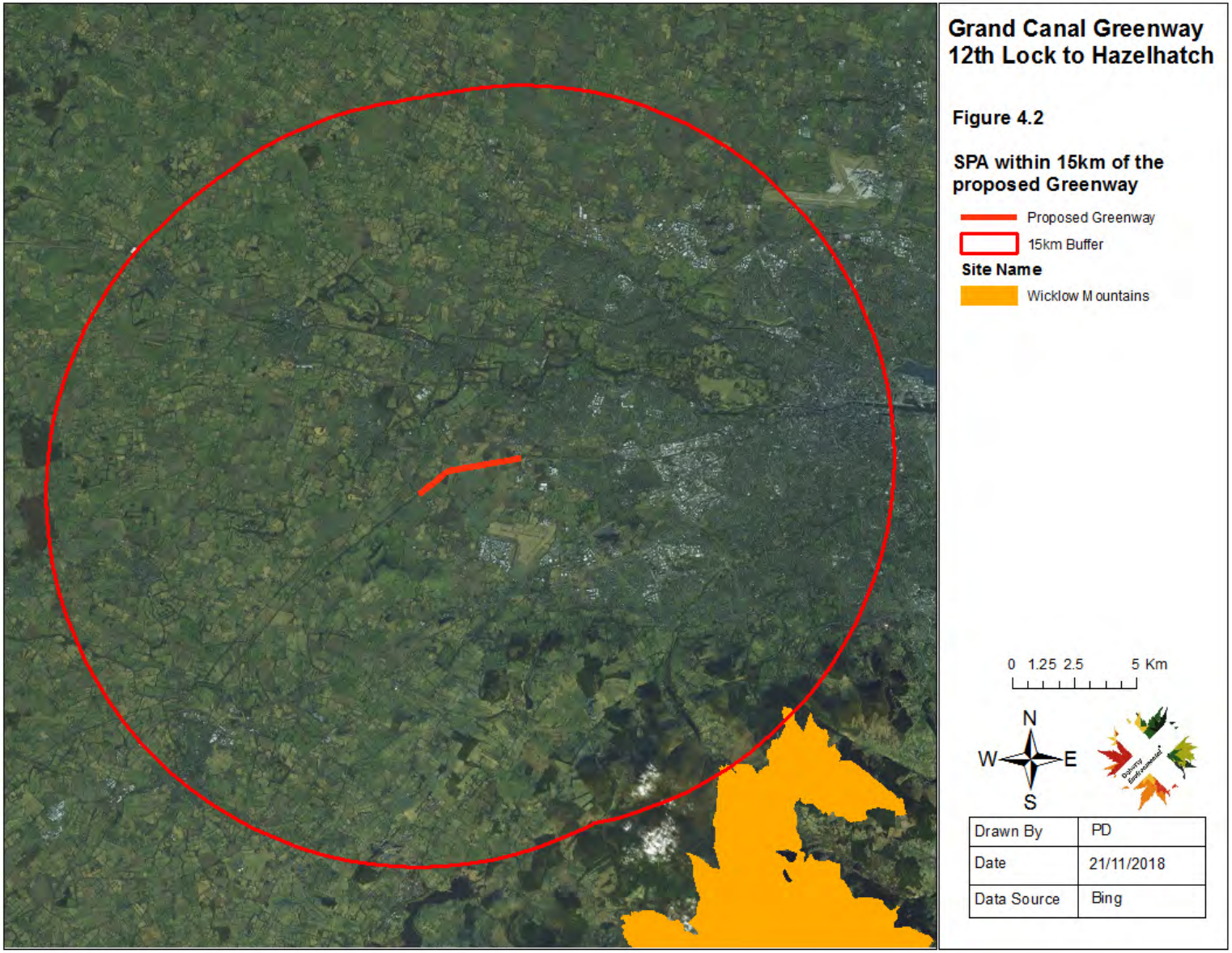
Potential impact pathways are restricted to hydrological pathways as aquaeous emissions to surface water and the canal represent the only potential emission to be generated during the project. Any European Sites occurring downstream of, or otherwise linked to the proposed greenway via hydrological pathways are considered to occur within the zone of influence of the project. The potential for qualifying species of surrounding European Sites to interact with the study area is also included as a potential impact pathway.

The receptors represent European Sites and their associated qualifying features of interest. All qualifying features of interest and special conservation interests as listed in Appendix 1 have been considered during the identification of European Sites occurring within the zone of influence of the project.

European Sites and their associated qualifying features are likely to occur in the zone of influence of the project only where the above pathways establish a link between the study area and European Sites or where the project site is likely to play an important role in supporting populations of mobile species that are listed as special conservation interests/qualifying species for surrounding European Sites. Table 4.1 provides a determination as to whether each European Site within a 15km buffer distance of the project site occur within the zone of influence of the project. This determination has been undertaken in line with the following assessment questions:

- Is there a hydrological pathway linking the Project site to European Sites and does this pathway have the potential to function as an impact pathway?
- Are qualifying habitats of these European Sites at risk of experiencing impacts as a result of the project?
- Does the project site have the potential to interact with or support Annex II qualifying species/special conservation interest species of these European Sites?


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.1
SAC within 15km of the proposed Greenway
Proposed Greenway
15km Buffer
SACs
Site Name
Glenasmole Valley SAC
Red Bog, Kildare SAC
Rye Water Valley/Carton SAC
Wicklow Mountains SAC
0 1.25 2.5 5 Km
N
W
E
S
Drawn By PD
Date 21/11/2018
Data Source Bing


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.2
SPA within 15km of the proposed Greenway
Proposed Greenway
15km Buffer
Site Name
Wicklow Mountains
0 1.25 2.5 5 Km
N
W
E
S
Drawn By PD
Date 21/11/2018
Data Source Bing

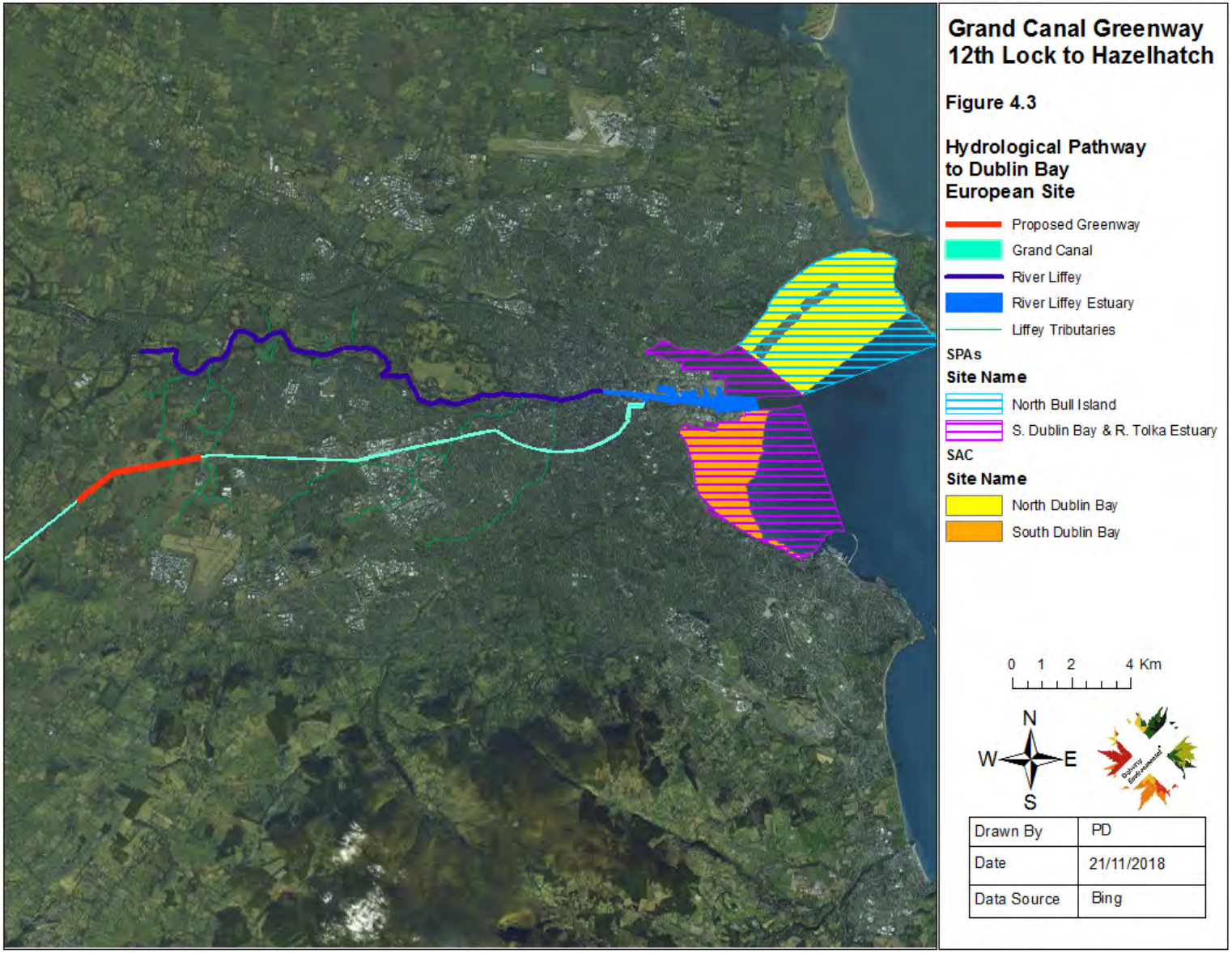

Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.3
Hydrological Pathway
to Dublin Bay
European Site
Proposed Greenway
Grand Canal
River Liffey
River Liffey Estuary
Liffey Tributaries
SPAs
Site Name
North Bull Island
S. Dublin Bay & R. Tolka Estuary
SAC
Site Name
North Dublin Bay
South Dublin Bay
0 1 2 4 Km
N
W
E
S
Drawn By PD
Date 21/11/2018
Data Source Bing

Table 4.1: Identification of European Sites occurring within the Zone of influence of the Project

European Sites	**Distance from Project Site**	**Is there a Hydrological Pathway and does it have the potential to function as an Impact Pathway**	**Do the Project have the potential to interact with Mobile Species**	**Do European Sites occur within the Projects Zone of Influence?**
Rye Water Valley SAC. Site Code: 001398	4km to the north	No. This SAC is located within a separate surface water catchment to the project.	No. No mobile species are listed as qualifying features of interest for this SAC (see Appendix 1 for a full list of qualifying features of interest for this SAC).	No. No impact pathways link the Project site to this SAC.
Glenasmole Valley SAC Site Code: 001209	9.5km to the southeast	No. This SAC is designated for the presence of the Annex 1 habitats grassland habitats and petrifying spring. The grassland habitats do not rely on lotic processes while the spring relies on soligenous hydrological processes. Furthermore this SAC is located within a separate surface water catchment to the proposed Project site.	No. No Annex 2 species are listed as qualifying features of interest for this SAC.	No. No impact pathways link the Project site to this SAC.

Wicklow Mountains SAC Site Code: 002122	10.9km to the southeast	No. This SAC is designated for the presence of the Annex 1 upland peatland and grassland habitats. Furthermore this SAC is located within a separate surface water catchment to the project.	No. Otters are listed as an Annex II qualifying species of this SAC. The surface water catchment supporting this otter population is located within a separate surface water catchment to the project site. While it is known that otters can roam widely, up to 20km along watercourses from their home range and can also move between catchments the conservation status of the population supported by this SAC is not predicted to rely on the Liffey catchment. This prediction is based on the distance between the project site and the nearest point of this SAC, which is approximately 12.5km over largely urban land cover and the territorial behaviour of otters. .	No. This SAC is located at a significant distance from the project site and there are no surface water connections linking the canal to this SAC. While otters are known to roam large distances overland, the distance between this SAC and the canal, which is approximately 12.5km across urban land cover at its nearest point makes it extremely unlikely that any individuals supported by this SAC will rely on the Grand Canal.
Red Bog SAC. Site Code: 000397	12.9km to the south	No. This SAC is designated for Annex 1 peatland habitats, namely transition mires and quaking bogs.	No. No Annex 2 species are listed as qualifying features of interest for this SAC.	No. No potential impact pathways link the project site to this SAC.

		These Annex 1 habitats are ombrotrophic in nature and there is no hydrological pathway linking these habitats or this SAC to the project site.		
Wicklow Mountain SPA. Site Code: 004040	10.9km to the south	No. This is an upland SPA designated for its role in supporting merlin and Peregrine falcon. There is no hydrological pathway linking the project site to this SAC.	No. The study area is not predicted to play an important role in terms of the provision of roosting, nesting or foraging habitat for either merlin or Peregrine falcon.	No. No potential impact pathways link the project site to this SPA.
South Dublin Bay SAC Site Code: 000210	20km downstream and 17km to the east	No. Modelling of the Liffey Estuary and Dublin Bay has shown that the waters from the Liffey draining into Dublin Bay are deflected east and north towards Dollymount and Howth. The presence of the South Great Wall in Dublin Bay provides a barrier to the movement of waters towards the south (Dowly & Bedri, 2007; Bedri et al., 2012; Camp, Dresser & McKee, 2012). As such there is no effective hydrological pathway between the project site and this SAC.	No. No Annex 2 species are listed as qualifying features of interest for this SAC.	No. For the reasons outlined in column 2 no potential impact pathways links the project site to this SAC.

North Dublin Bay SAC Site Code: 000206	22km downstream and to the east	Yes, surface waters draining from the Grand Canal and the Liffey catchment drain to Dublin Bay and are dispersed over this SAC. As such there is a hydrological connection between the project site and this SAC.	No. This SAC supports a population of the liverwort *Petalophyllum ralfsii*. This is a sedentary species, reliant on terrestrial dune slack habitats occurring on Bull Island and there is no potential for the project to interact with this species.	Yes. The potential for the hydrological pathway, linking the project site to this SAC, to function as an impact pathway requires further examination to establish whether or not the project could result in downstream effects to this SAC.
North Bull Island SPA Site Code: 004006	22km downstream and to the east	Yes, surface waters draining from the Grand Canal and the Liffey catchment drain to Dublin Bay and are dispersed over this SPA. As such there is a hydrological connection between the project site and this SPA.	No. This SPA is designated for its role in supporting a number of wetland bird species. Individuals associated with the SPA populations of these species are very unlikely to occur in the vicinity of the project site and there is no potential impact pathway (hydrological or aerial) linking the project site to the foraging and roosting ground upon which these species rely. Furthermore previous surveys in the vicinty of the project site have not record any evidence to suggest that special conservation interest bird species of this SPA relying on the project site.	Yes. The potential for the hydrological pathway, linking the project site to this SPA, to function as an impact pathway requires further examination to establish whether or not the project could result in downstream effects to this SPA.

South Dublin Bay & Tolka Estuary SPA Site Code: 004024	20km downstream and to the east	Yes, surface waters draining from the Grand Canal and the Liffey catchment drain to Dublin Bay and are dispersed over this SPA. As such there is a hydrological connection between the project site and this SPA.	No. This SPA is designated for its role in supporting a number of wetland bird species, including breeding terns. Individuals associated with the SPA populations of these species are very unlikely to occur in the vicinity of the project site and there is no potential impact pathway linking the project site to the foraging, nesting and roosting grounds upon which these species rely. Furthermore surveys in the vicinty of the project site have not record any evidence to suggest that special conservation interest bird species of this SPA relying on the project site.	Yes. The potential for the hydrological pathway, linking the project site to this SPA, to function as an impact pathway requires further examination to establish whether or not the project could result in downstream effects to this SPA.

Table 4.1 above outlines the relationship between the project site and the European Sites occurring within the surrounding 15km buffer area and downstream at Dublin Bay. Of the five European Sites occurring within a 15km radius of the Project site, none have been identified as occurring within the zone of influence of the project site.

Of the four European Sites occurring downstream at Dublin Bay, three have been identified as occurring within the zone of influence of the project site.

The remainder of this Screening aims to identify whether the project will have the potential to result in likely significant effects to the following European Site:

1. South Dublin Bay River Tolka Estuary SPA;
2. North Dublin Bay SAC; and
3. North Bull Island SPA.

4.1 EUROPEAN SITES OCCURRING WITHIN THE ZONE OF INFLUENCE OF THE VARIATON

The following sub-sections provide an overview of the three European Sites occurring within the zone of influence of the project.

4.1.1 North Dublin Bay

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. Qualifying features for which this site has been designated as a SAC are listed in Table 4.2 below. The distribution of the habitats associated with this SAC are outlined in the Conservation Objectives for this SAC (see NPWS, 2013).

The threats and pressures to this SAC have been documented in the Standard Natura 2000 Data Form for the site (NPWS, 2017). The documented threats and pressures to this SAC are as follows:

- Urbanised areas, human habitation
- Walking, horseriding and non-motorised vehicles
- Golf course
- Industrial or commercial areas
- Discharges

Table 4.2 lists each of the qualifying features of interest for this SAC and their conservation status.

Table 4.2: North Dublin Bay SAC qualifying features of interest and conservation status

Qualifying Annex Feature	Conservation Status (Site-Level)	Conservation Status (National-Level)
Mudflats and sandflats not covered by seawater at low tide	Favourable	Poor
Annual vegetation of drift lines	Not established	Poor
Salicornia and other annuals colonizing mud and sand	Unfavourable	Poor
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Favourable	Poor
Petalwort (Petalophyllum ralfsii)	Not established	Good
Mediterranean salt meadows (Juncetalia maritimi)	Favourable	Poor

Embryonic shifting dunes Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	Unfavourable-inadeqaute	Poor
Fixed coastal dunes with herbaceous vegetation (grey dunes)	Unfavourable-Bad	Bad
Humid dune slacks	Unfavourable-inadeqaute	Bad

4.1.2 North Bull Island SPA

This site covers all of the inner part of north Dublin Bay, with the seaward boundary extending from the Bull Wall lighthouse across to Drumleck Point at Howth Head. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Light-bellied Brent Goose, Shelduck, Teal, Pintail, Shoveler, Oystercatcher, Ringed Plover, Golden Plover, Grey Plover, Knot, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Turnstone and Black-headed Gull. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The qualifying features for which this site has been designated as a SPA are listed in Table 4.3 below. The threats and pressures to this SAC have been documented in the Standard Natura 2000 Data Form for the site (NPWS, 2017a). The documented threats and pressures to this SPA are as follows:

- Disposal of household / recreational facility waste
- Golf Course
- Industrial or commercial areas

- Walking, horseriding and non-motorised vehicles
- Bridge, viaduct
- Roads, motorways
- Discharges

Table 4.3 lists each of the qualifying features of interest for this SAC and their conservation status.

Table 4.3: North Bull Island SPA qualifying features of interest and conservation status

SCIs	Conservation Status
Light-bellied Brent Goose (*Branta bernicla hrota*)	Amber listed species- Species of medium conservation concern
Shelduck (*Tadorna tadorna*)	Amber listed species- Species of medium conservation concern
Teal (*Anas crecca*)	Amber listed species- Species of medium conservation concern
Pintail (*Anas acuta*)	Red listed species – Species of high conservation concern†
Shoveler (*Anas clypeata*)	Red listed species – Species of high conservation concern†
Oystercatcher (*Haematopus ostralegus*)	Amber listed species- Species of medium conservation concern

Golden Plover (*Pluvialis apricaria*)	Red listed species – Species of high conservation concern
Grey Plover (*Pluvialis squatarola*)	Amber listed species- Species of medium conservation concern
Knot (*Calidris canutus*)	Red listed species – Species of high conservation concern†
Sanderling (*Calidris alba)*	Green listed species – Species not threatened
Dunlin (*Calidris alpina*)	Amber listed species- Species of medium conservation concern
Black-tailed Godwit (*Limosa limosa*)	Amber listed species- Species of medium conservation concern
Bar-tailed Godwit (*Limosa lapponica*)	Amber listed species- Species of medium conservation concern
Curlew (*Numenius arquata*)	Red listed species – Species of high conservation concern
Redshank (*Tringa totanus*)	Red listed species – Species of high conservation concern
Turnstone (*Arenaria interpres*)	Green listed species – Species not threatened
Black-headed Gull (*Larus ridibundus*)	Red listed species – Species of high conservation concern

Wetlands & Waterbirds	

4.1.3 South Dublin Bay River Tolka Estuary SPA

The South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay. It includes the intertidal area between the River Liffey and Dun Laoghaire, and the estuary of the River Tolka to the north of the River Liffey, as well as Booterstown Marsh. A portion of the shallow marine waters of the bay is also included.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species over-wintering species: Light-bellied Brent Goose, Oystercatcher, Ringed Plover, Grey Plover, Knot, Sanderling, Dunlin, Bar-tailed Godwit, Curlew, Redshank, and Black-headed Gull. This SPA is also designated for its role in supporting breeding colonies of the following species: Roseate Tern, Common Tern and Artic Tern. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The qualifying features for which this site has been designated as a SPA are listed in Table 4.4 below. The threats and pressures to this SAC have been documented in the Standard Natura 2000 Data Form for the site (NPWS, 2017b). The documented threats and pressures to this SPA are as follows:

- Walking, horseriding and non-motorised vehicles
- Reclamation of land from sea, estuary or marsh
- Discharges
- Roads, motorways
- Industrial or commercial areas

Table 4.4 lists each of the qualifying features of interest for this SAC and their conservation status

Table 4.4: South Dublin Bay River Tolka Estuary SPA qualifying features of interest, and conservation status

SCIs	Conservation Status
Light-bellied Brent Goose (*Branta bernicla hrota*)	Amber listed species- Species of medium conservation concern
Oystercatcher (*Haematopus ostralegus*)	Amber listed species- Species of medium conservation concern
Ringed Plover (*Charadrius hiaticula*)	Amber listed species- Species of medium conservation concern
Grey Plover (*Pluvialis squatarola*)	Amber listed species- Species of medium conservation concern
Knot (*Calidris canutus*)	Red listed species – Species of high conservation concern†
Sanderling (*Calidris alba*)	Green listed species – Species not threatened
Dunlin (*Calidris alpina*)	Amber listed species- Species of medium conservation concern
Bar-tailed Godwit (*Limosa lapponica*)	Amber listed species- Species of medium conservation concern
Redshank (*Tringa totanus*)	Red listed species – Species of high conservation concern

Black-headed Gull (*Croicocephalus ridibundus*)	Red listed species – Species of high conservation concern
Roseate Tern (*Sterna dougallii*)	Green listed species – Species not threatened
Common Tern (*Sterna hirundo*)	Amber listed species- Species of medium conservation concern
Arctic Tern (*Sterna paradisaea*)	Amber listed species- Species of medium conservation concern
Wetlands & Waterbirds	

4.2 QUALIFYING FEATURES OF INTEREST/SPECIAL CONSERVATION INTERESTS OCCURRING WITHIN THE ZONE OF INFLUENCE OF THE PROJECT

Table 4.5 below lists the qualifying features of interest/special conservation interests of the three European Sites occurring within the zone of influence of the Project site and identifies the interest features that occur within the zone of influence of the proposed rezoning.

Table 4.5: Qualifying Features of Interest/Special Conservation Interests Occurring Within the Zone Of Influence of the Project site

European Site	Qualifying Interest	Does the qualifying feature of interest/special conservation interest occur within the Sphere of Influence of the Project
North Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide	Yes. Hydrological pathways in the form of surface water discharges to the Grand Canal and the Liffey catchment will have the potential to link the project to this qualifying habitat.

	Annual vegetation of drift lines	No. This habitat is not influenced by surface waters and lotic processes.
	Salicornia and other annuals colonizing mud and sand	Yes. Hydrological pathways in the form of surface water discharges to the Grand Canal and the Liffey catchment will have the potential to link the project to this qualifying habitat.
	Spartina swards (Spartinion maritimae)	Yes. Hydrological pathways in the form of surface water discharges to the Grand Canal and the Liffey catchment will have the potential to link the project to this qualifying habitat.
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Yes. Hydrological pathways in the form of surface water discharges to the Grand Canal and the Liffey catchment will have the potential to link the project to this qualifying habitat.
	Petalwort (Petalophyllum ralfsii)	No. This species is reliant on humid dune slacks occurring within the terrestrial environment. This dune slacks will not be influenced by hydrological emissions.
	Mediterranean salt meadows (Juncetalia maritimi)	No. Examples of this habitat are restricted to the northwestern end of Bull Island and are considered to lie outside the influence of the hydrological pathway established by the Grand Canal and the River Liffey Estuary.

	Embryonic shifting dunes Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	No. This is a terrestrial habitat that will not be influence by hydrological emissions.
	Fixed coastal dunes with herbaceous vegetation (grey dunes)	No. This is a terrestrial habitat that will not be influence by hydrological emissions.
	Humid dune slacks	No. This is a terrestrial habitat that will not be influence by hydrological emissions.
North Dublin Bay SPA	Light-bellied Brent Goose (*Branta bernicla hrota*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Shelduck (*Tadorna tadorna*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Teal (*Anas crecca*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.

	Pintail (*Anas acuta*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Shoveler (*Anas clypeata*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Oystercatcher (*Haematopus ostralegus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Golden Plover (*Pluvialis apricaria*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Grey Plover (*Pluvialis squatarola*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Knot (*Calidris canutus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Sanderling (*Calidris alba)*	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.

	Dunlin (*Calidris alpina*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Black-tailed Godwit (*Limosa limosa*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Bar-tailed Godwit (*Limosa lapponica*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Curlew (*Numenius arquata*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Redshank (*Tringa totanus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Turnstone (*Arenaria interpres*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Black-headed Gull (*Larus ridibundus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.

	Wetlands & Waterbirds	Yes. Hydrological pathways in the form of surface water and wastewater discharges will have the potential to link the project to littoral wetland habitat.
South Dublin Bay River Tolka Estuary SPA	Light-bellied Brent Goose (*Branta bernicla hrota*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Oystercatcher (*Haematopus ostralegus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Ringed Plover (*Charadrius hiaticula*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Grey Plover (*Pluvialis squatarola*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Knot (*Calidris canutus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Sanderling (*Calidris alba*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.

	Dunlin (*Calidris alpina*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Bar-tailed Godwit (*Limosa lapponica*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Redshank (*Tringa totanus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Black-headed Gull (*Croicocephalus ridibundus*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Roseate Tern (*Sterna dougallii*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Common Tern (*Sterna hirundo*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.
	Arctic Tern (*Sterna paradisaea*)	Yes. This species relies on mudflats and other littoral qualifying habitats/wetland habitats that are linked to potential hydrological emissions from the Project site.

	Wetlands & Waterbirds	Yes. Hydrological pathways in the form of surface water discharges will have the potential to link the project to littoral wetland habitat.

Following on from Table 4.5 above, Table 4.6 provides a summary of the qualifying features of interest occurring within the zone of influence of the proposed Project site. The qualifying features of interest are grouped into broader groups that will be referred to in the assessment sections below.

Table 4.6: Summary of qualifying features of interest/special conservation interests occurring within the Zone Of Influence of the Project

Qualifying feature Group	Qualifying feature of interest	Associated European Site
Coastal/Littoral Habitats	Mudflats and sandflats not covered by seawater at low tide	North Bull Island SAC
	Salicornia and other annuals colonising mud and sand	North Bull Island SAC
	Spartina swards (Spartinion maritimae)	North Bull Island SAC
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	North Bull Island SAC
Coastal/Littoral Bird Species	Special conservation interests wetland bird species	South Dublin Bay River Tolka Estuary SPA & North Dublin Bay SPA

5.0 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS TO FEATURES OF INTEREST WITHIN THE ZONE OF INFLUENCE OF THE PROJECT

The consideration of likely significant effects to European Sites as a result of the project relates to an examination of the project's potential to result in contamination to local surface waters with consequent adverse effects downstream at Dublin Bay. The local surface water that will receive contaminated surface water in the event of a release of pollutants to the aquatic environment are the Grand Canal and the watercourses flowing under the proposed greenway, such as the Tubbermaclug and Shinkeen Streams, which form part of the Liffey catchment (see Figure 3.1 for location of these watercourses). Whether the project will have the potential to result in adverse effects to the European Sites at Dublin Bay downstream of these receiving watercourses is dependent on the capacity of the hydrological pathway between the project site and Dublin Bay to function as an effective impact pathway. An assessment of the hydrological pathway and its potential to function as an impact pathway is provided in the following sub-section.

5.1 ASSESSMENT OF THE HYDROLOGICAL PATHWAY

The nearest point of the three Dublin Bay European Sites to the project site is approximately 20km downstream along the Grand Canal and the Liffey Estuary (see Figure 4.3 for an overview of the hydrological pathway). The Grand Canal and the associated minor watercourses draining lands in the vicinity of the project site represent a minor fraction of the overall volume of freshwater draining into the Liffey estuary and Dublin Bay. This coupled with the low quantities of potential polluting materials to be stored on site will eliminate the potential for the project, even in the event of the release of contaminated surface water to local receiving waters, from having an effect on the conservation status of European Sites downstream at Dublin Bay.

Further details on the reasons supporting this evaluation of the hydrological pathway's potential to function as an impact pathway are as follows:

- The quantities of potentially polluting materials that will be used in the vicinity of the Grand Canal throughout the construction phase will be small and their ingress to the Grand Canal, the Tubbermaclugg Stream or Shinkeen Stream draining lands adjacent to the project site, will become quickly diluted downstream. The bulk of all material

required for the construction phase will be stored at the proposed construction compound which will be located over 70m from the nearest point of the Grand Canal and is not located in the vicinity of any drainage ditch. This is an existing compound, that has been utilised, without incident, for the upgrade of the R120. The location of the compound away from receiving watercourses will significantly minimise the risk of contaminated surface water being released from the project site to the Grand Canal or associated watercourses during construction works.

- The volumes of surface water draining the project site represents a miniscule fraction of the volumes discharging to the Liffey Estuary upstream of the Dublin Bay European Sites. In the unlikely event that contaminated waters enter the Grand Canal (which is the most likely receiving water as the project site runs parallel to it) it is highly likely based on the above that any associated pollutants will be adequately diluted within the canal waters.

- In addition the Grand Canal waters represent a minor fraction of freshwater inputs to the Liffey estuary. For instance in a recent hydrodynamic model for Dublin Bay the medium flow rates of $15m^3/s$ was calculated for the River Liffey versus an estimated flow rate of $0.1m^3/s$ for the Grand Canal (DHI, 2018). It is noted that there are multiple other sources of freshwater (11 in total, some of which include the River Dodder, Royal Canal, River Cammock etc.) entering the Liffey Estuary. These other sources combine with the River Liffey discharges to further dilute freshwater discharging from the Grand Canal. In light of this any discharges to the River Liffey Estuary from the project site, via the Grand Canal will be thoroughly mixed and imperceptible downstream at Dublin Bay.

- Finally other studies have shown that pollutants in the estuary are rapidly mixed and become diluted within the estuary and Dublin Bay (O'Higgins and Wilson, 2005; Wilson and Jackson, 2011) again indicating that any potential for the release of contaminants to the Grand Canal or other watercourses draining lands adjacent to the canal during the project will not have the potential to result in any perceptible effect to water quality downstream at Dublin Bay.

5.2 ASSESSMENT OF PROJECT ELEMENTS

The elements of the project that require to be considered for their potential to result in the emission of pollutants to receiving waters are listed in Table 5.1 and an assessment of the potential effects these elements will have to water quality locally and downstream at Dublin Bay is also provided. This assessment is underpinned by the assessment of the hydrological pathway provided in Section 5.1 above.

Table 5.1: Assessment of Elements of the Project that could result in the Release of Contaminant to Receiving Waters

Element	Assessment
Mobilisation of sediment during construction of the trail surface and the excavation of the cable trench; Dewatering of excavation trenches.	For the reasons outlined in Section 5.1 this will not have the potential to result in water quality effects downstream at Dublin Bay. Furthermore it is noted that the Grand Canal is subject to low flow rates that are artificially controlled and is representative of a depositing waterbody. Any sediment discharging to this waterbody will settle within the canal rather that being transported downstream.
Potential emission of cementitious materials to receiving waters during the laying of cabling and the backfilling of the cable trench;	The risk of cementitious materials entering the Grand Canal, the Tubbermaclugg Stream, or Shinkeen Stream flowing under the Grand Canal, during construction works will be low. This is due to the lean, dry mix concrete that will be required for the laying of the cable duct. This is a lean mix with high viscosity and is not prone to significant spill events. For the reasons outlined in Section 5.1 this will not have the potential to result in water quality effects downstream at Dublin Bay. Furthermore it is noted that the Grand Canal is subject to low flow rates that are artificially controlled. Any cementitous materials discharging

	to this waterbody will settle within the canal rather that being transported downstream.
Potential emission of hydrocarbons during refuelling;	The risk of hydrocarbons being released to the Grand Canal or the Tubbermaclugg or Shinkeen Streams during the construction phase will be low due to the storage of all hydrocarbon materials within the construction compound located at an area set back from the Grand Canal and any surrounding watercourses or drainage ditches. Minor refuelling of plant will be undertaken along the canal. The risk of a significant spill of hydrocarbons during refuelling will be low as only minor quantities will be conveyed to plant along the construction corridor at one time.
Potential spillage of spoil and construction material such as lean mix cement during the transport of such materials along the canal haul route; and	In the event of such spills, spoil and cementitious material will settle in the slow flowing canal and should they be released to the Liffey catchment they will become thoroughly dispersed to the extent that they will not be perceptible downstream at Dublin Bay. For the reasons outlined in Section 5.1 this element of the project will not have the potential to result in water quality effects downstream at Dublin Bay.
Potential mobilisation of sediment to the receiving watercourses during the operation phase	The quarry dust trail surface is a compacted surface that is not freely mobilised in surface water runoff. Thus the nature of the proposed trail surface finish will ensure that the trail surface during the operation phase of the project does not present an ongoing source of sediment runoff to the canal or other minor watercourses of the Liffey catchment flowing under the canal. As such there will be no potential for the operation phase of the project to result in potential impacts to water quality at the local level or further afield downstream at Dublin Bay.

5.3 IN-COMBINATION EFFECTS

It is possible that the construction phase of the project will overlap with other development projects along the Grand Canal or downstream in the vicinity of the canal. These other project include the development of a greenway along other sections of the Grand Canal towpath upstream of the project site; the R120 upgrade; the Grange Castle West Access Road; and the proposed Clonburris SDZ.

Currently there are no proposals to undertake works for the provision of a greenway along other sections of the Grand Canal within the River Liffey catchment. As such there will be no potential for the project to combine with proposed greenway developments further west along the Grand Canal to result in cumulative impacts to the European Sites at Dublin Bay.

The proposed greenway will not overlap with the construction phase of the R120 upgrade. The operational phase of this new road will not result in any synergistic interactions with the proposed greenway that could result in cumulative impacts to the Grand Canal during the construction or operation phase of the greenway. In light of this there will be no potential for the project to combine with the R120 upgrade to result in cumulative effects to the European Sites at Dublin Bay.

The proposed greenway will not overlap with the construction phase of the proposed Grange Castle West access road and as such will not have the potential to result in cumulative impacts as a result of construction phase discharges to the Liffey catchment. Furthermore it is noted that even in the event that the construction phase of both projects were to overlap, for reasons outlined in Section 5.1 above they would not have the potential to combine to result in likely significant effects to the European Sites at Dublin Bay.

The Clonburris SDZ is proposed to the east of the proposed greenway. This project is located to the north of the canal and aims to convert existing greenfield land to residential land. This project, which has been screened for Appropriate Assessment, has not been found to have the potential to result in likely significant effects to European Sites. It has been adjudged not to have the potential to combine with other land use plans or projects to result in cumulative impacts downstream to the European Sites at Dublin Bay.

6.0 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS IN VIEW OF EUROPEAN SITE CONSERVATION OBJECTIVES

The function of this screening exercise is to determine whether the proposed greenway project is likely to have significant effects on the European Sites occurring within its zone of influence. The screening is required to be completed in view of the Conservation Objectives for the qualifying features of interest of these European Sites that also occur within the zone of influence of the project.

Site Specific Conservation Objectives (SSCOs) have been formulated for all three European Sites occurring within the zone of influence of the project. The structural and functional elements of a European Site to maintain the favourable conservation status of qualifying features of interest is embedded into the list of SSCOs for each of the site's interest features. As such the SSCOs of a European Site represent the parameters against which an assessment of a project's potential to result in likely significant effects should be undertaken.

SSCOs for the special conservation interests of the South Dublin Bay River Tolka Estuary SPA and the North Bull Island SPA; and the relevant qualifying features of interest of the North Dublin Bay SAC occurring within the zone of influence of the project have been published by the NPWS (NPWS, 2013; 2015a; 2015b). Table 6.1 lists the Conservation Objectives attributes and targets for each of these features and provides an assessment of the project's potential to result in likely significant effects to these objectives.

Table 6.1: Assessment of the Project potential to effect the SSCOs of the qualifying feature occurring within its Zone of Influence

Attribute. No.	Attribute	Target	Assessment
Mudflat (North Dublin Bay SAC)			
1	Habitat area	The permanent habitat area is stable or increasing, subject to natural processes.	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.

2	Community distribution	Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
Atlantic Saltmarsh & Salicornia and other annuals colonising mud (North Dublin Bay SAC)			
3	Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession.	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
4	Habitat distribution	No decline or change in habitat distribution, subject to natural processes.	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
5	Physical structure: sediment supply	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
6	Physical structure: creeks and pans	Maintain creek and pan structure, subject to natural processes, including erosion and succession	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
7	Physical structure: flooding regime	Maintain natural tidal regime	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
8	Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
9	Vegetation structure: vegetation height	Maintain structural variation within sward	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.

10	Vegetation structure: vegetation cover	Maintain more than 90% of the saltmarsh area vegetated	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
11	Vegetation composition: typical species and sub. communities	Maintain range of sub communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
12	Vegetation structure: negative indicator species *Spartina anglica*	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
Special conservation interest bird species (South Dublin Bay River Tolka Estuary SPA & North Bull Island SPA)			
22	Population trend	Long term population trend stable or increasing	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
23	Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by special conservation interest bird species of the SPA occurring within the zone of influence other than that occurring from natural patterns of variation	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.
Wetland habitat (South Dublin Bay River Tolka Estuary SPA & North Bull Island SPA)			
24	Wetland habitat area	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation	For reasons outlined in Section 5 above the project will not have the potential to undermine the targets for this conservation objective attribute.

7.0 CONCLUSION

During the Screening of the proposed greenway it was found that five European Sites occur within a 15km radius of the project site and an additional four European Sites occur at a greater distance (i.e. approximately 20km or more downstream). The nearest European Site (Rye Water Valley SAC) to the project site is located approximately 4km to the northeast. The five European Sites occurring within a 15km radius of the project site, along with South Dublin Bay SAC (located downstream at Dublin Bay) were not identified as occurring within the zone of influence of the project and were screened out from further consideration at an early stage of this screening exercise.

The remain three European Sites occurring at Dublin Bay were identified as occurring within the zone of influence of the project by virtue of the presence of a hydrological pathway linking the project site to these European Sites.

The potential for the hydrological pathway, that links the project to these European Sites, to function as an impact pathway was assessed as part of this screening exercise. This assessment was completed by considering all aspects of the proposed project that could result in the emission of potentially polluting material to the Grand Canal and other surface watercourses draining lands adjacent to the project.

This assessment found that the three European Sites downstream at Dublin Bay are not deemed to be at risk of likely significant effects from the project due to:

- The low risk of significant impacts posed by the project to the water quality of the Grand Canal, the Tubbermaclugg Stream and Skinkeen Stream flowing under the Grand Canal;

- The low volumes of water runoff discharging to the receiving Grand Canal, Tubbermaclugg Stream and Shinkeen Stream flowing under the Grand Canal, from the project site which will facilitate dilution of any potentially polluting surface water runoff locally within these waterbodies;

- The minor fraction of freshwater flows that the Grand Canal, Tubbermaclugg Stream and Shinkeen Stream flowing under the Grand Canal contribute to the overall

freshwater flows to the Liffey Estuary and Dublin Bay. This minor ratio will facilitate thorough dilution of any potentially polluting surface water entering the Grand Canal or the Tubbermaclugg Stream downstream at Dublin Bay; and

- The known potential for waters at Dublin Bay to rapidly mix and assimilate pollutants.

For the reasons outlined above it is considered that the proposed greenway along the Grand Canal from the 12th Lock to Hazelhatch will not present a risk to the Conservation Objectives of European Sites downstream at Dublin Bay. As such this screening exercise concludes that an Appropriate Assessment is not required for this project.

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APPENDIX 1: QUALIFYING FEATURES OF INTEREST OF EUROPEAN SITES OCCURRING WITHIN THE WIDER SURROUNDING AREA

A total of five European Sites were identified as occurring within a 15km radius of the project site and an addition four European Sites were identified as occurring downstream of the project site at Dublin Bay. Table A1.1 below lists the qualifying features of interest of each of these European Sites.

Table A1.1: Qualifying Features of Interest European Sites occurring within a 15km radius and downstream of the Project

European Sites	Qualifying features of interest
Rye Water Valley/Carton SAC	Petrifying springs with tufa formation (Cratoneurion) [7220]
	Vertigo angustior (Narrow-mouthed Whorl Snail) [1014]
	Vertigo moulinsiana (Desmoulin's Whorl Snail) [1016]
Glanasmole Valley SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]
	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]
	Petrifying springs with tufa formation (Cratoneurion) [7220]
Red Bog SAC	Transition mires and quaking bogs [7140]
Wicklow Mountain SAC	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]

	Natural dystrophic lakes and ponds [3160]
	Northern Atlantic wet heaths with Erica tetralix [4010]
	European dry heaths [4030]
	Alpine and Boreal heaths [4060]
	Calaminarian grasslands of the Violetalia calaminariae [6130]
	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]
	Blanket bogs (* if active bog) [7130]
	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110]
	Calcareous rocky slopes with chasmophytic vegetation [8210]
	Siliceous rocky slopes with chasmophytic vegetation [8220]
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
	Lutra lutra (Otter) [1355]
Wicklow Mountain SPA	Merlin (Falco columbarius) [A098]

	Peregrine (Falco peregrinus) [A103]
South Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140]
	Annual vegetation of drift lines [1210]
	Salicornia and other annuals colonising mud and sand [1310]
	Embryonic shifting dunes [2110]
North Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140]
	Annual vegetation of drift lines [1210]
	Salicornia and other annuals colonising mud and sand [1310]
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
	Mediterranean salt meadows (Juncetalia maritimi) [1410]
	Embryonic shifting dunes [2110]
	Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]

	Humid dune slacks [2190]
	Petalophyllum ralfsii (Petalwort) [1395]
North Bull Island SPA	Light-bellied Brent Goose (Branta bernicla hrota) [A046]
	Shelduck (Tadorna tadorna) [A048]
	Teal (Anas crecca) [A052]
	Pintail (Anas acuta) [A054]
	Shoveler (Anas clypeata) [A056]
	Oystercatcher (Haematopus ostralegus) [A130]
	Golden Plover (Pluvialis apricaria) [A140]
	Grey Plover (Pluvialis squatarola) [A141]
	Knot (Calidris canutus) [A143]
	Sanderling (Calidris alba) [A144]
	Dunlin (Calidris alpina) [A149]
	Black-tailed Godwit (Limosa limosa) [A156]
	Bar-tailed Godwit (Limosa lapponica) [A157]

	Curlew (Numenius arquata) [A160]
	Redshank (Tringa totanus) [A162]
	Turnstone (Arenaria interpres) [A169]
	Black-headed Gull (Chroicocephalus ridibundus) [A179]
	Wetland and Waterbirds [A999]
South Dublin Bay & Tolka Estuary SPA	Light-bellied Brent Goose (Branta bernicla hrota) [A046]
	Oystercatcher (Haematopus ostralegus) [A130]
	Ringed Plover (Charadrius hiaticula) [A137]
	Grey Plover (Pluvialis squatarola) [A141]
	Knot (Calidris canutus) [A143]
	Sanderling (Calidris alba) [A144]
	Dunlin (Calidris alpina) [A149]
	Bar-tailed Godwit (Limosa lapponica) [A157]
	Redshank (Tringa totanus) [A162]
	Black-headed Gull (Chroicocephalus ridibundus) [A179]

	Roseate Tern (Sterna dougallii) [A192]
	Common Tern (Sterna hirundo) [A193]
	Arctic Tern (Sterna paradisaea) [A194]
	Wetland and Waterbirds [A999]

Appendix B – Ecological Impact Assessment Screening

Ecological Impact Assessment

Grand Canal Greenway

12th Lock to Hazelhatch

Doherty Environmental

December 2018

Ecological Impact Assessment

December 2018

Document Stage	Document Version	Prepared by
Final	1	Pat Doherty MSc, MCIEEM

For and on behalf of

Doherty Environmental

Prepared By: Pat Doherty

Signed: 

This report has been prepared by Doherty Environmental with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for Clifton Scannell Emerson Associates Consulting Engineers on behalf South Dublin County Council and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

Table of Contents

1.0 INTRODUCTION

Doherty Environmental Consultants Ltd. (DEC) have been commissioned by Clifton Scannell Emerson Associates (CSEA) to undertake an Ecological Impact Assessment (EcIA) for the proposed Grand Canal Greenway (the project) between the 12th Lock and Hazelhatch.

DEC understand that this work is to prepare an ecological assessment of the proposed development to allow the relevant information and findings to be incorporated into a planning application for the proposed greenway.

The proposed greenway location is presented in Figure 1.1.

1.1 ASSESSMENT AIMS

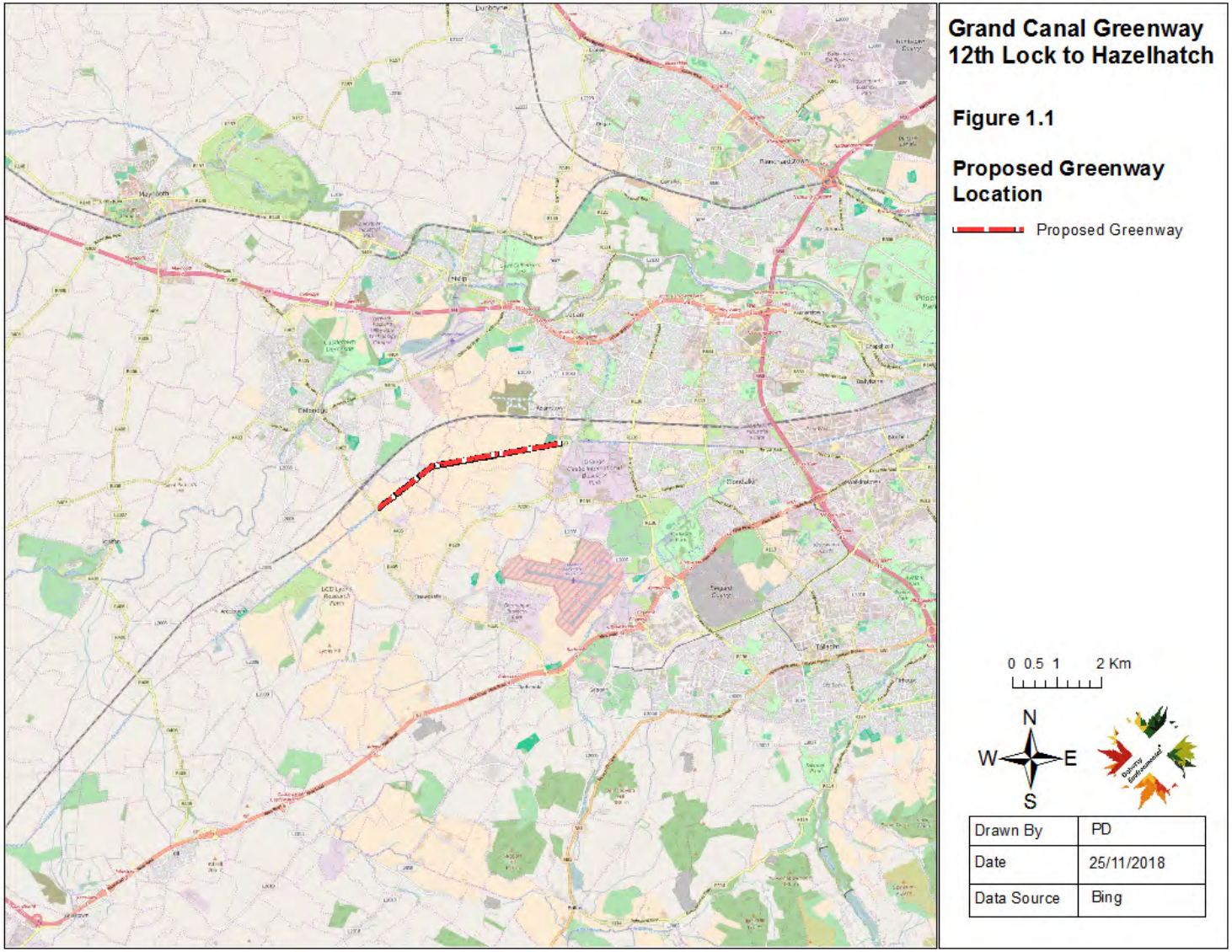
The aim of this EcIA is to detail the status of known or potential ecological receptors to the construction and/or operation of the proposed greenway, and to identify potential impacts and mitigation requirements to ensure compliance with relevant national and European statutory requirements for ecological protection. The report provides an assessment of the potential impacts of the proposed development on the biodiversity supported by the surrounding area.

1.2 LEGISLATIVE REQUIREMENTS

Flora and fauna in Ireland is protected at a national level by the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000 and the Flora (Protection) Order, 1999 (SI 94/1999). They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC).

The transposition of the EU Habitats Directive by the European Communities (Natural Habitats) Regulations 1997 – 2011 (referred to as the Habitat Regulations) provides the legal basis for the protection of habitats and species of European importance in Ireland.

The legislative protection of habitats and species provided by the Habitats Directive has been implemented in Ireland and throughout Europe through the establishment of a network of designated conservation areas known as the Natura 2000 (N2K) network (with individual sites being referred to as Natura 2000 Sites). The N2K network includes sites designated as


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 1.1
Proposed Greenway Location
Proposed Greenway
0 0.5 1 2 Km
N
W
E
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Drawn By PD
Date 25/11/2018
Data Source Bing

Special Areas of Conservation (SACs), under the EU Habitats Directive and Special Protection Areas (SPAs) designated under the EU Birds Directive. SACs are designated in areas that support habitats listed on Annex I and/or species listed on Annex II of the Habitats Directive. SPAs are designated in areas that support: 1% or more of the all-Ireland population of bird species listed on Annex I of the EU Birds Directive; 1% or more of the population of a migratory species; and more than 20,000 waterfowl. Under the National Habitat Regulations all designated Natura 2000 Sites are referred to as European Sites.

The Wildlife Act 1976 (as amended) also provides for the statutory designation of nature conservation areas. These areas are referred to under the Wildlife Acts as Natural Heritage Areas and are designated in areas that support habitats and/or species of national importance.

Other relevant national legislation concerning the protection of flora, fauna and fisheries include the:

- Planning Act 2010;
- European Communities (Quality of Salmonid Waters) Regulations, 1988;
- The Freshwater Fish Directive 1978 (78/659/EEC);
- The Surface Water Regulations, 2009; and
- Flora Protection Order, 2009

1.3 GUIDELINES

Guidance relevant to biodiversity aspects of the environment were referred to as follows:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2016). Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009a).
- Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009a).

- Environmental Impact Assessment of National Road Schemes: A Practical Guide (NRA, 2009b).
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002).
- Guidelines for Ecological Report Writing (CIEEM, 2017)

2.0 PROJECT DESCRIPTION

The proposed Grand Canal Greenway – Hazelhatch to 12th Lock will include the following features:

- 4.6km of shared walking and cycling Greenway along the existing northern Grand Canal towpath.
- Path widths will vary from 2.5m to 3.5m in width. Widths will be dictated by existing on site features.
- Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust or Asphalt Tarmac depending on local conditions for pedestrian and cyclists use.
- Provision of access controls such as pedestrian and cycle friendly gates along the route.
- Underground utilities and services including: Power ducting, telecom ducting, Public Lighting ducting & CCTV ducting.
- The provision of a temporary construction compound to be situated in the townland of Brownstown to the south of the Grand Canal
- Provision of a temporary bridge crossing, in the form of a bailey bridge, to facilitate movements between the temporary construction compound to the south of the canal at Brownstown to the proposed greenway.
- All associated ancillary works and integrated landscape plans for the reinstatement of temporary construction footprint.

The detailed approach to the works to the Greenway is presented in the following section but primarily comprise the following:

- Upgrading of towpath trails with new trail surface.
- Traffic safety measures to facilitate safe pedestrian and cycling crossing
- Safety Railings at section of verge where there are steep or near verticle falls to the north; and
- Fencing/gates to facilitate safety and permit access to residences/fields.

There is no lighting or tree removal proposed as part of this application.

2.1 METHODOLOGY FOR GREENWAY CONSTRUCTION.

2.1.1.1 General Methodology:

As outlined in the introduction, the proposal is to locate the cycleway and footway on the existing towpath of the Grand Canal between the 12th Lock and Hazelhatch.

The proposal entails the upgrading of the existing towpath, the length of which is also a National Way-marked Trail along the Grand Canal.

The proposed development, which is the subject of this Part 8, will include the following:

1. Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust, Surface Dressing or Asphalt (Tarmac) depending on local conditions for pedestrian and cyclists use.
2. Provision of access controls (pedestrian/cycling friendly gates) road makings, traffic calming measures on the proposed cycle/walk way.
3. Provision of safety railings.

Surface Type

A tailored surface finish shall be employed to ensure a durable and fit for purpose trail in accordance with National Trails Office Guidance. This surface will not only improve accessibility, but provide a more robust surface that will be able to withstand increased footfall and traffic. The proposed surface type to be used on the proposed greenway will be an unbound surface of compacted quarry stone and dust. As specified in the name of this surface, it is a compacted surface and as such it is highlighted that the "dust" element of the surface is not in

fact prone to suspension in surface water or air but is in fact compacted into the surface of the trail.

The existing sections of asphalt occurring either end of the proposed greenway at the 12th Lock and Hazelhatch will be retained and upgraded. Otherwise a compacted quarry stone and dust surface will be used.

2.1.1.2 Trail Surface Construction Materials

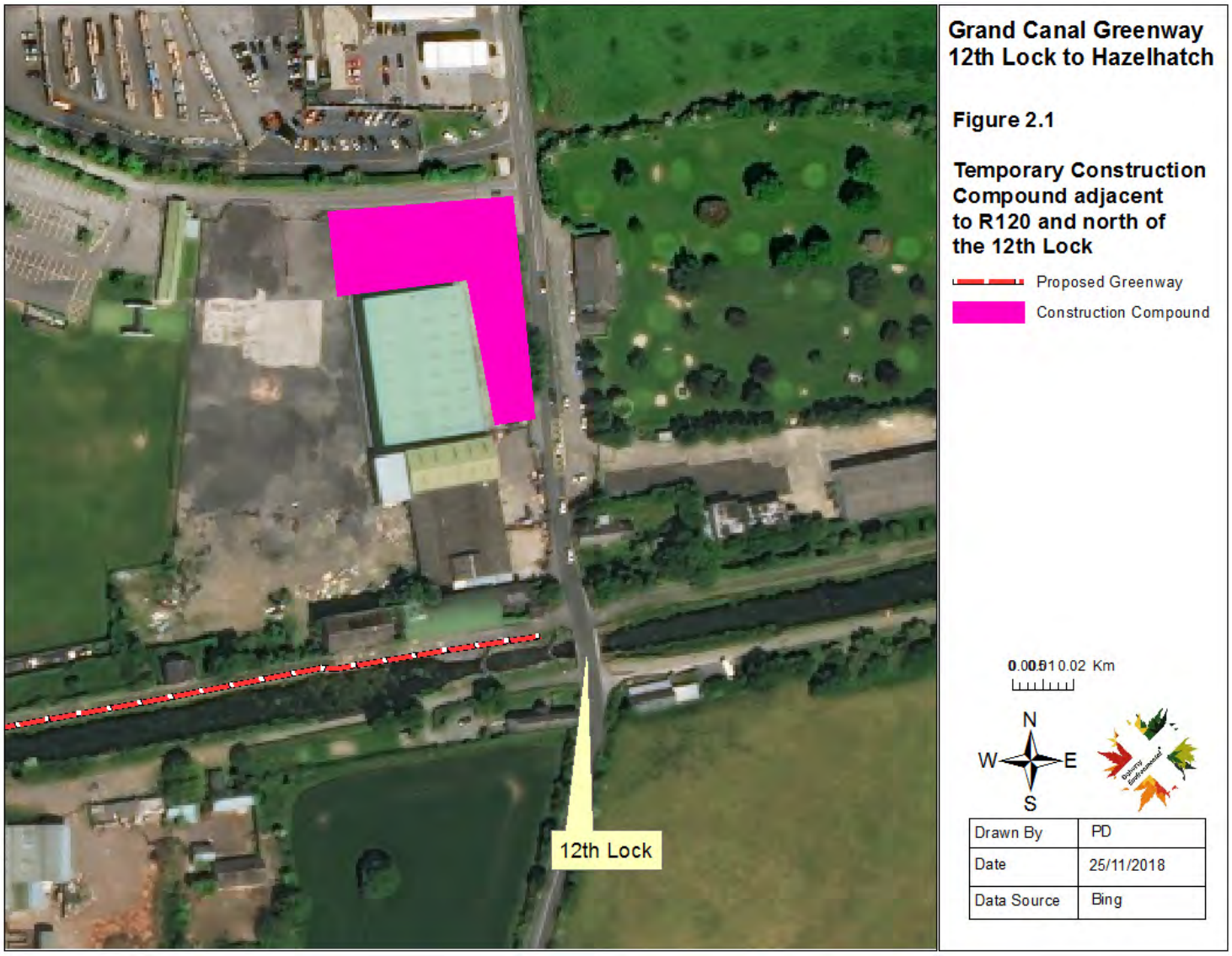
Materials for construction of the trail will be imported and stockpiled at the construction compound, located along the R120 to the north of the Grand Canal and the 12th Lock (see Figure 2.1 for location). The materials to be employed shall principally consist of:

- Geotextile ground reinforcing cloth
- Granular sub-base material (NRA clause 804)
- 6mm crushed limestone dust; and
- Topsoil / grass seed

2.1.1.3 Construction Methodology

The first item of works to be completed on the ground prior to the commencement of the construction works will be the setting out of the construction footprint along the proposed greenway. Along the northern canal bank the construction footprint will be limited to the width of the existing towpath from its south boundary adjacent to the bankside verge to its northern boundary which is represented variously by a grassy verge, treelines, and low to high verticle banks. Once marked out on the ground the construction corridor temporary fencing will be installed. Once fencing is in place all construction plant, machinery and personnel will be restricted from encroaching into areas along the canal beyond the temporary construction fenceline.

Once the fenceline is in place the section of the canal will be closed to the public for the duration of the construction phase, which is expected to last for approximately 8-months.


12th Lock
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 2.1
Temporary Construction Compound adjacent to R120 and north of the 12th Lock
Proposed Greenway
Construction Compound
0 0.005 0.01 0.02 Km
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Date
25/11/2018
Data Source
Bing

Construction materials will be transported from stockpiled areas at the construction compound along the haul road to the northern canal bank in 6-ton dumper trucks for construction of the trail and cable ducts. A total of 2 no. dumper trucks will be required throughout the duration of the construction phase.

Excavations, using one 8-ton excavator, will be required for the provision of a cable trench that will facilitate the installation of the cabling and ducts. Excavation of the existing surface will be kept to a minimum. The maximum depth of the cable trench will be 1.25m. Excavated material will be used for the reinstatement of the trench with additional surplus material being disposed of offsite. It is estimated that approximately 7,250m^3 of surplus spoil for offsite disposal will be generated during the project.

Works will be undertaken on a section by section basis with only one section being commenced and completed at any one time. The sections will be kept to a minimum to reduce the potential for disturbance to adjacent ecological receptors.

Works will be undertaken on a section by section basis with only one section being commenced and completed at any one time. The sections will be kept to a minimum to reduce the potential for disturbance to adjacent ecological receptors.

Detailed construction methodologies for the proposed trail surface type is outlined in Section 2.1.1.4 below.

2.1.1.4 CONSTRUCTION METHODOLOGY FOR SURFACE TYPES

Figure 2.2: Proposed Compacted Stone and Dust

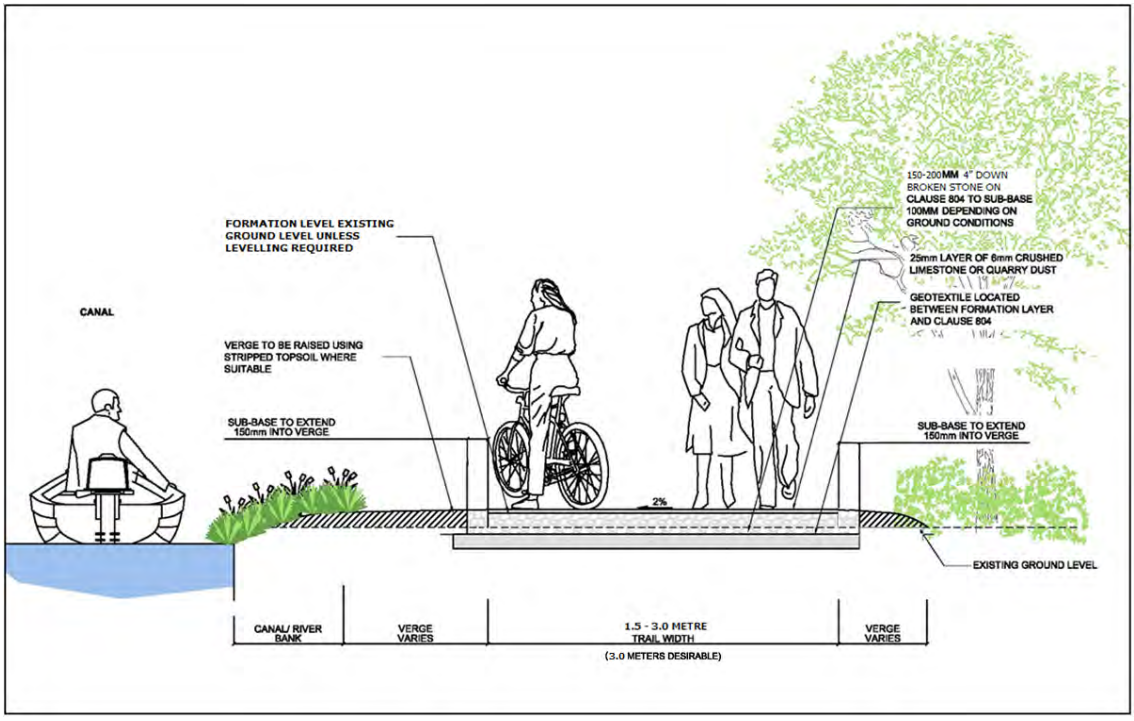


Table 2.1 Type A Compacted Stone and Dust

Compacted Stone and Dust	
LOCATIONS	MATERIAL SPECIFICATION
Along the entire stretch of the proposed greenway with the exception of either end at the 12th Lock and Hazelhatch.	Geotextile Polybrane 240 Membrane or alternative equivalent product grade

	Sub -Base layer 4" Down Broken Stone, then Granular sub-base, in accordance with Clause 804 of TII Specification. Surface layer 0/6mm crushed limestone or quarry dust

CONSTRUCTION SEQUENCE FOR TRAIL SURFACE (Refer Figure 2.2 above)

(a) Formation Tray Excavation where unavoidable (Desirable Width of 3.5m. Note width will vary from a maximum 3.5m wide and reduce to suit existing restricted access widths for example at overflow bridges) (b) Overlay to Existing Path (Desirable Path Width of 3.0m. Note width will vary from a maximum 3.0m wide and reduce to suit existing restricted access widths for example at lock houses and lock gates)

Grade out irregularities to form 3.3m wide formation tray (width of formation tray to be approximately 300mm wider than the path width) to maximum depth of 100mm below ground level. (Actual depth will depend on depth of sub-base being used, which will depend on ground conditions. Where possible new construction will overlay existing). Formation tray should be rectangular in section with vertical sides and level base.

Any Stripped vegetation and excavated topsoil to be stacked neatly either side of formation tray to be used for reinstatement of path shoulders.

There would be no excavation requirements in regard to the overlay of the existing surface other than to address isolated issues with soft spots.

Geotextile Installation

Lay and secure geotextile sheet in formation tray or on top of the existing ground. Overlap joining sheets by 1.0m.

If required in soft ground - Lay and secure geogrid on top of geotextile sheet. Overlap joining sheets by 1.0m.

Sub-Base Layer

Using either a drag box or suitable excavator lay the required depth of 4" down Broken Stone upon the geotextile sheet to falls and levels, to form 1:50 (2%) camber or 1:40 (2.5%) cross-fall in maximum layer depths of 150mm – 200mm. Then 100mm Clause 804 granular sub-base. Depths of Sub-base will depend on existing ground conditions

Compact sub-base layer using a pedestrian roller taking care not to apply undue pressures to the canal bank until satisfactory compaction is achieved.

Once sub-base layer is compacted, check levels of the surface at regular intervals along the compacted sub-base layer for consistent even surface regularity. Any part of the sub-base layer deviating from the required level must be raked off or topped up with additional Clause 804 granular sub-base and re-compacted to the correct levels.

Surface Layer

Using either a drag box or suitable excavator lay 25mm depth of 6mm limestone dust to falls and levels, to form 2.5m to 3.5m wide path surface with 1:50 (2%) camber or 1:40 (2.5%) crossfall along the centre line of compacted sub-base layer.

Compact surface layer using a roller until satisfactory compaction is achieved.

Once rolling is finished, check levels of the surface at regular intervals along the compacted surface layer for consistent even surface regularity. Any part of the surface layer deviating from the required level must be raked off or topped up with additional 6mm limestone dust and re- compacted to the correct levels.

Landscaping

Using available topsoil and turfs from excavations (and only if necessary, imported topsoil). Landscaped verges and edges should be finished level with path surface and taper down and away from the path surface to allow surface water to run off onto adjacent verges.

2.2 CONSTRUCTION METHODOLOGY FOR DUCTING INSTALLATION

Excavation

- Chapter 8 Approved Pedestrian barriers will be used to demark the works area and to prevent unauthorized access into the works area.
- Route of the track to be marked out.

- The excavation will commence removing the ground carefully in layers. Spoil will be loaded directly onto 6 ton dumper.
- The trench will be excavated to the required depth and width for the ducting trench.
- If required by trench depth or nature of ground, make trench safe for personnel entry by battering sides.
- Where the trench can be stepped additional trench protection will not be required.
- Where it is not practicable to batter trench sides or step, Trench protection will be used. This will be stored onsite to be used as required. This will be either trench box or sheet piles, wailers and struts dependent on the location.
- Sufficient trench protection material will be delivered to site in advance of excavation.
- Remove any groundwater from the trench using 2" sub pump if necessary.

Duct Installation – Power Ducting

- Place lean mix bed into trench, level manually and compact with a mechanical trench compactor in line with the specification.
- Once the lean mix has been levelled place the ducts in the trench in the specified format.
- The ducts will be joined manually using the collars supplied by the ducting provider.
- Cable tie the ducts as required by the design specification.
- Manually insert the timber templates to space out the bottom row of ducts and apply the next level of lean mix over the ducts and level manually compacting in even layers using the trench compactor.
- Place the marker tape.
- Then repeat the process with another layer of ducts and template as per the design specification and compact with lean mix lean mix using a mechanical compactor.
- Apply the marker tape manually.
- Where required use shallow plating
- Backfill with leanmix stone and apply warning tape 300mm down from the surface
- All ducts must remain capped during the process until they are ready to use.

- Lubricant will be used when applying couplers.

Duct Installation – Telecom, CCTV & Public Lighting Ducting

- Place sand bed into trench, level manually and compact with a mechanical trench compactor in line with the specification.
- Once levelled place the ducts in the trench in the specified format.
- The ducts will be joined manually using the collars supplied by the ducting provider or the spigot and socket duct ends.
- Manually insert the timber templates to space out the bottom row of ducts and apply the next level of lean mix over the ducts and level manually compacting in even layers using the trench compactor.
- Place the marker tape.
- Then repeat the process with another layer of ducts and template as per the design specification and compact sand surround using a mechanical compactor.
- Apply the marker tape manually.
- Backfill with excavated material and apply warning tape 300mm down from the surface
- All ducts must remain capped during the process until they are ready to use.
- Lubricant will be used when applying couplers.

Backfilling-

- Backfilling can then commence with use of the dumper directly into the trench using the required material.
- The material will then be compacted using a mechanical trench compacter in layers in line with NRA specification (Purple Book)
- Marker tape will then be used approximately 300mm from the finished surface or as per ESBN specification / design requirements.
- Backfilling along the section of the trench opposite the artificial quarry ponds at Gollierstown quarry will be undertaken in accordance with design measures that aim to reinstate the existing towpath substrated around the cable duct. The existing substrate will be reinstated at this location to maintain seepage pathways between the canal and

the artificial pond to the north where the rare species Vertigo moulinsiana was recorded.

2.3 TEMPORARY CONSTRUCTON COMPOUND

An existing temporary construction compound is located to the north of the Grand Canal and adjacent to the R120 (on its western side) (see Figure 2.1 for location). This temporary compound has been used for the upgrade of the R120 road. It is proposed to retain this compound on site for use as the construction compound for the proposed greenway upgrade.

All construction materials, fuels, lubricants, plant and machinery will be stored in this compound. All spoil material arising from the project that will be disposed of will also be stored at this compound.

3.0 METHODOLOGY

3.1 DESK STUDY

A desktop assessment was carried out to collate available information on the ecological baseline of the proposed greenway and surrounding area. Records for rare, threatened and/or protected species were source from the National Biodiversity Data Centre (NBDC). The proposed greenway is located within or adjacent to 5 tetrads (i.e. 2km squares). Records held by the NBDC for all 5 tetrads were downloaded and reviewed for the presence of rare, protected and threatened species.

Data on designated and protected nature conservation sites was downloaded from the NPWS website and the data.gov.ie website. A review of the BSBI records for the section of the Grand Canal and surrounding area was undertaken for rare, threatened and protected flora. A review of the Bird Atlas for the UK and Ireland (Balmers et al. 2013) was completed to identify records for bird species in the surrounding area.

A review of all available mapping for the proposed greenway was also completed. This involved a review of satellite imagery available through Google, Bing and Apple Maps; a reivew of the latest Ordnance Survey Ireland (OSI) orthophotography; and a review of OSI historical maps which included 25 inch and 6 inch maps from the mid-1800's to the early 1900s.

3.1.1 Previous Studies of the Grand Canal

All previous available surveys and studies of the ecology of the Grand Canal relevant to the proposed greenway section between the 12th Lock and Hazelhatch and surrounding environs were reviewed and used to inform the EcIA. The studies reviewed as part of the EcIA are as follows:

Ecological Survey of the Grand Canal. The Wildlife Service and Waterways Section, Office of Public Works, Trim (Dromey, M., Johnston, B. and Keane, S., 1992).

Ecological Element of the Pilot Waterways Corridor Study. Report prepared for the Heritage Council (White Young Green, 2002)

Survey for otter presence between the 9th Lock and 12th Locks of the Grand Canal (Dave Wall Wildlife Consultant, 2008).

Proposed foot/cycle path and cable laying development between the 3rd and 12th locks on the south side of the Grand Canal, Co. Dublin (Kelleher, C., 2009).

Freshwater crayfish in the millrace at the 12th Lock: Field Visit and Comment (Reynolds, J.D., 2012).

West Dublin 220kV/110kV Substation and Associated Works: Planning and Environmental Considerations Report (Tobins, 2015).

Ecological Assessment of the Grand Canal Main Line. Report prepared for Waterways Ireland (Roughan & O'Donovan (2016).

Assessment of bat usage of the Grand Canal between Hazelhatch Bridge and the 12th Lock Bridge (Adamstown) (FERS, 2016).

Survey for the occurrence of otters along the Grand Canal between 12th Lock Bridge and Hazelhatch Bridge (FERS, 2016)

Ecological Survey of Clonburris Strategic Development Zone, Clondalkin, Co. Dublin (FERS, 2018)

3.2 FIELD SURVEYS

3.2.1 Terrestrial Habitat & Flora Surveys

Detailed habitat surveys were completed between the Hazelhatch and the 12th Lock in August and September 2015 (ROD, 2016). To augment the 2015 surveys additional habitat surveys were completed in June and July 2018. The 2018 surveys aimed to identify any additional flora occurring along the canal, with particular emphasis being given to the presence or otherwise of early flowering species such as orchids.

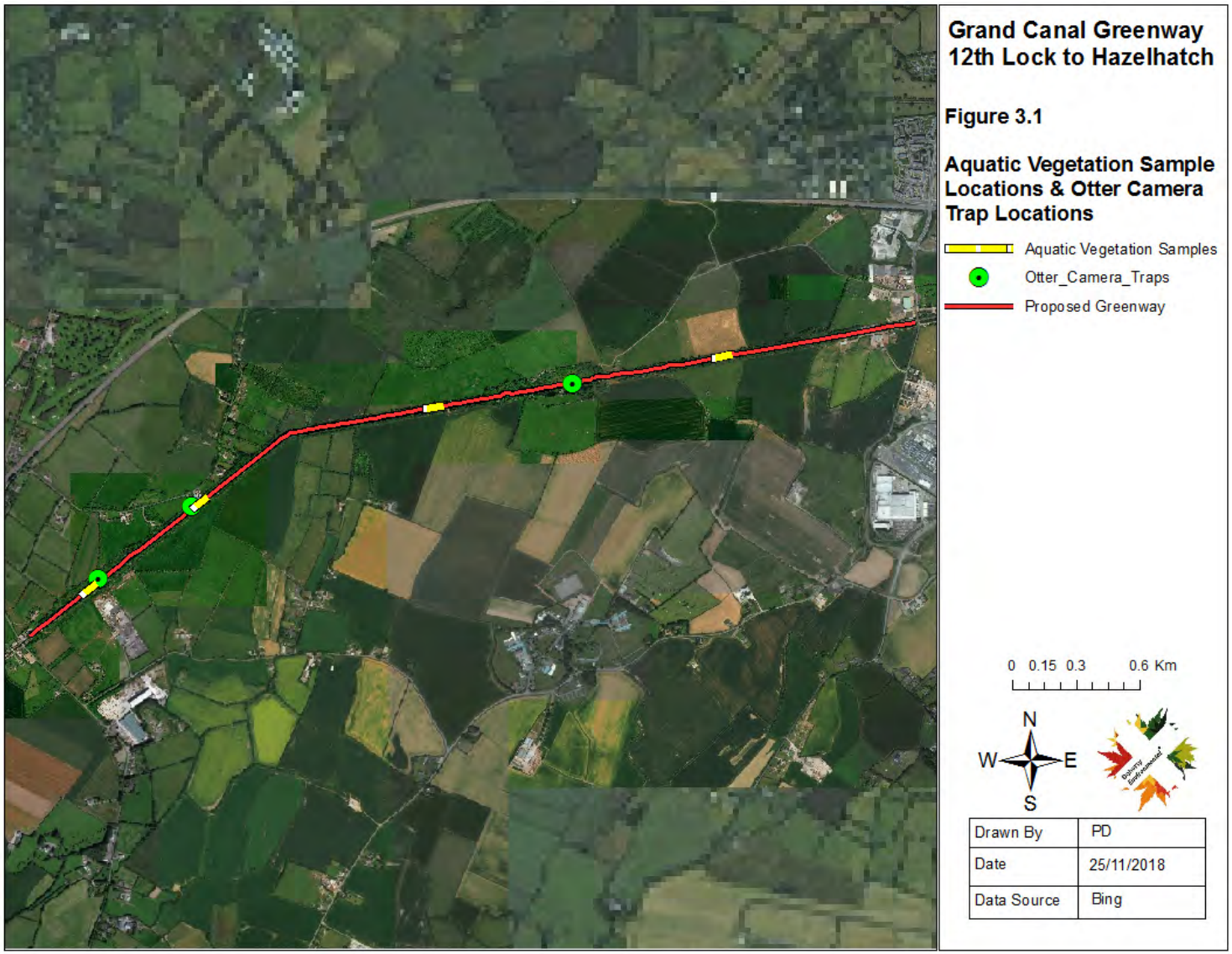
The basis of the surveys undertaken on the above dates was an Extended Phase 1 Habitat Survey. This habitat survey was undertaken in accordance with the Heritage Council Draft Best Practice Guidance for Habitat Survey and Mapping. The National Vegetation Classification (NVC) User's Handbook also informed the approach to the habitat surveys. Habitats were classified using Fossit's Guide to Habitats in Ireland (2000) which classifies habitats according to a hierarchical framework with Level 1 habitats representing broad habitat groups, Level 2 representing habitat sub-groups and Level 3 representing individual habitats. The field survey focused on identifying Level 3 habitats.

The DAFOR scale was used to characterise the vegetation within each habitat. This scale refers to plant species in terms of dominance, abundance, frequency, occasional and rare (DAFOR). While habitat surveys were undertaken outside the optimum survey period for identifying vegetation, it is considered that the dominant habitats supported by the site were accurately identified.

In this report, scientific and common names for higher plants follow those in the Botanical Society of the British Isles (BSBI) standard list, published on its website www.bsbi.org.uk. Scientific and common names for bryophytes follow Smith (2004). Scientific and common names of mammals follow Whilde (1993).

3.2.2 Canal Flora Surveys

The aquatic vegetation of the Grand Canal was surveyed using grapnel and by observing vegetation from the bank side. The survey method used during the canal flora surveys was based on the Joint Nature Conservation Councils (JNCC) Common Standards Methods (CSM) for canal surveys. This involved selection a number of 100m long survey sections along the canal and surveying the vegetation from four points along each of the survey sections. A total of four 100m survey sections were surveyed and four grapnel samples were taken from each of these four survey sections. The location of the four 100m survey locations are shown on Figure 3.1.


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.1
Aquatic Vegetation Sample Locations & Otter Camera Trap Locations
Aquatic Vegetation Samples
Otter_Camera_Traps
Proposed Greenway
0 0.15 0.3 0.6 Km
N
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Drawn By PD
Date 25/11/2018
Data Source Bing

3.2.3 Non-volant Mammal Surveys

3.2.3.1 Otters

Surveys for field signs indicating the presence of otters were completed during all months between June 2018 and November 2018 (inclusive). The extent of the survey area comprised the entire stretch of the proposed greenway from the 12th Lock to Hazelhatch. The surveys focused on recording field signs along the northern bank of the canal within the footprint of the proposed greenway. Particular attention was given to identifying the presence of holts or couches along the canal bank and particularly in areas between Hazelhatch and Gollierstown, where sloping banks leading down to the back-drain occur. These slopes were identified as providing suitable condition for supporting holts. The wet woodland and swamp habitat occurring at the base of the slope towards Hazelhatch were searched for mammal paths, and where paths were identified attempts were made to follow these paths to establish if they led to holt sites.

The northern bankside was searched in detail for the presence of spraints and prey remains. All mammal access points to the canal, indicative of otter slides and haul outs, were recorded and searched for evidence of use by otters. Mammal paths leading north from the canal towpath into the back drain were followed and searched for field signs such as spraints and where bare ground was present also footprints. Paths that led north from the canal towpath into wet woodland and scrub habitat were followed to search for possible holts or couches to the north. All otters surveys were completed during and after periods of dry weather when field signs are more persistent on the ground.

Camera traps were erected at three locations along and adjacent to the canal to monitor for otters. The camera trap locations were selected to provide coverage of otter habitat. All three camera traps were installed between August and October 2018. One camera trap was position on the northern bank of the canal looking northeast towards an otter slide in the vicinity of an identified couch location. A second was located immediately downstream of the back-drain overflow from the canal and the third was positioned across from a mammal track along un-named stream crossed by the canal. The location of the camera trap survey points are shown on Figure 3.1.

Limitations in the effectiveness of trail cameras to record otters have been reported in previous studies (Lerone et al. 2011 & 2015) as body surface temperatures of otters emerging from water do not differ from surrounding ambient temperatures. In order to overcome this limitation each of the three trail cameras, in addition to being set to trigger via heat sensitive motion detection, were set to recorded still photo images at one minute intervals through each night of recording.

All photographs logged by each of the cameras were reviewed for the presence of otters.

3.2.3.2 Badgers & Other Non-Volant Mammals

A survey for field signs indicating the presence of protected non-volant mammal species was undertaken. This survey was undertaken during the daytime and areas of woodland and scrub bounding the towpath to the north were search for field signs. Any mammal field signs typical of badgers activity were recorded during the surveys. These field signs, as described in Neal & Cheeseman [(1)] and Bang & Dahlstrom [(2)], include:

- mammal breeding and resting places, such as setts, holts, couches, lairs;
- pathways;
- prints;
- spraints and faecal deposits;
- latrines (and dung pits used as territorial markers);
- prey remains and feeding signs (snuffle holes);
- hair; and

(1) Neal, E., & Cheeseman, C., (1996). 'Badgers'. Poyser Natural History, London.

(2) Bang, P., & Dahlstrom, P., 'Animal Tracks and Signs'. Oxford University Press, Oxford.

- scratch marks.

A camera trap was set up at a main badger sett to monitor badger traffic in and out of the sett.

3.3 BIRD SURVEY

The general bird survey was completed to identify the presence of bird species occurring along the canal. This was based on walked transects along the northern towpath from Hazelhatch to the 12th Lock. Three repeat transects were walked between June and August 2018. All birds seen and heard were recorded during each of the transects.

Targeted kingfisher surveys were completed on the 18th June and the 24th July involving vantage point watches along a section of the canal upstream and downstream of Golliertown Bridge. This location was selected as excellent view of the canal are afforded from the bridge and also because the sections of most vertical bankside along the canal occur on the southern bank downstream of Gollierstown Bridge. The vantage point watches were undertaken for 2 hours between 15:00 and 17:00 on the 18th June and between 19:00 and 21:00 on the 24th July.

3.4 BAT SURVEYS

A range of bat surveys were completed along the canal during the 2018 bat activity season. The bat field surveys were informed by a number of recognised guidance which include:

- Bat Survey Guidelines: Traditional Farm Buildings Scheme (Aughney, T *et al*. 2008, Heritage Council);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National road Schemes. National Roads Authority. Ireland; and
- Bat Surveys: Good Practice Guidelines (3nd Edition) (Collins, 2016, Bat Conservation Trust (BCT), UK).

3.4.1 Bat Habitat Evaluaton

The evaluation of the potential suitability of the proposed greenway and the canal corridor for bats has been informed by the guidelines outlined by Collins (2016). The suitability of an area to support bats is based on the availability of suitable roosting habitat as well as the availability of suitable commuting and breeding habitat. The roosting, commuting and foraging habitats are

considered when ranking bat habitat suitability. Collins (2016) classifies bat habitat suitability under four categories ranging from negligible, low, moderate and high value.

3.4.2 Identification of Potential Bat Roosts

During initial appraisal of the proposed greenway corridor an assessment was made of on-site features that have the potential to support roosting bats. These features include built structures and trees along and adjacent to the study corridor.

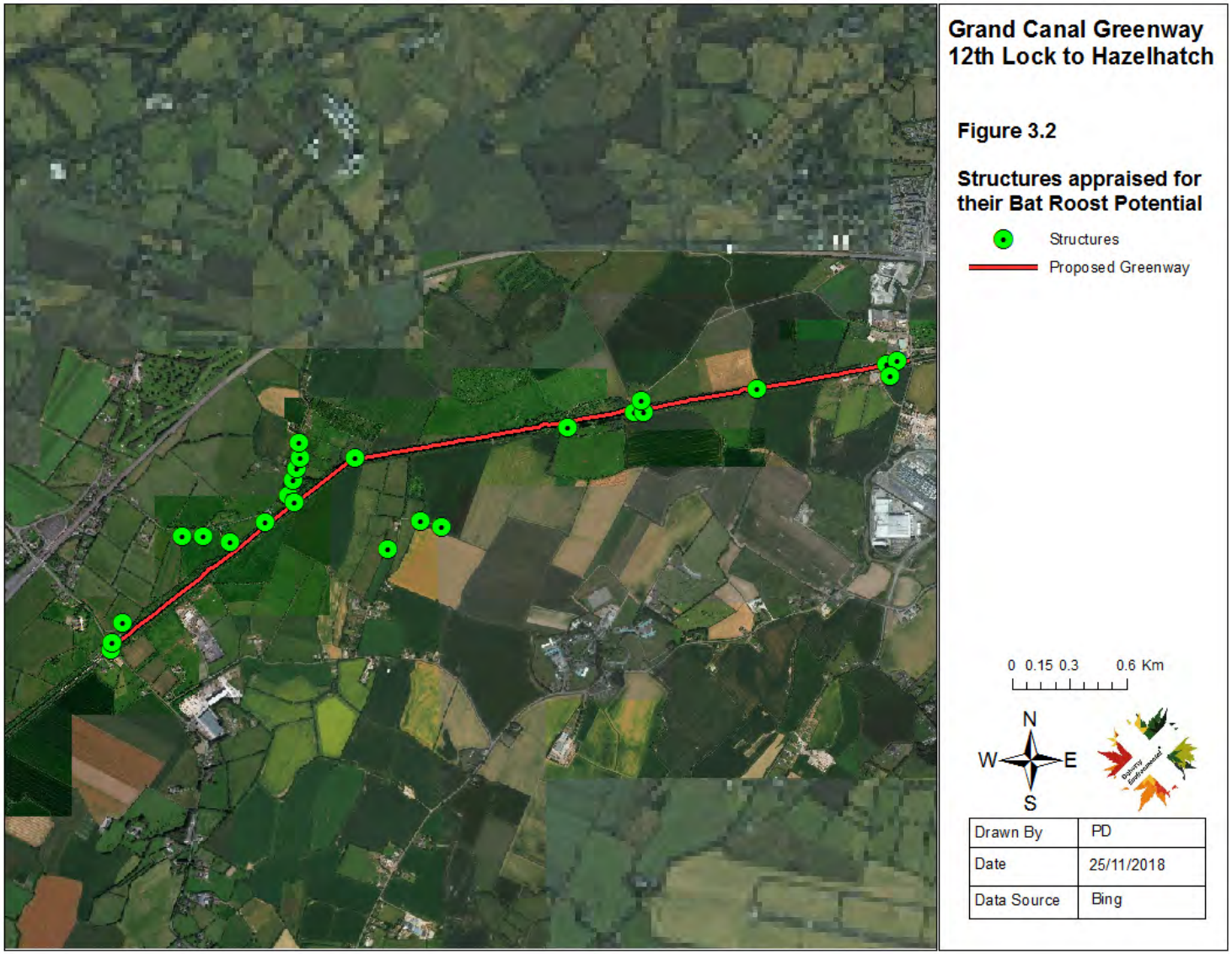
Built structures occurring within and adjacent to the proposed greenway were assessed for their potential to support roosting bats. Structures occurring immediately adjacent to the proposed greenway are concentrated to the western and eastern ends. Gollierstown Bridge and some older dilapidated buildings are the only other structures that occur in the immediate vicinity of the greenway. All structures inspected for their potential to support roosting bats are shown in Figure 3.2. No internal inspection surveys of occupied residential/commercial structures were undertaken. It is also noted that residential dwellings located to the north of the proposed greenway at its western end were appraised from the public road and/or from the back-drain and no detailed close up inspection was carried out for these structures.

External inspection surveys were carried out during the daytime of structures and involved inspecting the structure for:

- obvious exit/egress points for bats such as missing roof tiles, opening to the roof spaces, wall crevices, open windows & doors etc.; and
- field signs associated with bat activity such as faecal droppings, scratch marks, staining on walls etc.

Other structural features such as roof material, aspect and roof shape were also recorded. The roost potential of these structures was assessed with reference to features that are typically associated with bat roosts in buildings (see Kelleher and Marnell, 2006; Collins, 2016).

Trees occurring immediately adjacent to the northern towpath were inspected for their potential to support bat roosts. The inspection involved identifying trees that displayed


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.2
Structures appraised for their Bat Roost Potential
Structures
Proposed Greenway
0 0.15 0.3 0.6 Km
N
W
E
S
Drawn By PD
Date 25/11/2018
Data Source Bing

features typically used by bats such as cavities, hollows, cracks in major limbs and dense ivy cover. The trees were also examined for evidence indicating the presence or use of the tree by bats. Such evidence includes:

- scratch marks and/or staining at hollows, cavities etc;
- bat dropping in, around, and/or below hollows, cavities etc.; and
- the smoothing of surfaces around hollows, cavities etc.

The roost potential of trees was graded according to the categories outlined in *Table 4.1* of the BCT Bat Surveys: Good Practice Guidelines (Collins, 2016).

Binoculars were used during the daytime assessment. Photographs were taken of all structures and trees, which were deemed to have potential to support bat roosts, along with a GPS record of their locations.

3.4.3 Roost Surveys – Emergence/ Return Surveys

3.4.3.1 Structures

To determine the presence or absence of roosting bats, dusk emergence and pre-dawn roost surveys were undertaken at all structures occurring immediately adjacent to the proposed greenway. Other structures identified as being of higher potential for supporting bats in the wider vicinity to the north and south of the proposed greenway were also surveyed for roosting bats.

Structures adjudged to be of low value to the north and south of the canal were not subject to bat roost surveys. In general these structures supported one or more of the following unfavourable features for supporting roosting bats:

- Tiled or slate roofs with no obvious access points to the structures interior;
- Corrugated roofs; and
- Lofts converted for residential use i.e. bedrooms etc.

3.4.4 Bat Activity Surveys

The survey effort for bat activity surveys along the proposed greenway were informed by the approach outlined in the BCT guidance (Collins, 2016). Transect and automatic detector surveys were undertaken throughout the activity season to assess the levels of foraging and commuting activity along the canal.

3.4.4.1 Transect Activity Surveys

A transect survey was completed along the northern towpath of the canal and also along hedgerow field boundaries within fields to the north and south of the canal. The transect survey involved surveyors walking along the canal and continuously monitoring for bat activity with hand held bat detectors. The surveyors walked each transect at an even pace and paused to undertake five-minute surveys at fixed spot survey locations. The fixed-point spot surveys were selected prior to commencing the first transect in June 2018 and were located at points along the transect that intersected with north-south orientated hedgerows and linked into the canal corridor and also (for comparison purposes) at points where no such hedgerows linked into the canal. The location of the spot survey points along the canal are shown on Figure 3.3. During the five-minute spot survey the surveyor took up a position on the canal bank and used high-powered LED mag-lite torches to visually monitor the canal water. The visual observations were undertaken to support the recording of any Daubenton's bats foraging or commuting over the canal.

Transect surveys were completed following the completion of dusk emergence surveys or commenced at sunset on nights where no emergence survey was completed. Transect surveys lasted for approximately 2 hours.

During spot surveys bat activity was recorded by counting the number of passes detected by different bat species. The number of passes recorded were used to categorise activity levels. One pass not repeated within 1 minute was recorded as a commuting pass. Where 2 to 5 passes were recorded during a spot survey bat activity was categorised as low activity. Where 5 to 10 passes were recorded during a spot survey bat activity was categorised as moderate activity. Where in excess of 10 passes were recorded during a spot survey bat activity was categorised as high activity. It is noted that no guidelines currently categorise bat activity into low, moderate or high activity classes. However, Matthews et al. (2016) categorised nightly


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.3
Bat Survey Locations
Spot Survey Locations
Automatic Survey Locations
Monitoring Point No.
MP1
MP2
MP3
MP4
Proposed Greenway
1
2
3
4
5
6
7
8
9
10
11
12
13
0 0.125 0.25 0.5 Km
N
W
E
S
Drawn By PD
Date 25/11/2018
Data Source Bing

bat activity into the following activity classes: Low - <3 passes; Moderate – 3 – 49 passes; High >50 passes. As such this approach informed the categorisation of activity during the transect surveys, but as Matthews activity categories apply to entire nights, the categorisation for high activity have been reduced to >10 passes, to reflect the short duration of the spot surveys along transects.

Where bats were seen the number of individuals were recorded. The location of all bat passes was recorded using a hand-held GPS. Echo Metre Touch and Peterssons D230 bat detectors, featuring both heterodyne and frequency division were used during the activity surveys. Bats were identified in the field to species level, *Myotis* sp. were identified to family level.

During hand-held bat surveys species were identified in real time by recording peak frequency. Notes were also made on the time of recording and type of behaviour of each bat encountered during the activity surveys.

3.4.4.2 Static Automatic Activity Surveys

Automatic survey sessions were undertaken between June and October 2018. Song Metre 4 (SM4) remote bat detectors were used during the automatic static detector surveys. Monitoring points were selected along the canal and included positions along the northern towpath and also low over the canal itself. The monitoring points were selected to provide spatial coverage along the length of the proposed greenway corridor as well as providing coverage for bat activity low over the canal and at higher elevations along the canal towpath.

At points low over the canal the recording microphone was secured to an extension pole which was in turn secured to a strong tree limb or directly to the tree trunk. At high points along the northern towpath the microphone was secured via a pole to limbs overhanging or bounding the towpath. The microphones on these trees were positioned approximately 3m to 4m above ground.

The automatic recorders were set to record continuously throughout the night during each night of survey. Recording was programmed to start 30 minutes before sunset and finish 30 minutes after sunrise.

The dates, number of hours surveying per night and total number of hours survey completed per session are provided in Appendix B. The location of each automatic survey session is shown

in Figure 3.3. MP2 to MP4 were positioned low over the canal, within approximately 50cm of the water surface. MP1 was positioned at an elevated position on a tree along the northern towpath.

3.4.5 Bat Call Analysis

Analysis of bat calls recorded during the transect surveys was undertaken using Song Scope and Analook software. Peak frequencies of bat calls were used to support the identification of bat species noted in the field.

All bat calls recorded during the automatic monitoring sessions in 2018 were analysed using Kaleidoscope Pro software (V.5). The bat call classifiers for British Bats provided by Kaleidoscope Pro were used to identify the species responsible for generating the bat call. These classifiers assign calls to species based on call characteristics, with the peak frequency of the calls being particularly important in distinguishing between species with similar call characteristics (i.e. Pipistrelle species).

The number of calls recorded by the automatic detectors is representative of bat activity in the area surrounding the automatic survey location. The amount of activity recorded does not allow a quantification of the number of individuals recorded at this location but does provide quantitative data on bat activity at this location during the surveys. The SM2 records ultrasonic sound, including bat calls, to a data file stored on a removal flash card. Upon completion of the automatic survey the data files were analysed for bat calls. Each continuous bat call of one second or greater was recorded as an individual bat pass. Bat calls separated by one second or more are recorded as individual bat passes. The data files were analysed as follows:

- The total number of bat passes recorded throughout the automatic survey period.
- The total number of bat passes recorded per species per survey night.

A Bat Activity Index (BAI) for each of the above is also provided by calculating the number of bat passes per hour throughout each discrete monitoring period. Although a useful index of bat activity, this index cannot be used to infer population abundance or the number of individuals using the site (Hayes 2000, Kunz et al. 2007).

Currently there is no accepted guideline for classifying levels of bat activity recorded during automatic monitoring sessions, in terms of low, moderate or high levels of nightly activity. However Matthews et al. (2016) recently categorised nightly activity into low, moderate and high groups with low activity assigned to <5 passes per night; moderate assigned to 5 – 49 passes per night; and high assigned to ≥50 passes per night. This activity hierarchy is used in the analysis and interpretation of automatic monitoring results.

3.5 WHITE-CLAWED CRAYFISH & AQUATIC INVERTEBRATES

Surveys for white-clawed crayfish were based on analysing the results of sweep net sampling of the Grand Canal, analysis of grapnel samples during canal vegetation surveys and a search for field signs, such as corpse and shell fragments in otters spraints, indicating the presence of crayfish.

3.6 VERTIGO MOULINSIANA & MALACOLOGICAL SURVEY

The Vertigo moulinsiana was completed over two phases. The first phase assess the habitats present along the canal by walking the entire stretch of the proposed greenway between Hazelhatch and the 12th Lock. The habitat and vegetation type were noted all along the survey area, at both sides of the towpath, i.e. the in-stream vegetation and the vegetation at the opposite/ landward side of the towpath.

The potential of each stretch of habitat for supporting *Vertigo moulinsiana* was rated, and notes were taken as to the character and make-up of the stretch. Habitats were rated as follows:

N – not suitable for supporting *Vertigo moulinsiana.*

L – low suitability, low chance of the target species occurring.

M – moderate suitability, moderate chance of occurrence of species.

H – high suitability, species may occur.

Following the habitat walkover survey a number of locations spread along the entire area were selected for detailed sampling of molluscs. Sample sites were selected along the fringing

emergent vegetation of the canal and from areas of suitable wetland habitat to the north of the northern towpath.

All mollusc species found were identified with reference to Cameron (2003), Kerney & Cameron (1979) and other relevant works (e.g. Cameron *et al.*, 2003). A full description of the Vertigo moulinsiana survey methods are outlined in Appendix C to this report.

3.7 ANT HILLS

The locations of notable ant hills were recorded using a hand-held GPS. Ants were sampled in the field using a pooter and were identified using a 20x hand lense.

3.8 TERRESTRIAL INVERTEBRATES: BUTTERFLIES & BEES

Records of butterflies, bees and Odonata species occurring along the canal were recorded will present on site during all periods of suitable weather conditions.

A targeted search for the presence of marsh fritillary larvae on the stems of Succisa pratensis was completed in suitable grassland habitat surrounding ponds to the west of Gollierstown quarry in September 2018.

3.9 HERPETOFAUNA

All incidental observations of common frog, smooth newt and common lizards were recorded and the location of the record was logged using a hand held GPS.

3.10 ECOLOGICAL EVALUATION

The nature conservation value of habitats and ecological sites occurring within the proposed site are based upon an established geographic hierarchy of importance as outlined by the National Roads Authorities (NRA, 2009). The outline of this geographic hierarchy is provided below and this has been used to determine ecological value in line with the ecological valuation examples provided by the NRA (see NRA, 2009). The geographic evaluation hierarchy is as follows:

- International Sites (Rating A);
- National Importance (Rating B);
- County Importance (Rating C);
- Local Importance (higher value) (Rating D); and
- Local Importance (lower value) (Rating E)

Using this site evaluation scheme the key ecological receptors occurring along and within the zone of influence of the proposed greenway have been identified.

3.11 IMPACT ASSESSMENT

3.11.1 Zone of Influence

The zone of influence of the proposed greenway has been established so that the assessment of potential impacts associated with its construction and future use target the biodiversity receptors that may be affected. Given that a sensitive approach to the design of the project has been adopted it is considered that it will project will not have the potential to result in wide scale impacts to terrestrial habitats, flora and fauna in the wider area surrounding the proposed greenway. As such it considered reasonable to confine the zone of influence to surrounding terrestrial receptors to a 1km radius surrounding the project. However due to the presence of aquatic habitats in the form of the canal and watercourses flowing under the canal and the proposed greenway the potential may exist for impacts to aquatic receptors at greater distance from the project site. Assigning a distance to the aquatic zone of influence of the project is based primarily on the potential pollution risk posed by the project to water quality. The pollution risk posed by the project to water quality in the canal or streams flowing under the canal is considered to be low based on the scale of works to be undertaken, the materials required for the completion of the construction phase and the nature of the operation phase which will not involve the use of any potentially polluting materials. Therefore it light of the above it is considered that a 5km zone of influence and potential zone of impact buffer will be sufficient to allow a thorough assessment of impacts to all possible ecological receptors.

3.11.2 Impact Magnitude

Impact magnitude refers to changes in the extent and integrity of an ecological receptor. The IEEM (2006) defines integrity of designated conservation areas as “the coherence of the

ecological structure and function across the area that enables it to sustain the complex of habitat and/or the levels of populations of the species for which it was classified". For non-designated sites this can be amended to: "the coherence of ecological structure and function, that enables it (the site or population's supported by the site) to be maintained in its present condition'. For the purposes of this assessment the impact magnitude is influenced by the intensity, duration, frequency and reversibility of a potential impact and is categorised as follows:

High magnitude impact: that which results in harmful effects to the conservation status of a site, habitat or species and is likely to threaten the long-term integrity of the system.

Moderate magnitude impact: that which results in harmful effects to the conservation status of a site, habitat or species, but does not have an adverse impact on the integrity of the system.

Low magnitude impact: that which has a noticeable effect but is either sufficiently small or of short duration to cause no harm to the conservation status of the site, habitat or species.

Imperceptible: that which has no perceptible impact.

Positive: that which has a net positive impact for the conservation status of a site, habitat or species.

3.11.3 Impact Duration

The duration of an impact follows those defined by the EPA (2015), which are as follows:

- Temporary: up to 1 year
- Short-term : 1 to 7 years
- Medium term : 7 to 15 years
- Long term: 15 to 60 years
- Permanent : over 60 years

3.11.4 Impact Significance

The significance of impacts is determined by evaluating the nature conservation value of the site, habitat or species concerned together with the magnitude of the impacts affecting the system. The more ecologically valuable a receptor and the greater the magnitude of the impact, the higher the significance of that impact is likely to be. Table 3.1 outlines the levels of impact significance to be used during the assessment of impacts. The probability of an impact occurring will also be outlined when defining the significance of impacts.

Table 3.1: Impact Assessment Matrix

Nature Conservation Value	Magnitude of Potential Impact			
	High	Moderate	Low	Imperceptible
International	Severe	Major	Moderate	Minor
National	Severe	Major	Moderate	Minor
County	Major	Moderate	Minor	Minor
Local	Moderate	Minor	Minor	Negligible
Low	Minor	Negligible	Negligible	Negligible

3.12 LIMITATIONS

The principal limitations encountered during the current study related to mammal surveys and the difficulties in identifying the presence of holts, couches and setts in very dense scrub vegetation which occurs to the north of the canal.

4.0 RESULTS

4.1 DESKTOP ASSESSMENT

4.1.1 Designated Conservation Areas

The proposed greenway is not located within our bounding any European Sites. Only one European Sites, the Rye Water Valley/Carton SAC, is located within the 5km zone of influence of the project site. The boundary of this SAC is located approximately 4km to the north of the project site. No NHAs are located within 5km of the proposed greenway.

The proposed greenway is entirely located within the Grand Canal pNHA. The Liffey Valley pNHA is located approximately 2.8km to the north, while the Royal Canal pNHA is located approximately 4.5km to the north of the proposed greenway.

A brief synopsis of each of these conservation areas are provided in the following sub-sections. In addition to these four conservation areas an additional four European Sites occur downstream of the proposed greenway at Dublin Bay. These sites are the South Dublin Bay River Tolka Estuary SPA; North Bull Island SPA; South Dublin Bay SAC; and North Dublin Bay SAC. These four sites are located approximately 20km downstream of the proposed greenway and occur while outside the defined zone of influence of this project. Nevertheless a full account of these European Sites, their qualifying features of interest and an assessment of the project's potential to result in likely significant effects to their Conservation Objectives is provided in the Screening Statement in support of Appropriate Assessment for the project.

4.1.1.1 Grand Canal pNHA

The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. The Grand Canal Natural Heritage Area (NHA) comprises the canal channel and the banks on either side of it. The canal system is made up of a number of branches - the Main Line from Dublin to the Shannon, the Barrow Line from Lowtown to Athy, the Edenderry Branch, the Naas and Corbally Branch and the Milltown Feeder. The Kilbeggan Branch is dry at present, but it is hoped to restore it in the near future. Water is fed into the summit level of the canal at Lowtown from Pollardstown Fen, itself an NHA.

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 Guelder-rose (*Viburnum opulus*) are present. The vegetation of the towpath is usually dominated by grass species. 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.

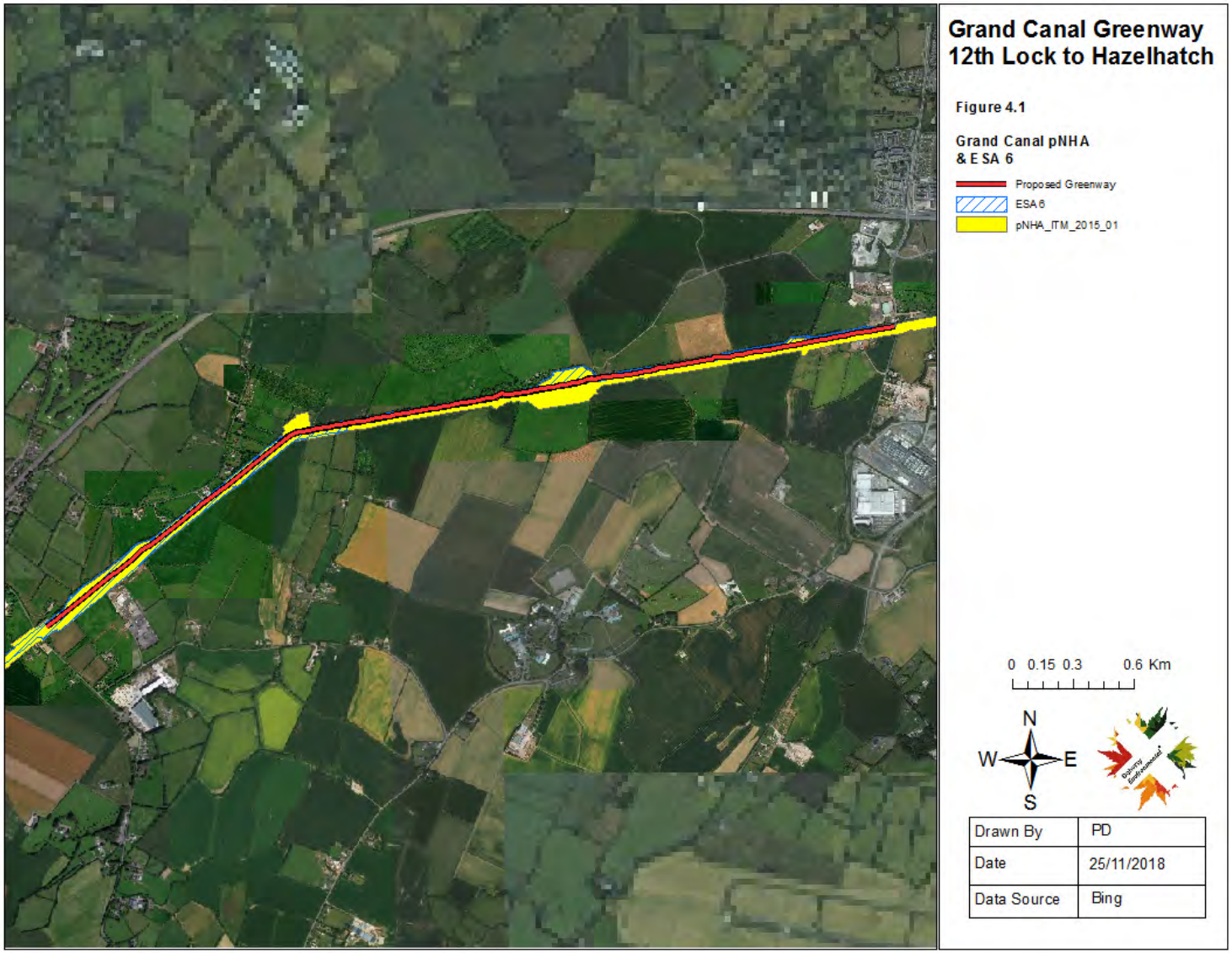
The diversity of the water channel is particularly high in the eastern section of the Main Line - between the Summit level at Lowtown and Inchicore. Arrowhead (Sagittaria sagittifolia) and Watercress (Nasturtium officinale) are more common in this stretch than on the rest of the system. All sites for Hemlock Water-dropwort (Oenanthe crocata) on the Grand Canal system are within this stretch. The aquatic flora of the Corbally Extension of the Naas Branch of the canal is also very diverse, with a similar range of species to the eastern Main Line.

Otter spraints are found along the towpath, particularly where the canal passes over a river or stream. The Common Newt breeds in the ponds on the bank at Gollierstown in Co. Dublin. The Rare and legally protected Opposite-leaved Pondweed (Groenlandia densa) (Flora Protection Order 1987) is present at a number of sites in the eastern section of the Main Line, between Lowtown and Ringsend Basin in Dublin.

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. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods. Figure 4.1 shows the extent of this European Sites along the proposed greenway.

4.1.1.1.1 Grand Canal Ecological Sensitive Area (ESA)

The section of the Grand Canal between Hazelhatch and the 12th Lock has been identified as a ecological sensitive area (ESA) during ecological surveys of the entire main line of the Grand Canal in 2015 (ROD, 2016). Figure 4.1 shows the extent of this European Sites along the proposed greenway. This ESA was identified as ESA no. 6 along the main line of the Grand Canal and was described as follows:


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.1
Grand Canal pNHA
& E SA 6
Proposed Greenway
ESA 6
pNHA_ITM_2015_01
0 0.15 0.3 0.6 Km
N
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Date
25/11/2018
Data Source
Bing

This ESA is identified for the diverse vegetation within the open channel and the rich diversity and zonation on the canal verge. The aquatic diversity includes *Sagittaria sagittifolia* swamp amongst well developed fringe *Nuphar-Potamogeton* communities. The *Phragmites* swamp is also well developed along the canal margins between Aylmers and Gollierstown Bridges.

The south canal verge is also diverse with Common Spotted Orchid (*Dactylorhiza fuchsii*) and many constant species of neutral and dry calcareous grassland abundant. Beyond the south canal boundary there is a mature species-rich hedgerow/woodland including Oak, Ash, Spindle, Sycamore, Willow and Beech. The scrub and woodland mosaic along the north boundary of the canal between Hazelhatch and Aylmer Bridges is also diverse.

4.1.1.2 Liffey Valley pNHA

The River Liffey is a designated salmonid water and the Liffey Valley pNHA forms part of the Liffey Valley Special Amenity Areas Order 1990. The Liffey Valley pNHA is important because of the diversity of the habitats within the site, ranging from aquatic to terrestrial. A number of rare and threatened plant species have been recorded from the site including the threatened Green Figwort (*Scrophularia umbrosa)*, a species listed in the Irish Red Data Book, which has been recorded from a number of stations along the river within the site. The rare and legally protected Hairy St. John's-Wort (*Hypericum hirsutum)* (Flora Protection Order 2015) has been recorded from woodlands in this site. This species has only been recorded in Kildare and Dublin, at sites on the river Liffey, since 1970. The threatened Yellow Archangel (*Lamiastrum galeobdolon)*, listed in the Irish Red Data Book, is also recorded in the Liffey Valley pNHA woodlands.

4.1.1.3 Royal Canal pNHA

The Royal Canal pNHA comprises the central channel and the banks on either side of it. 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 Guelder-rose (Viburnum opulus) are present.

The vegetation of the towpath is usually dominated by grass species. Crested Dog's-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) (Flora Protection Order 1987) 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 habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.

4.1.1.4 Rye Water Valley/Carton SAC

Rye Water Valley/Carton SAC is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in parenthesis are Annex 1 Habitat and Annex 2 Species codes, as listed in the EU Habitats Directive):

[7220] Petrifying Springs*;

[1014] Narrow-mouthed Whorl Snail (*Vertigo angustior*); and

[1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*).

Hairy St. John's-wort (*Hypericum hirsutum*), a species legally protected under the Flora (Protection) Order, 1999, occurs in Carton Estate and there is an old record from the estate for the similarly protected Hairy Violet (*Viola hirta*). However, this latter species has not been recorded from the site in recent years. Another species listed in the Red Data Book, Green Figwort (*Scrophularia umbrosa*), occurs on the site in several locations by the Rye Water. The woods at Carton Demesne are the site of a rare Myxomycete fungus, *Diderma deplanatum*.

The marsh, mineral spring and seepage area found at Louisa Bridge supports a good diversity of plant species, including stoneworts, Marsh Arrowgrass (*Triglochin palustris*), Purple Moor-grass (*Molinea caerulea*), sedges (*Carex* spp.), Common Butterwort (*Pinguicula vulgaris*), Marsh Lousewort (*Pedicularis palustris*), Grass-of- parnassus (*Parnassia palustris*) and Cuckooflower (*Cardamine pratensis*). The mineral spring found at the site is of a type considered to be rare in Europe and is a habitat listed on Annex I of the E.U. Habitats Directive. The Red Data Book species Blue Fleabane (*Erigeron acer*) is found growing on a wall at Louisa Bridge.

The Rye Water is also a spawning ground for Trout and Salmon, and the rare, White- clawed Crayfish (*Austropotamobius pallipes*) has been recorded at Leixlip. The latter two species are listed on Annex II of the E.U. Habitats Directive.

Both *Vertigo angustior* and *Vertigo moulinsiana* occur at Louisa Bridge (see Figure 4.1 for location). *Vertigo angustior* occurs in marsh habitat surrounding the petrifying spring at Louisa Bridge and also at the base of the spring-fed slope along the riparian flood plain of the Rye Water (Kelly-Quinn & Baars, 2012). The most recent monitoring report for *Vertigo angustior* (Moorkens & Killeen, 2011) recorded the status of this species within the Rye Water Valley/Carton SAC at unfavourable/bad conservation status, with 0.61 ha of sub-optimal and unsuitable habitat being recorded at this site.

4.1.2 NBDC Records

The proposed greenway spans the five tetrads O03A, O03B, O03F O03G and N93V. A review of protected and rare species records for each of these tetrads held by Biodiversity Ireland (www.biodiversityireland.ie accessed on the 20th November 2017) was undertaken.

The protected, rare and/or sensitive species recorded within the 4 tetrads surrounding the proposed greenway are outlined in Table 4.1. As virtually all birds are protected in Ireland, only records for amber and red listed species are detailed in this table. A comment on the likelihood of each of these species occurring within the Proposed access road is also provided in the table below. The likelihood of presence is based upon the habitat occurring within the Proposed access road.

Table 4.1: Protected and/or Rare Species occurring in the 4 Tetrads surrounding the Proposed access road

Common Name	Status	Record Date	Likelihood of being supported by the project site and adjacent area
Smooth Newt	Protected Species: Wildlife Acts	2010	Suitable habitat is provided along field boundary hedgerow and drainage ditches and along the Coldflow Stream. Ponds located adjacent to the Grand Canal to the north of the proposed access road provide suitable habitat for this species also.
Common Frog	Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts	1997 2011	Suitable habitat is provided along field boundary hedgerow and drainage ditches and along the Coldflow Stream. Ponds located adjacent to the Grand Canal to the north of the proposed access road provide suitable habitat for this species also.
Kestrel	Amber Listed	Bird Atlas 2007 - 2011	Suitable foraging habitat is available for kestrel.
Common Buzzard	Green Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided within the proposed access road.
Sparrowhawk	Green Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway.
Red Kite	Amber Listed	2016	Suitable habitat is provided along the proposed greenway
Skylark	Amber Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway
Common Swift	Amber Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway
Yellowhammer	Red Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway
Black-headed Gull	Red Listed	Bird Atlas 2007 - 2011	Winter roosting habitat is provided along the proposed greenway
Grey Wagtail	Red Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway
Golden Plover	Red Listed	Bird Atlas 2007 - 2011	Suitable roosting and winter grazing on stubble is provided along the proposed greenway.

Common Name	Status	Record Date	Likelihood of being supported by the project site and adjacent area
Mistle Thrush	Amber Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway.
Kingfisher	Protected Species; Listed on Annex 1 of EU Birds Directive; Amber-listed.	Bird Atlas 2007 - 2011	Suitable roosting and foraging habitat is provided along the proposed greenway. Suitable nesting habitat is limited.
Little Egret	Protected Species; Listed on Annex 1 of EU Birds Directive	Bird Atlas 2007 - 2011	Suitable roosting habitat is provided along the proposed greenway.
House Martin	Amber Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway.
Little Grebe	Amber Listed	Bird Atlas 2007 - 2011	Suitable roosting and foraging habitat is provided along the proposed greenway.
Northern Lapwing	Red Listed	Bird Atlas 2007 - 2011	Suitable roosting habitat is provided along the proposed greenway.
Tufted Duck	Red Listed	Bird Atlas 2007 - 2011	Suitable roosting and foraging habitat is along the proposed greenway.
Common Coot	Amber Listed	Bird Atlas 2007 - 2011	Suitable roosting and foraging habitat is provided along the proposed greenway.
Mute Swan	Amber Listed	Bird Atlas 2007 - 2011	Suitable roosting and foraging habitat is provided along the proposed greenway.
Cormorant	Amber Listed	Bird Atlas 2007 - 2011	Suitable roosting and foraging habitat is provided along the proposed greenway.
Herring Gull	Red Listed	Bird Atlas 2007 - 2011	Winter roosting habitat is provided along the proposed greenway.
Lesser Black-backed Gull	Amber Listed	Bird Atlas 2007 - 2011	Winter roosting habitat is provided along the proposed greenway.
Great Black-backed Gull	Amber Listed	Bird Atlas 2007 - 2011	Winter roosting habitat is provided along the proposed greenway.
Linnet	Amber Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway.

Common Name	Status	Record Date	Likelihood of being supported by the project site and adjacent area
Barn Swallow	Amber Listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway.
House Sparrow	Amber listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway.
Common Starling	Amber listed	Bird Atlas 2007 - 2011	Suitable habitat is provided along the proposed greenway.
Redshank	Red Listed	Bird Atlas 2007 - 2011	Suitable roosting habitat is provided along the proposed greenway.
Trimmer's Mining Bee	Critically Endangered	1977	No recent record of this species. The last record of this species in the tetrad O03G was from 1977. Preferred nest sites for this species occurs in sparsely vegetated or short cropped areas exposed to sunshine such as south-facing banks and slopes. Such banksides occur along the proposed greenway.
Andrena (Melandrena) nigroaenea	Vulnerable	1977	See appraisal for Trimmer's Mining Bee.
Pisidium hibernicum	Near threatened	2003	Last recorded in 2003 in the tetrad O03G. Likely to be supported by the freshwater habitats along the proposed greenway.
Pisidium pulchellum	Near Threatened	2003	Last recorded in 2003 in the tetrad O03G. Likely to be supported by the freshwater habitats within and along the proposed greenway.
Myxas glutinosa	Endangered		Last recorded in 2003 in the tetrad N93V. The Grand Canal is known to support this species.
Chaetarthria seminulum	Threatened	1987	This species is mainly associated with large lake habitats. No record for this species in the wider region was noted in the Red List of Irish Water Beetles (Foster, 2009).
Otter	Protected Species; EU Habitats Directive Annex II	1980 1982	Suitable foraging habitat is provided along the proposed greenway.
Irish Hare	Protected Species: Wildlife Acts	2006	Suitable foraging habitat is provided along the proposed greenway.

Common Name	Status	Record Date	Likelihood of being supported by the project site and adjacent area
Badger	Protected Species: Wildlife Acts	1992 2008	Suitable foraging habitat is provided along the proposed greenway.
Hedgehog	Protected Species: Wildlife Acts	2012	Suitable foraging habitat is provided along the proposed greenway.
Daubenton's Bat	Protected Species; EU Habitats Directive Annex IV	2013 2014	Suitable foraging habitat is provided along the proposed greenway.
Leisler's bat	Protected Species; EU Habitats Directive Annex IV	2002 2009	Suitable foraging habitat is provided along the proposed greenway.
Soprano pipistrelle	Protected Species; EU Habitats Directive Annex IV	2009 2013	Suitable foraging habitat is provided along the proposed greenway.
Common pipistrelle	Protected Species; EU Habitats Directive Annex IV	2002 2009	Suitable foraging habitat is provided along the proposed greenway.
Brown long-eared	Protected Species; EU Habitats Directive Annex IV	2002	Suitable foraging habitat is provided along the proposed greenway.
Pygmy shrew	Protected Species: Wildlife Acts	2012	Suitable foraging habitat is provided along the proposed greenway.
Meadow Barley	Protected: Flora Protection Order; Endangered	1922	No recorded since 1922. Unlikely to occur along the proposed greenway.

4.1.3 Invasive Plant Species

The non-native invasive species Canadian Waterweed (*Elodea canadensis*) is abundant instream along the section of the canal opposite the proposed greenway. A non-native ornamental pea species was also recorded along the canal adjacent to an overflow to the back drain at GR698125 730379. The non-native Symphoricarpos albus was recorded in wet woodland habitat between the canal and the back-drain to the west of the proposed greenway.

4.2 SURVEY RESULTS

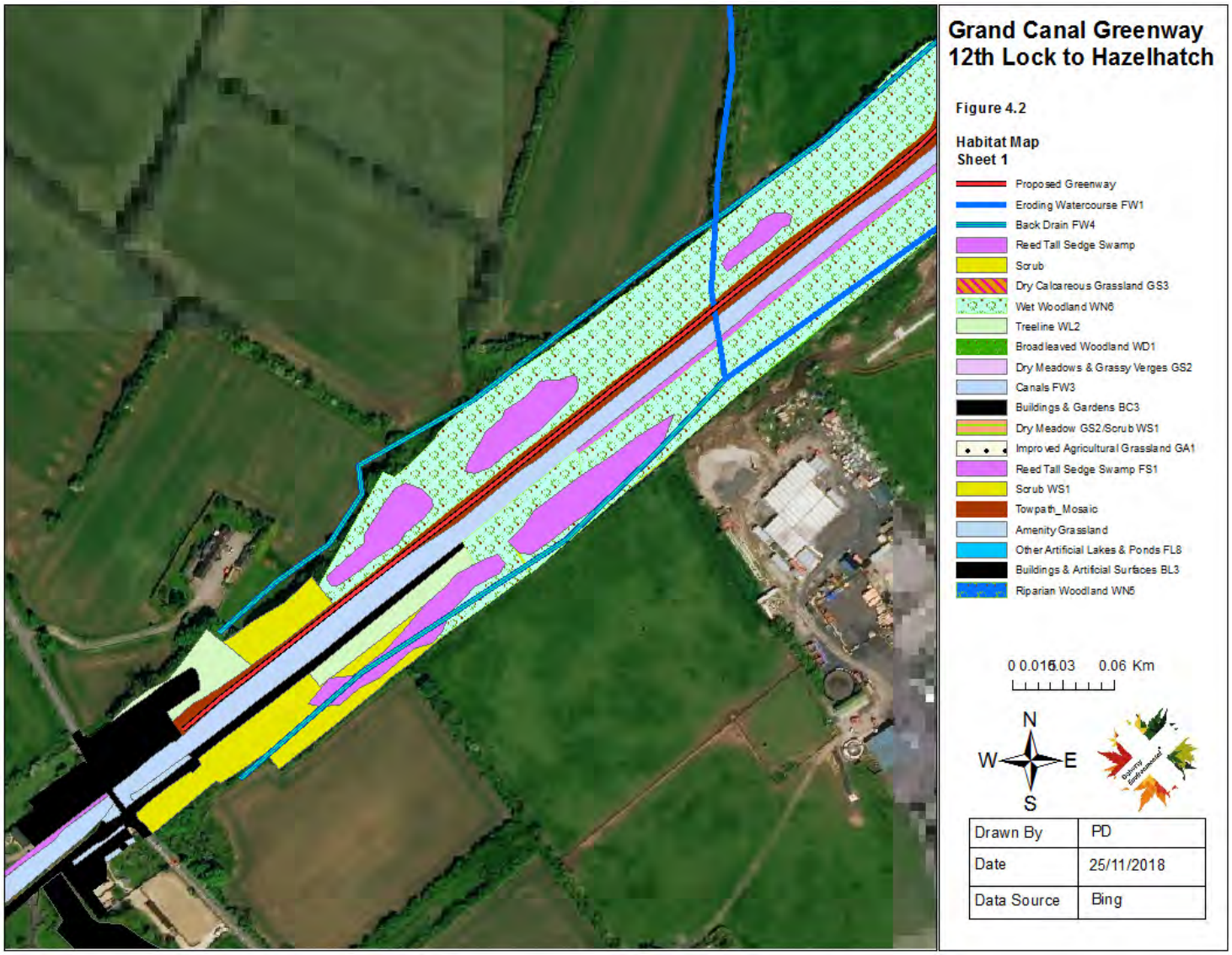
4.2.1 Habitats

The habitats recorded along the proposed greenway are listed in Table 4.2 below and the following sub-sections provide a description of the each of the habitats occurring within and immediately adjacent to the proposed greenway. Each habitat described below has been identified to Level 3 of Fossit's *Guide to Habitats in Ireland*. The alpha-numeric code for each habitat is also provided alongside the habitat name (e.g. Treeline WL2). The locations and extent of each habitat described below are illustrated Habitat Maps: Figure 4.2 to 4.10. The extent and distribution of habitats occurring along the proposed greenway is based on the initial habitat mapping completed by ROD in 2015. Alterations to habitats have been made at locations where the findings of the 2018 surveys differed from those recorded in 2015. The main difference in the findings of the initial 2015 habitat surveys and the 2018 habitat ground-truthing surveys are to the west of the proposed greenway where scrub habitat has been changed to wet woodland and swamp habitat and in the vicinity of Gollierstown quarry where dry meadow and grassy verge grassland has been changed to dry calcareous grassland. The habitat descriptions outlined for habitats by ROD (ROD, 2016a, ROD, 2016b) also provide a basis for the habitat descriptions outlined below.

Table 4.2: Level III Habitats occurring along the Proposed Greenway

Habitat Code	Habitat Name
TM	Towpath habitat mosaic
FL8	Other artificial lakes and ponds
FS1	Reed and tall sedge swamp
FS2	Tall herb swamp
FW3	Canal
GA1	Improved agricultural grassland
GA2	Amenity Grassland
GS1	Dry calcareous and neutral grassland
GS2	Dry meadows and grassy verges
WD1	Broadleaved woodland

WL1	Hedgerows
WL2	Treeline
WN5	Riparian woodland
WN6	Wet Willow Alder Ash woodland
ED2	Spoil and bare ground
ED3	Recolonising bare ground
ED5	Refuse and other waste
BL1	Stone Walls
BL3	Buildings and artificial surfaces
WS1	Scrub


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.2
Habitat Map
Sheet 1
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
Canals FW3
Buildings & Gardens BC3
Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
Reed Tall Sedge Swamp FS1
Scrub WS1
Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
Buildings & Artificial Surfaces BL3
Riparian Woodland WN5
0 0.015 0.03 0.06 Km
N
W
E
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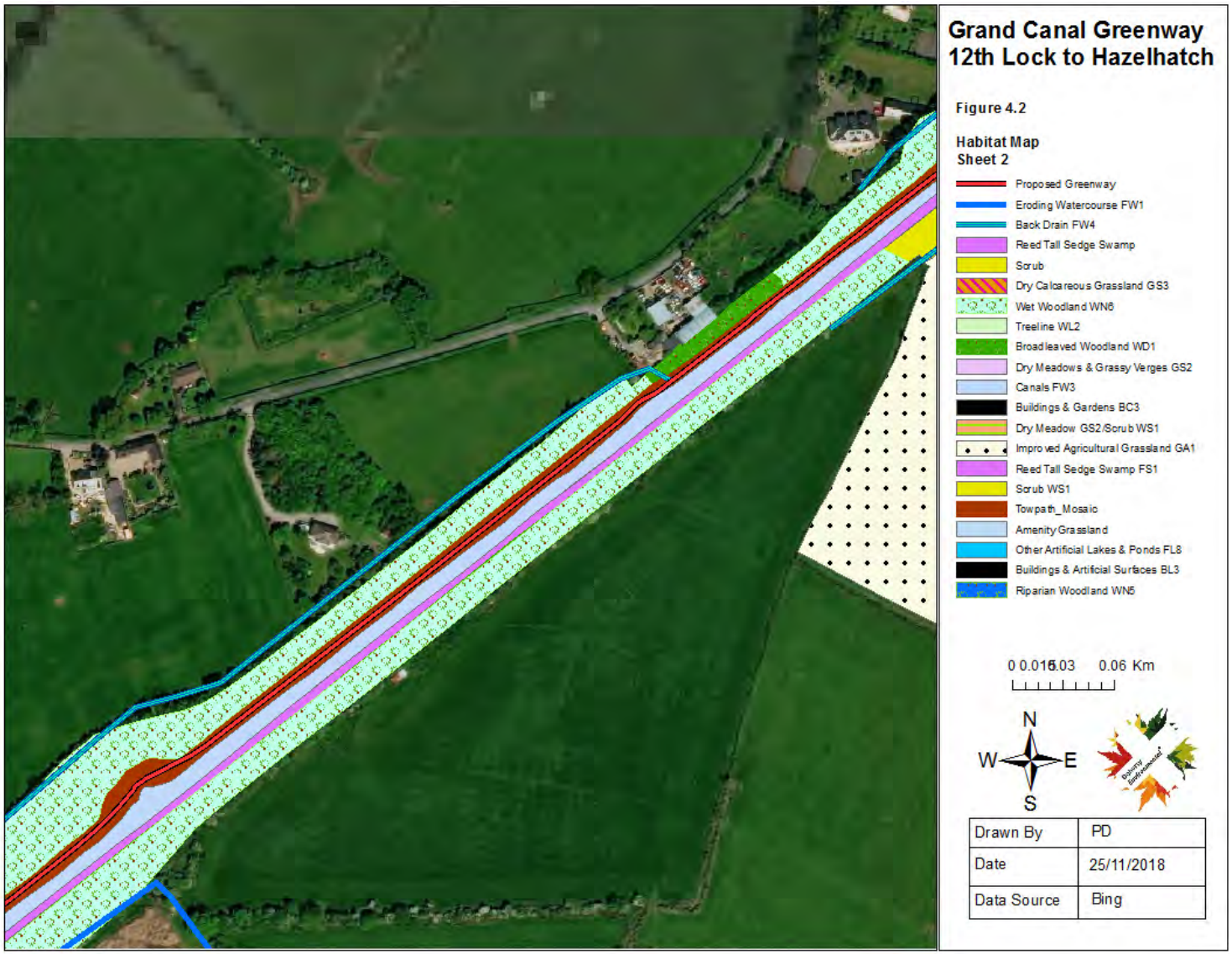
Drawn By PD
Date 25/11/2018
Data Source Bing


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.2
Habitat Map
Sheet 2
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
Canals FW3
Buildings & Gardens BC3
Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
Reed Tall Sedge Swamp FS1
Scrub WS1
Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
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Riparian Woodland WN5
0 0.015 0.03 0.06 Km
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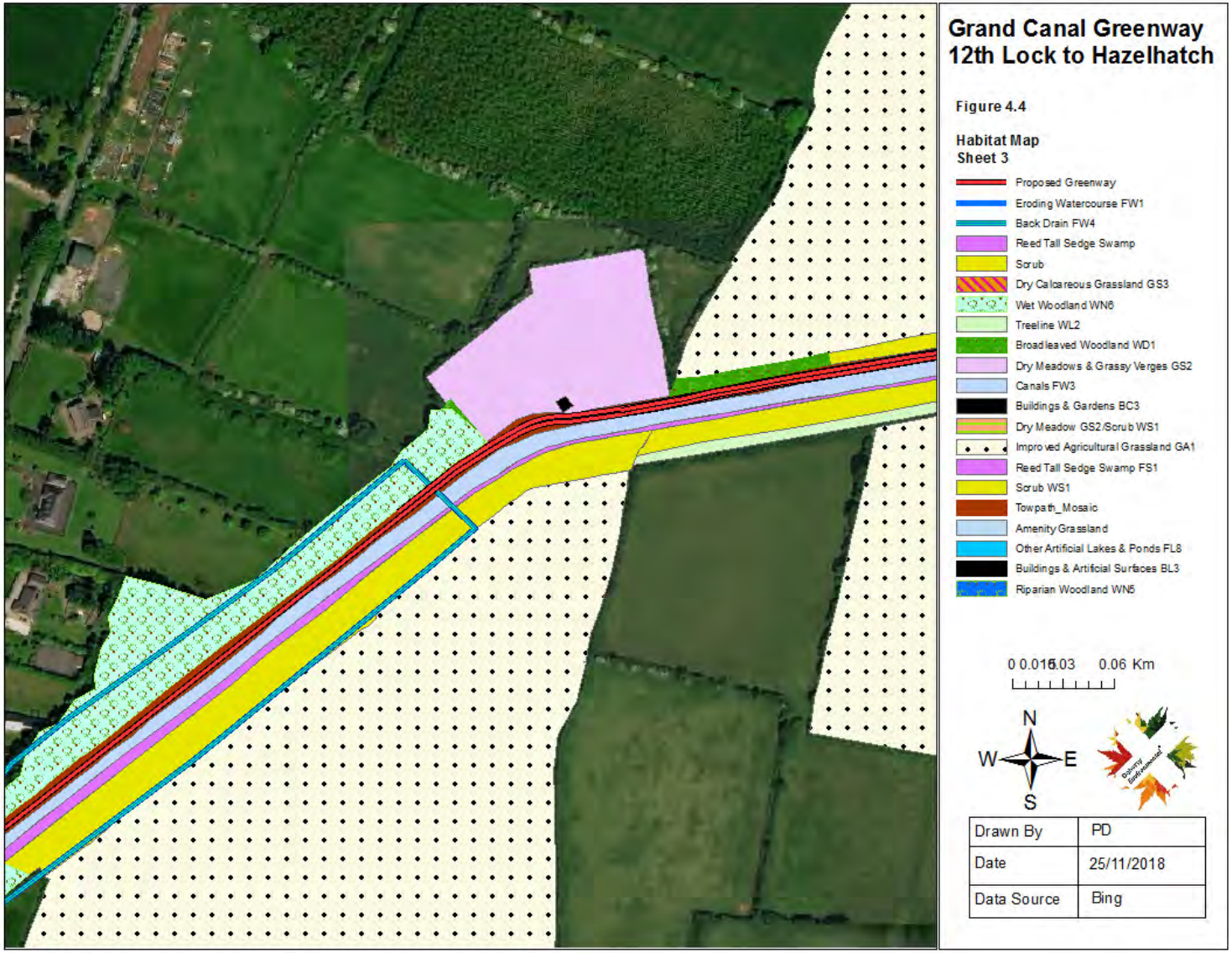
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.4
Habitat Map
Sheet 3
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
Canals FW3
Buildings & Gardens BC3
Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
Reed Tall Sedge Swamp FS1
Scrub WS1
Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
Buildings & Artificial Surfaces BL3
Riparian Woodland WN5
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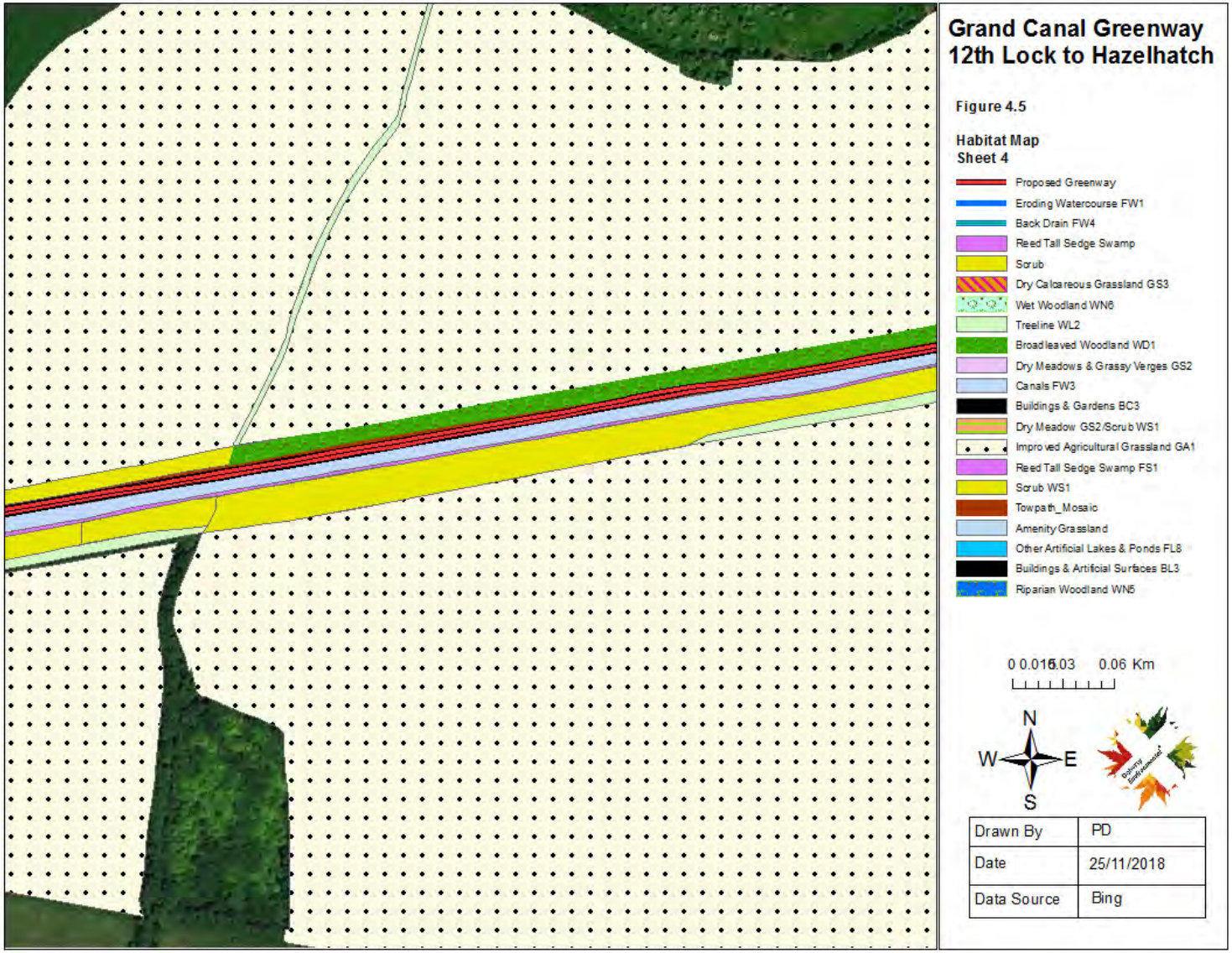
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.5
Habitat Map
Sheet 4
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
Canals FW3
Buildings & Gardens BC3
Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
Reed Tall Sedge Swamp FS1
Scrub WS1
Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
Buildings & Artificial Surfaces BL3
Riparian Woodland WN5
0 0.015 0.03 0.06 Km
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Date 25/11/2018
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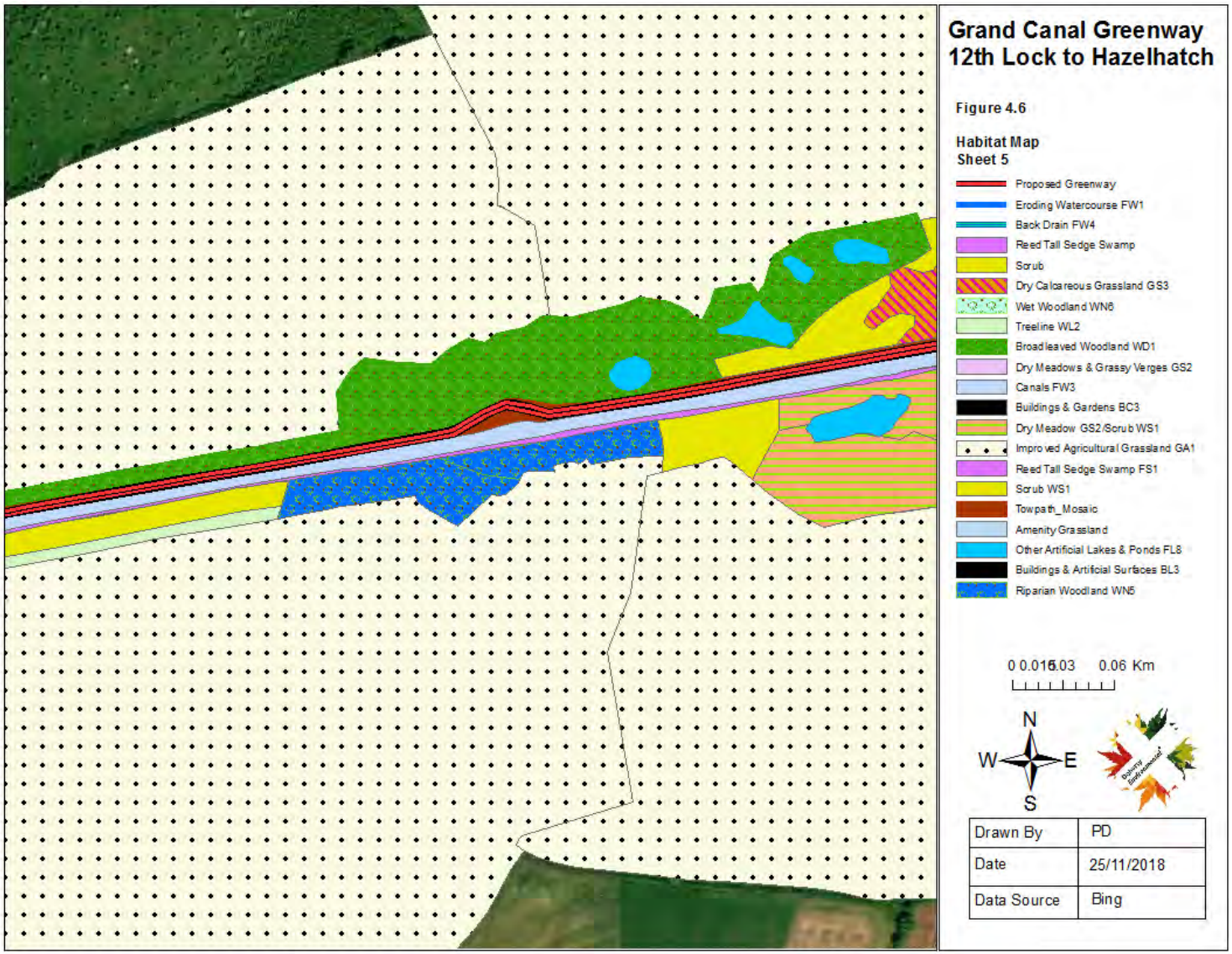
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.6
Habitat Map
Sheet 5
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
Canals FW3
Buildings & Gardens BC3
Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
Reed Tall Sedge Swamp FS1
Scrub WS1
Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
Buildings & Artificial Surfaces BL3
Riparian Woodland WN5
0 0.015 0.03 0.06 Km
N
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Date 25/11/2018
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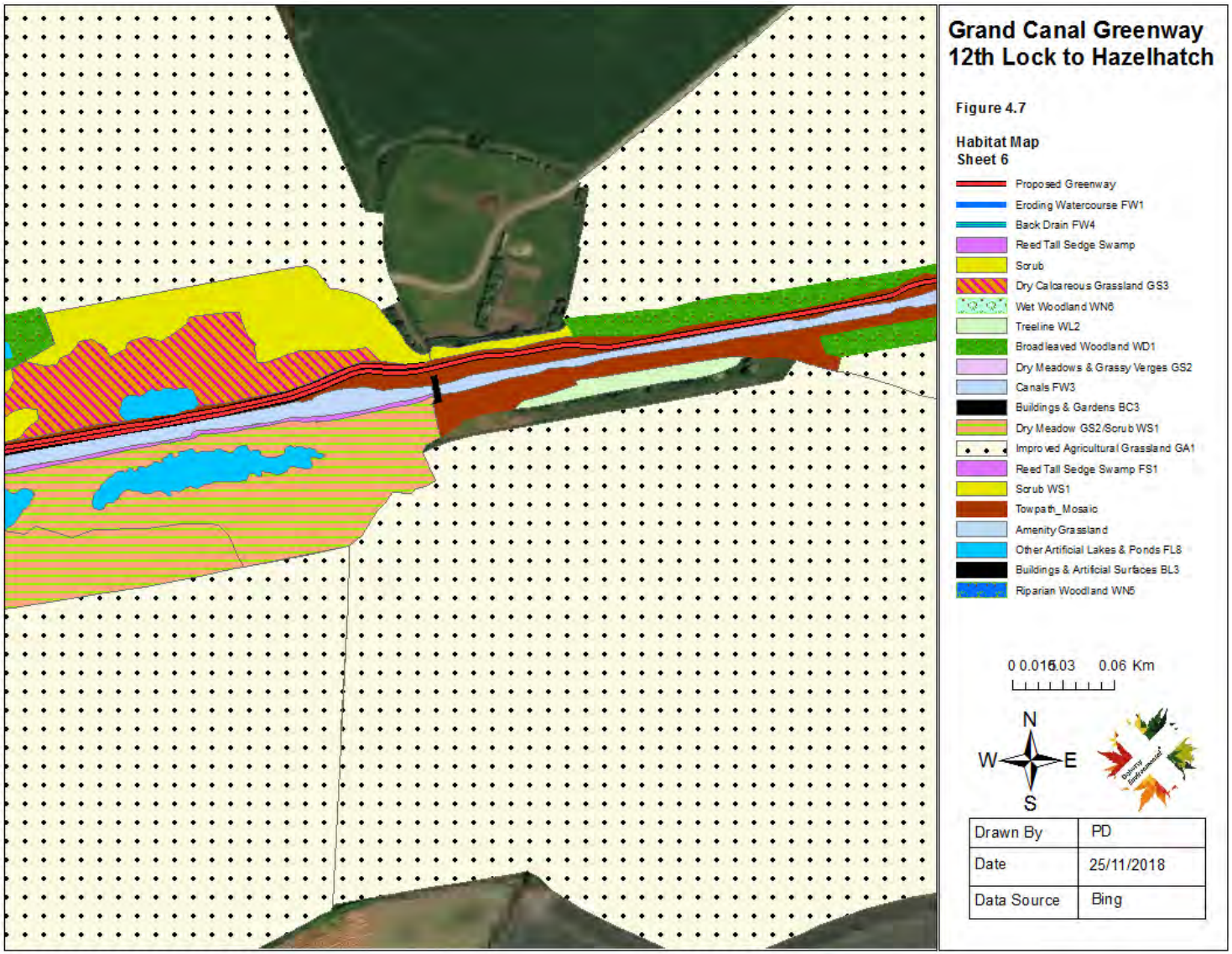
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.7
Habitat Map
Sheet 6
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
Canals FW3
Buildings & Gardens BC3
Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
Reed Tall Sedge Swamp FS1
Scrub WS1
Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
Buildings & Artificial Surfaces BL3
Riparian Woodland WN5
0 0.015 0.03 0.06 Km
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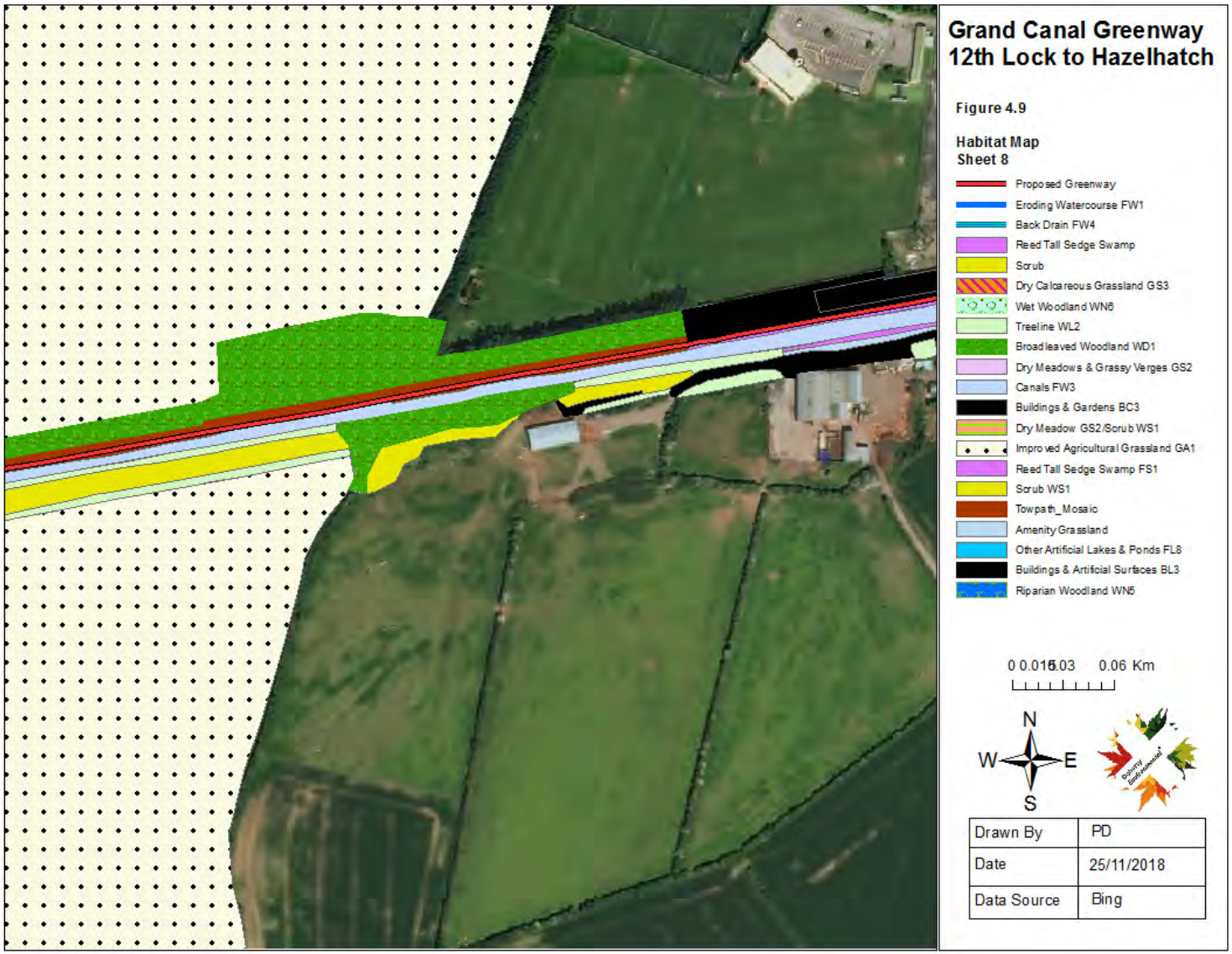
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.9
Habitat Map
Sheet 8
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
Canals FW3
Buildings & Gardens BC3
Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
Reed Tall Sedge Swamp FS1
Scrub WS1
Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
Buildings & Artificial Surfaces BL3
Riparian Woodland WN5
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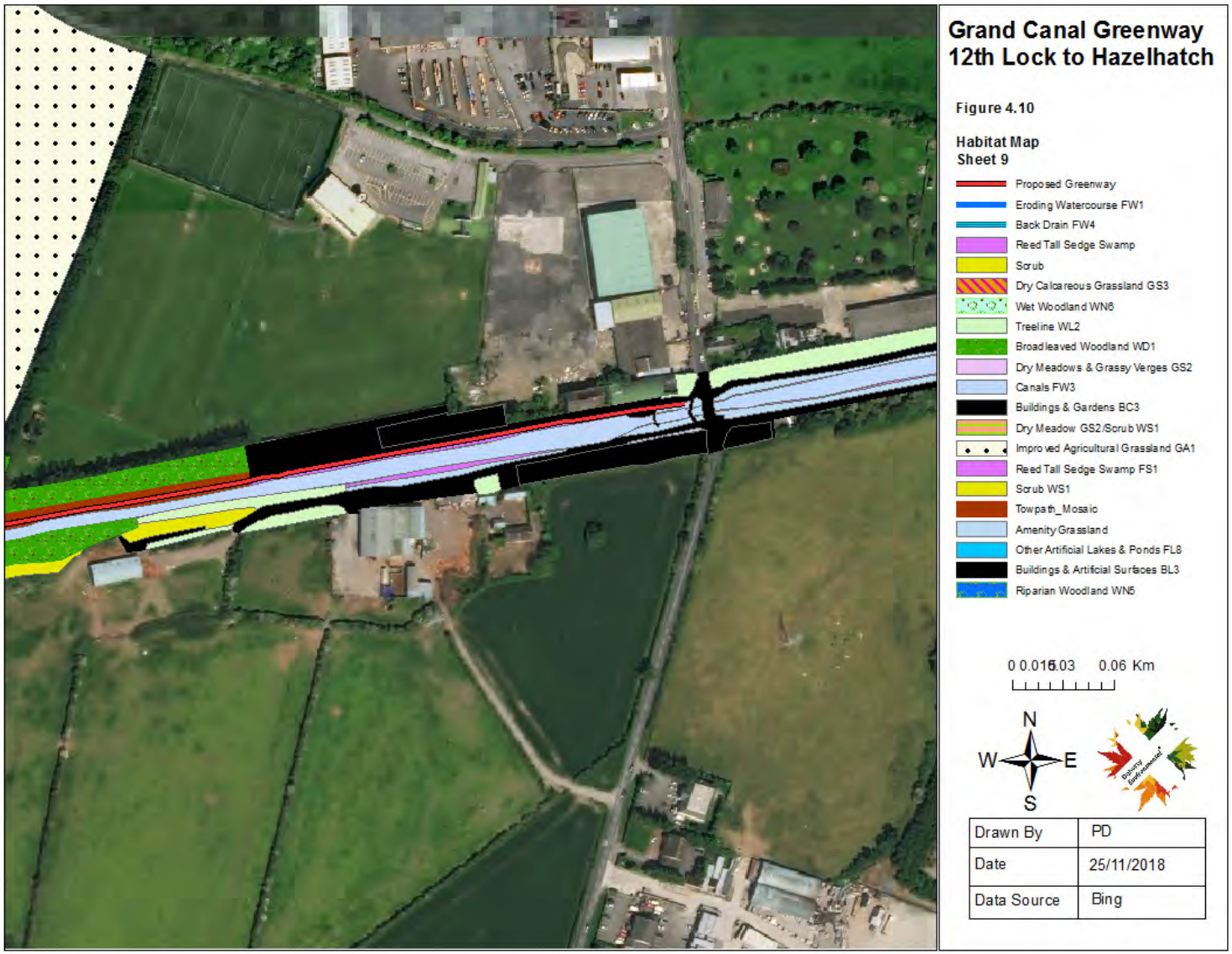
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.10
Habitat Map
Sheet 9
Proposed Greenway
Eroding Watercourse FW1
Back Drain FW4
Reed Tall Sedge Swamp
Scrub
Dry Calcareous Grassland GS3
Wet Woodland WN6
Treeline WL2
Broadleaved Woodland WD1
Dry Meadows & Grassy Verges GS2
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Dry Meadow GS2/Scrub WS1
Improved Agricultural Grassland GA1
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Towpath_Mosaic
Amenity Grassland
Other Artificial Lakes & Ponds FL8
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Date 25/11/2018
Data Source Bing

4.2.1.1 Towpath habitat mosaic

Towpath Mosaic is a bespoke habitat category developed by Waterways Ireland to describe the uniform habitat components that occur between open canal (FW3) and the vegetation either side of the towpath including the canal verge. This approach and habitat category is consistent with other Waterways Ireland canal surveys (see also Smith & Gittings, 2014). Due to the narrow bands of varying habitats along the canal bank, a towpath mosaic was used to map the transition from emergent vegetation at the edge of the canal to the semi- natural neutral/calcareous dry grassland communities found consistently throughout the canal towpath and boundary. This zonation in habitat was typically categorised as incorporating habitat types reed and large sedge swamp (FS1) to marsh (GM1) to wet grassland (GS4) and then to dry meadows and grassy verges (GS2) at the edge of the towpath. The towpath mosaic occurs over a width of approximately 2-3 m or less. Additionally, a towpath mosaic consisting of amenity grassland (GA2), spoil and bare ground (ED2), dry meadows and grassy verges (GS2) and scrub (WS1) was often a common zonation identified along the canal bank.

4.2.1.2 Other artificial lakes and ponds

This category is used for artificial or ornamental bodies of standing water that may be found in parks, demesnes, gardens or golf courses. Flooded quarries, tailings, ponds and water treatment plants (with open water) are also included. The examples of this habitat occurring to the north and south of the canal are representative of flooded quarry voids, being associated with Gollierstown Quarry which was quarried in the 1800's to provide stone for the building of the canal. The ponds are of variable size but all are likely to be of significant depth. They are fringed by swamp and marsh communities dominated by *Typha latifolia, Phragmites australis, Glyceria maxima* and *Filipendula ulmaria*. Other species occurring include *Schoenoplectus lacustris, Galium palustre, Ranunculus flammula, Equisetum fluviatile, Carex disticha, Carex acutiformis, Iris pseudacorus, Menyanthes trifoliata, Lythrum salicaria, Epilobium hirsutum, Eupatoria cannabinum*, *Lycopus europaeus* and *Angelica sylvestris* The levels in the ponds immediately adjacent to the canal are likely to be influenced by water seepage from the canal. Trial pits undertaken along the northern towpath in November 2018 indicated that water was seeping through the canal linear and under the towpath stone-work.

4.2.1.3 Reed and tall sedge swamp

This category includes species-poor stands of herbaceous vegetation that are dominated by reeds *Phragmites australis* and other large grasses *Glyceria* or large, tussock-forming sedges. Most reed and large sedge swamps are overwhelmingly dominated by one or a small number of species, as in the case of reedbeds. The examples occurring adjacent to the northern towpath are dominated by Phragmites australis, which occur as monospecific stands along some sections of the canal. Other species associated with this habitat include *Typha latifolia, Glyceria maxima, Sparganium emersum* and *Schoenoplectus lacustris*. Examples of Typha latifolia, *Glyceria maxima* and *Sparganium emersum* dominated tall reed swamp occur adjacent to the back drain at lower elevations to the north of the canal nearer the Hazelhatch end of the proposed greenway. Poor drainage in this area has led to the development of this swamp community.

4.2.1.4 Tall Herb Swamp

Tall-herb swamps are comparatively species-rich stands of herbaceous vegetation that occur in wet areas where the water table is above the ground surface for most of the year, or where water levels fluctuate regularly as in the case of tidal sections of rivers. Tall or robust broadleaved herbs dominate and common components include *Berula erecta*, *Apium nodiflorum*, *Lycopus europaeus*, *Veronica beccabunga*, *Oenanthe crocata*, *Eupatorium cannabinum* and *Myosotis scorpioides*. These swamps may also support *Iris pseudacorus*, *Alisma plantago-aquatica* and *Equisetum fluviatile*, in addition to occasional reeds, large grasses *Glyceria maxima, Festuca arundinacea* and sedges. This habitat forms part of the zonation within the Towpath Mosaic (TM).

4.2.1.5 Canal FW3

Canals are The Grand Canal adjacent to the proposed greenway represents the dominant habitat feature in the vicinity of the route. It is 8 to 10m wide along the entire stretch of the proposed route. The Grand Canal is representative of an artificial linear body of water that was originally constructed for the purpose of navigation. The canal adjacent to the proposed greenway is still open to navigation and a number of canal barges are moored permanently on the canal at Hazelhatch.

Channel dredging and maintenance to retain canal function for boat traffic along the canal frequently removes shallower, marginal areas within the channel. This has resulted in sharp transition between the emergent vegetation and aquatic communities in the channel.

Aquatic macrophytes occurring along the canal is restricted to a number of species with *Elodea canadensis, Nuphar lutea, Lemna trisculca, Potamogeton natans* and *Saggittaria sagittifolia* being dominant. Other species recorded along the canal include *Hipperus vulgaris, Callitriche stagnalis, Menyanthes trifoliata* and *Chara vulgaris*.

The canal provides important habitat for a range of fauna including fish, otters and white-clawed crayfish.

4.2.1.6 Improved agricultural grassland

This category is used for intensively managed or highly modified agricultural grassland that has been reseeded and/or regularly fertilized, and is now heavily grazed and/or used for silage making. It includes regularly reseeded monoculture grasslands and rye-grass leys that are planted as part of an arable rotation. These differ significantly from areas of permanent grassland. Improved agricultural grassland is typically species-poor. As agriculture is the predominant land use in the area, a large proportion of the land outside the canal and its verges and towpaths is classified as Improved Agricultural Grassland.

4.2.1.7 Amenity Grassland

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.

4.2.1.8 Dry calcareous and neutral grassland

This encompasses all unimproved and semi-improved grasslands on both calcareous and neutral soil. It is associated with free-draining mineral soils and low intensity agriculture. Calcareous grassland is restricted in its distribution and is now largely confined to the steep slopes of esker ridges and moraines in the midlands, and to other areas with shallow and rocky limestone soils. Management and fertiliser use makes calcareous grasslands more like neutral

grasslands in character and these have a wider distribution. Dry calcareous and neutral grassland may comprise a wide range of grasses and broadleaved herbs. Species richness varies and can be high. This habitat occurs on open embankments and ridges along the canal boundary and also in suitable conditions at the towpath verge.

Examples of this habitat occur in the vicinity of Gollierstown quarry to the north of the canal and along the vertical bank to the west of the canal. Species occurring within this habitat include *Arrhenatherum elatius, Dactylis glomerata, Briza media, Cynosurus cristatus, Festuca rubra, Brachypodium sylvaticum, Carex flacca, Plantago lanceolata, Dactylorhiza fuschii, Ranunculus bulbosus, Ranunculus acris, Ononis repens, Euphrasia sp., Stachys arvensis, Blackstonia perfoliata, Galium verum, Lotus corniculatus, Achillea millefolium, Filipendula ulmaria, Agrimonia eupatoria, Centaurea nigra, Knautia arvensis, Succisa pratensis, Prunella vulgaris, Potentilla reptans, Potentilla sterilis, Potentilla anserina, Leucanthemum vulgare, Primula veris, Bellis perennis* and *Rubus fruticosus agg*.

4.2.1.9 Dry meadows and grassy verges

This habitat occurs along the northern towpath in two forms, as intensively managed and disturbed habitat supporting a restricted range of grass and herb species along the centre of the towpath and as a more diverse and established community at the verge of the towpath adjacent to the northern boundary of the towpath. The former example is routinely mown, heavily trampled with denuded desire lines, and is likely to be subject to enrichment by regular dog walking. The vegetation occurring along this section is species-poor and consists of grasses such as Lolium perenne, Arrhenatherum elatius, Dactylis glomerata, Alopecurus pratensis, Holcus lanatus and Poa species. The herb layer is restricted and consists predominantly of commonly occurring species such as *Trifolium repens, Ranunculus repens, Ranunculus acris, Rumex acetosa, Taraxacum officinale agg,* and *Cerastium fontanum.*

In the more species-rich example of this habitat where it is less disturbed on the verge and subject to only occasional mowing the following species were noted: *Rubus fruticosus agg., Eupatorium cannabinum, Salix cinerea, Trifolium repens, Trifolium repens, Plantago lanceolata, Dactylis glomerata, Briza media Ulex europaeus, Euonymus europaeus, Poa trivialis, Poa annua, Pilosella officinalis, Rumex crispus, Vicia sepium, Crataegus monogyna, Ranunculus repens, Taraxacum officinale agg, Valeriana officinalis, Galium verum, Equisetum arvense, Filipendula ulmaria, Leontodon autumnalis, Cerastium fontanum, Sonchus arvensis,*

Lotus corniculatus, Achillea millefolium, Sambucus nigra, Arrhenatherum elatius, Salix aurita, Veronica beccabunga, Epilobium montanum, Veronica chamaedrys, Geum urbanum, Chamerion angustifolium, Lathyrus pratensis, Centaurea nigra, Primula veris, Primula vulgaris, Heracleum sphondylium, Anthriscus sylvestris, Angelica sylvestris, Lapsana communis, Ulex europaeus, Lolium perenne, Leucanthemum vulgare, Potentilla reptans, Ononis repens, Potentilla anserina, Odontites vernus, Lonicera periclymenum, Symphytum officinale, Knautia arvensis.

4.2.1.10 Broadleaved woodland

This general category includes woodland areas with 75-100% cover of broadleaved trees, and 0-25% cover of conifers. It should be used in situations where woodland stands cannot be classified as semi-natural on the basis of the criteria outlined above. Trees may include native and non-native species. Plantations of broadleaved trees are included if the canopy height is greater than 5 m, or 4 m in the case of wetland areas. Mixed Broadleaved woodland occurs frequently within the Site along the Grand Canal boundary often forming important corridors with adjacent land parcel boundaries, treelines and hedgerows.

4.2.1.11 Riparian woodland

This category includes wet woodlands of river margins (gallery woodland) and low islands that are subject to frequent flooding, or where water levels fluctuate as a result of tidal movement (in the lower reaches of rivers). Riparian woodland is dominated by stands of willows that may include native (*Salix cinerea, S. purpurea, S. triandra* and nonnative *Salix fragilis, S. alba, S. viminalis* species. *Alnus glutinosa* is occasional. The field layer is characterised by broadleaved herbs such as *Urtica dioica*, *Ranunculus repens*, Wood Dock *Rumex sanguineus*, *Filipendula ulmaria*, *Angelica sylvestris.*

4.2.1.12 Wet Willow Alder Ash woodland

This broad category includes woodlands of permanently waterlogged sites that are dominated by *Salix* spp., *Alnus glutinosa* or *Fraxinus excelsior*, or by various combinations of some or all of these trees. It includes woodlands of lakeshores, stagnant waters and fens, known as carr, in addition to woodlands of spring-fed or flushed sites. The modified and linear canal environment lacks any extensive stands of WN6 with the constant species of this habitat dominant along the canal boundary and along embankments in association with Drainage Ditches (FW4).

The examples of wet woodland on lower ground between the canal and the back-drain are representative of wet woodland ash/alder/willow carr. The dominant trees include Fraxinus excelsior, S. *cinerea, S. cinerea (oleifolia*), *Salix aurita* and alder (*Alnus glutinosa*). *Acer pseudoplatanus and Fagus sylvatica* are also frequent in this habitat. Other woody species include *Crataegus monogyna, Prunus spinosa, Corylus avellana, Ulex europaeus* and *Rhamnus cathartica*. The non-native *Symphoricarpos albus* was also noted. The herb layer consists of a range of hydrophilous and woodland species such as *Carex remota, Carex riparia, Carex acutiformis, Carex disticha*; *Senecio palustre*, Iris pseudacorus; *Scrophularia umbrosa*; Urtica dioica; *Mentha aquatica*; *Ranunculus bulbosus*; *Ranunculus repens*; Filipendula ulmaria; Galium palustre; *Phragmites australis*; wild angelica *Angelica sylvatica*; *Oenanthe crocata*; *Myosotis secunda*; *Lythrum salicaria*; *Lycopus europaeus*; *Urtica dioica* and *Lysimachia vulgaris*. Typical mosses noted during the woodland survey include *Calliergonella cuspidata*; *Thamnobryum alopecuroides; Kindbergia praelonga; Hypnum cupressiforme; Homalathecium lutescens; Neckera complanata; Ulota phyllanta; Ulota crispa;* and *Orthtrichum pulchellum.*

4.2.1.13 Scrub

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 5 m, or 4 m in the case of wetland areas. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland. In the absence of grazing and mowing, scrub can expand to replace grassland or heath vegetation. Trees are included as components of scrub if their growth is stunted as a result of exposure, poor soils or waterlogging. If tall trees are present, these should have a scattered distribution and should not form a distinct canopy. This classification is ubiquitous throughout the canal boundary often forming the towpath verge often in combination with treelines or as the transitional zone and understorey of broadleaved woodland (WD1) largely comprising *Crataegus-Prunus* associations. Scrub canbe either open, or dense and impenetrable, and it can occur on areas of dry, damp or waterlogged ground. Common components include spinose plants such as *Crataegus monogyna*, *Prunus spinosa*, *Ulex europaeus*, Euonymus europaeus, *Rhamnus cathartica Rubus fruticosus agg.* and erect or scrambling roses *Rosa* spp., in addition to a number of *Salix* spp., and *Corylus avellana*.

4.2.1.14 Hedgerows

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. In general a greater variety of hedgerow species produces a broader range of hedge structure and niches. Hedgerows are linear strips of shrubs, often with occasional trees, that typically form field or property boundaries. Most hedgerows originate from planting and many occur on raised banks of earth that are derived from the excavation of associated Drainage Ditches (FW4). Species composition varies with factors such as age, management, geology, soils and exposure. Hedgerows share many constant species and commonly support a high proportion of spinose plants such as *Crataegus monogyna*, *Prunus spinosa*, *Ulex europaeus*, *Ilex aquifolium*, *Rosa canina* or Rubus fruticosus agg., in addition to many other native and non-native trees and shrubs including, for example, *Fraxinus excelsior*, *Corylus avellana*, *Fagus sylvatica*, *Sambucus nigra*, *Ulmus spp*. and *Salix spp*..

4.2.1.15 Treeline

A treeline is a narrow row or single line of trees that is greater than 5 m in height and typically occurs along field or property boundaries. This category includes tree-lined roads or avenues, narrow shelter belts with no more than a single line of trees, and overgrown hedgerows that are dominated by trees. Most treelines are planted and trees are often regularly spaced. Treelines are found usually along the canal boundary or delineating public road and land parcels.

4.2.1.16 Spoil and bare ground

4.2.1.17 Recolonising bare ground

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.

4.2.1.18 Refuse and other waste

This category is used for any areas where domestic, industrial, agricultural and other waste is stored, treated or disposed. It includes rubbish dumps, tip heads, landfill sites, sewage plants,

slurry pits and heaps of manure or spent mushroom compost. These areas are usually characterised by high nutrient levels and/or the presence of scavengers.

There is a area corresponding to this habitat type occurring to the south of the canal a short distance to the west of the 12th Lock.

4.2.1.19 Stone Walls

Examples of this habitat occurring along the proposed greenway are restricted to the parapet walls of Gollierstown Bridge and the stonewalls associated with the canal lock at the 12th Lock. Species recorded these stonewalls include *A. ruta-muraria, A. ceterach*, A. Trichomanes, *Hedera helix, Polypodium sp., Geranium robertianum, Centranthus ruber* and *Cymbalaria muralis.*

4.2.1.20 Buildings and artificial surfaces

This broad category incorporates areas of built land that do not fit elsewhere in the classification. It includes all buildings (domestic, agricultural, industrial and community). It also includes areas of land that are covered with artificial surfaces of tarmac, cement, paving stones, bricks, blocks or Astroturf (e.g. roads, car parks, pavements, runways, yards, and some tracks, paths, driveways and sports grounds). This classification comprises paths, roads, bridges, houses and farm buildings along the canal.

4.2.2 Rare & Protected Flora

The rare flora recorded along the proposed greenway canal corridor include *Groenlandia densa* which is a species protected under the Flora Protection Order, 2015 and *Zannichellia palustris* which has an occasional distribution in Ireland.

4.2.3 Annex 1 Habitats

4.2.3.1 Dry Calcareous Grassland Neutral Grassland – Semi-natural Dry Grasslands and Scrub Facies on Calcareous Substrates (Festuco-Brometea) (6210)

The example of calcareous grassland occurring around the artificial pond to the west of Gollierstown Bridge supports a variety of calcicole species. The orchid Dactylorhiza fuschii is

present in this habitat and it is possible that other orchids, that did not flower during the 2018 season, are also supported by this habitat. The GS1 areas have affinity to the Annex I habitat 6210. This Annex I habitat is listed as a priority habitat where it is found to support important orchid sites. The JNCC in the UK and the Irish Semi-natural Grassland Survey have split this Annex I habitat type into two sub-types 6210 and 6211, with the latter representing the priority habitat supporting important orchid sites. The example of dry calcareous grassland occurring in the vicinity of Gollierstown Quarry has links to the former 6210 habitat. The presence of scrub facies within this grassland is also consistent with the characteristics of this Annex I habitat. The presence of established yellow meadow anthills, which are not in themselves diagnostic of calcareous grassland, is also an indication of the semi-natural condition of this grassland that exists in an undisturbed state.

4.2.3.2 Annex I habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine level (6430)

Examples of the tall herb swamp habitat occurring along the canal and surrounding pond habitat to the west of Gollierstown Bridge have affinities to this Annex I habitat. Many of the positive indicator species associated with this habitat such as *Filipendula ulmaria, Eupatorium cannabinum, Calystegia sepium, Alisma plantago-aquatica, Stachys palustris, Valeriana officinalis, Galium palustre, Angelica sylvestris* etc occur within this habitat. However the examples of this habitat along the canal would fail on other criteria due to the presence of negative indicator species and particularly *Glyceria maxima* and *Urtica dioica*, which can be frequent to dominant in places, and the ongoing management regime of the habitat which results in the mowing of the sward to a low height. Also the deposition of cutting onto this habitat has likely led to an increase in the abundance of more nitrophile species such as *Glyveria* and *Urtica dioica.*

4.2.3.3 Alluvial Forests with Alnus glutinosa and Fraxinus excelsior (Alno- Padion, Alnion incanae, Salicion Albae) (91EO)

The wet woodland occurring in the "back-drain" to the north of Gollierstown Bridge and Hazelhatch is dominated by a number of species that are listed as indicator species of the Annex 1 woodland habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (91E0). These species include the positive indicator woody species *Salix cinerea, Alnus glutinosa, Fraxinus excelsior* and *Crataegus monogyna*. The examples of this woodland also support a range of

positive indicator herb species such as *Filipendula ulmaria, Urtica dioica, Galium palustre, Iris pseudacorus, Mentha aquatica* and *Angelica sylvestris* and positive indicator bryophytes that include *Calliergonella cuspidata, Hypnum cupressiforme, Kindbergia praelonga* and *Ulota* species on trees. However negative indicator species also occur in the form of Acer pseudoplatanus, *Fagus sylvatica*, *Cotoneaster* spp. and *Symphoricarpos albus.* It is also noted that the woodland is not of ancient origin, having colonised the area following the construction of the canal in the early to mid-1800's. Nevertheless this woodland is likely to satisfy other criteria such as structure of the woodland with an age distribution positive woody species (Alnus glutinosa, Fraxinus excelsior and/or Salix cinerea) that satisfies targets and the extent of dead wood within the woodland. As such, even though this habitat is of recent origin, having developed in a setting of artificial creation and contains a number of negative indicator species, it is still considered to have affinities to this Annex I habitat.

4.2.4 Fauna

4.2.4.1 Otters

Otters (*Lutra lutra*) and their holts and couches are protected under the EU Habitats Directive as well as under the Wildlife Act (as amended) 1976. Otters holts and couches are generally established along river banks and these mammals are rarely found far away from aquatic habitats.

Evidence of otter activity was recorded along the entire stretch of the northern towpath from approximately 200m to the east of Hazelhatch and 350m west of the 12th Lock. No otter field signs were recorded at either end. A complete presentation of the otter survey results, including maps of field sign locations is provided in the confidential Appendix 1 to this EcIA.

High levels of activity were recorded to the west of Gollierstown Bridge in the vicinity of the old quarry and ponds. Fresh spraints were routinely recorded and otters were visually observed in the canal between the ponds and moving from the canal to the adjacent pond to the north. Two otters were also visually observed in the canal during bat surveys in July 2018.

High levels of activity were also recorded towards the west of the proposed greenway between Hazelhatch and Gollierstown Quarry. Slides and spraints were frequent along the edge of the northern towpath in this area. Spraints were observed on the middle of the towpath and on the

northern verge of the towpath along worn mammal paths. Paths were also observed at numerous locations opposite spraints and slide locations. These paths moved through dense scrub and wetland woodland habitats in a northerly direction away from the canal. An established path was identified leading towards an un-named watercourse flowing north under the canal. A camera trap was located at this location, however this was damaged and unfortunately no data was recovered from it.

An individual otter was visually recorded by the camera trap downstream of the overflow in September 2018. The otter was recorded on two consecutive nights on the 4th September 2018 and 5th September 2018. No otter activity was recorded by the camera trap monitoring the canal at Gollierstown Quarry. The third camera trap, as noted above, was damaged in the un-named stream towards the west of the proposed greenway and no data was recorded from the data card.

A total of four confirmed and/or possible breeding/resting areas were identified during otter field surveys.

An active holt was identified to the north of the canal along the southern side of a drain. The holt location is located approximately 15m to the north of the canal towpath. One well-worn entrance was recorded. No spraints were noted outside the holt but a well worn path lead to the holt and spraints were found at the northern side of the towpath on the verge and at the start of the path leading to the holt. The well worn nature of the paths, along with the presence of spraints along this path and the un-obstructed entrance and well worn path all suggest that this holt is used by otters.

A possible couch site was identified under an elder tree in the vicinity of the above holt location. A path led from the canal to this point and the ground under the elder tree appear to be relatively clear and smoothed down suggesting the presence of a resting mammal. Spraints and a slide were also noted at the start of the path along the canal bank.

A second, inactive holt entrance was identified to the north of the canal on the slope of the embankment. The entrance was well concealed underneath a fallen limb. There was no signs of reason traffic in and out of the entrance with much vegetation occurring around the entrance and no evidence of a well worn path leading into the entrance. This holt is located approximately 15m from the towpath.

On the south of the canal at the quarry and associated ponds a range of field signs were identified including extensive spraints, prey remains (where contained an abundance of white-clawed crayfish fragments) and slide and haul outs to and from the canal. A well-worn path was identified leading from the canal to the pond to the south and during inspections and otter was flushed from the base of tree over the pond. The evidence gathered at this location along with visual observations of otters on a number of occasions during surveys indicates that the area to the south of the canal is being used as a couch/holt site location.

A survey for otters completed between June and September 2016 also reported high frequency of field signs along the canal. The 2016 findings with respect to the relative absence of otter signs in the vicinity of the 12th Lock and Hazelhatch were similar to the 2018 findings. However the 2016 survey did not identify otter activity in the immediate vicinity of Gollierstown Bridge. This finding contrasts with the 2018 survey findings which identified this area (and particularly the area around the quarry to the west of the bridge) as the most active location for otters (based on the sightings of otters and the abundance of spraints and prey remains noted throughout the survey period).

While the 2016 survey did not identify the location of any holts or couches along the canal it stated that, based on the field evidence recorded there was certainly a minimum of one if not two holts occurring along the stretch of the canal between Hazelhatch and the 12th Lock.

A survey for the presence of otters along the canal between the 9th and 12th Lock in 2008 found extensive field signs indicating the presence of otters towards the 12th Lock end of this stretch of the canal (Wall, D., 2008). This survey found large amounts of crayfish remains in spraints, suggesting that this species is an important foraging resource for otters. Similar findings were recorded during the 2018 surveys to the west of the 12th Lock. No holts were identified during 2008 survey but the possibility of otters using rabbit warrens was noted.

Surveys for otters along the stretch of the canal between the 12th Lock and the 10th Lock in 2015 found evidence of otter activity in the form of spraints to the northwest of this section in the vicinity of the 12th Lock and the Griffeen Stream (FERS, 2015). Again crayfish remains were noted as plentiful in spraints and were considered to represent a principal food resource for otters. No holts were identified during the survey. A repeat survey of this stretch of canal was completed in 2018 but no evidence of otter activity was recorded. (FERS, 2018)

4.2.4.2 Badgers

Two active badger setts and one inactive sett were recorded to the north of the towpath along the canal. The location of these badger setts are presented in the confidential Appendix 1 to this EcIA. These setts were identified as a main, annexe/main and outlier sett. The main sett contains a minimum of ten entrance. Badger hair was found in sett entrances and fresh spoil heaps and bedding were noted at and around entrances. This badger sett was also identified during otter surveys in 2016 when it was found to have been interfered with (FERS, 2016). There was a subsequent absence of activity in the vicinity of sett following the interference in 2016. The results of the 2018 survey indicate that badgers have reoccupied the sett and are again using the sett as territorial base.

In addition to the above sett a second active sett was recorded. This sett was also active during the 2018 surveys with badger hair, fresh spoil and bedding noted at the entrances. The sett was located under dense scrub and it is possible that additional entrances are associated with this sett.

An inactive two-entrance sett was identified to the north of the canal during habitat surveys. The entrances were concealed with undisturbed vegetation at the entrances and there was no indication that this sett was used by badgers during the 2018 survey season between June and November.

In addition to the above badger field signs, this species was also recorded to the south of the canal in the vicinity of the 12th Lock during otter surveys in 2016 (FERS, 2016).

4.2.4.3 Other Mammals

Other mammals recorded along the Grand Canal during surveys in 2018 and 2016 include pine marten, fox, hedgehog, rabbit and brown rat. Fox was regularly recorded using the canal overflow as a commuting route during camera trap surveys in August and September.

4.2.4.4 Bats

A detailed presentation of the bat survey results is provided in Appendix 2 to this EcIA. No bat roosts were identified at structures along the canal during roost emergence and return surveys. Two aqueducts will be crossed by the proposed greenway. The aqueduct over the

Tobermaclugg Stream towards the east of the project is low lying and not considered suitable for supporting roosting bats. This aqueduct is graded as a Grade 1 bridge under the Norman and Billington bats in bridges classification scheme. The second aqueduct near Hazelhatch provides suitable roosting habitat for bats. However no bats were observed to be roosting in crevices in this bridge during inspection surveys in July 2018.

The canal provides valuable foraging habitat for a range of species. Eight species of bat were identified foraging and commuting along the canal during manual transect and automatic bat detector surveys. The most dominant species foraging along the canal were Soprano pipistrelle and Common pipistrelle followed by Leisler's bat. High levels of foraging activity for Daubenton's bat was also recorded. Activity for other Myotis species, Nathusius pipistrelle and Brown long-eared was lower and was never recorded at high levels during the surveys.

Table 4.3 below provides a summary of bat recorded during automatic monitoring along the canal. Monitoring was completed from four points along the canal with a total of 188 monitoring nights completed. This resulted in a total number of 43,258 passes being recorded. Between the months of June and September, with the exception of one monitoring session bat activity recorded was consistently high within an overall nightly average of over 200 passes per night being recorded between the months of June and October. The highest levels of bat activity between June and August inclusive was consistently recorded at MP3, located low over the canal towards the western end of Gollierstown quarry.

Table 4.3: Summary of Bat Activity

Month	MP No.	No. Night	No Hours	Total Passes	Average Passes/Night	Bat Activity Category
Jun	1	8	56	3767	471	High
Jun	2	9	63	2840	316	High
Jun	3	9	63	4590	510	High
Jun	4	9	63	1219	135	High
Jul	2	12	96	3255	271	High
Jul	3	24	192	11160	465	High
Jul	4	20	160	2785	139	High
Aug	1	10	80	60	6	Low
Aug	2	12	96	2207	184	High
Aug	3	19	152	5866	309	High
Aug	4	14	112	1798	128	High
Sept	2	26	234	3217	124	High
Oct	2	16	160	494	31	Medium

Total		**188**	**1527**	**43258**	**230**	

Bat activity was recorded along the entire stretch of the canal. During manual transect surveys bat activity was found to be higher at 5-minute spot survey points where hedgerow led north or south to the canal from the surrounding area than in areas where no linear habitat from the surrounding area intersected the canal. High levels of foraging activity were consistently recorded in the vicinity of Gollierstown quarry, near the 12th Lock and also near Hazelhatch.

Nightly bat activity for all species combined was consistently high during all surveys between June and September. Activity started to decrease later in September with infrequent and low to medium levels of activity recorded during October.

Bat surveys were completed along the canal between Hazelhatch and the 12th Lock in 2016 (FERS, 2016). During this survey the same four species, Soprano pipistrelle, Common pipistrelle, Leisler's bat and Daubenton's bat (in that order) were found to be the dominant species.

Similar levels of high bat activity along the canal were recorded during automatic bat surveys completed between the 12th Lock and 10th Lock (FERS, 2018). Bat activity along this stretch of the canal was dominated by the same four species, namely Common pipistrelle, Soprano pipistrelle, Leisler's bat and Daubenton's bat. Activity for Nathusius pipistrelle and other Myotis species was lower and no Brown long-eared activity was recorded.

During bat surveys in 2016 in the vicinity of the 12th Lock (Tobins, 2016) Common pipistrelle, Soprano pipistrelle and Daubenton's bat were recorded foraging.

4.2.4.5 Birds

Bird species identified during bird transect surveys are outlined in Table 4.4. No kingfisher were recorded during targeted survey completed at Gollierstown Bridge. the potential for nesting habitat for kingfisher along this section of the canal is limited during the relative absence of suitable bankside nesting habitat. Where steep banksides do occur such as to the east of Gollierstown Bridge no nest sites were located. Kingfisher was noted recorded as nesting along the section of the canal between the 12th Lock and the 10th Lock during surveys in 2015

and 2018 (FERS, 2018). However a pair were observed foraging along this section of the canal in 2018 in a westerly direction towards the 12th Lock.

Table 4.4: Bird species observed during the 2018 Breeding Season

Common Name	Scientific Name	Status	May	June	July	Breeding association with the Grand Canal
Barn owl	*Tyto alba*	BoCCI Red List				Observed flying over the canal and over scrub habitat to the south of the canal before flying southwest over Brownstown.
Blackbird	*Turdus merula*	BoCCI Green List				Territories registered on the along the canal throughout the breeding season. Breeding
Blackcap	*Sylvia atricapilla*	BoCCI Green List		-	-	Territory noted in the vicinity of Gollierstown Quarry.
Black-headed Gull	*Larus ridibundus*	BoCCI Red List				Regularly seen passing over the canal
Blue tit	*Cyanistes caeruleus*	BoCCI Green List				Territories registered along the canal throughout the breeding season. Breeding
Bullfinch	*Pyrrhula pyrrhula*	BoCCI Green List				Territories registered along the canal throughout the breeding season. Breeding
Buzzard	*Buteo buteo*	BoCCI Green List				Foraging over grassland to the south of the canal.
Chaffinch	*Fringilla coelebs*	BoCCI Green List				Territories registered along the canal throughout the breeding season. Breeding
Chiffchaff	*Phylloscopus collybita*	BoCCI Green List			-	Territories registered along the canal Breeding
Common Gull	*Larus canus*	BoCCI Amber List	-			Seen flying by the island between the island and Knockaphort.
Coot	*Fulica atra*	BoCCI Amber List				Observed breeding on the canal. Breeding
Cormorant	*Phalocrocorax carbo*	BoCCI Amber List				Observed flying along the canal.
Dipper	*Cinclus cinclus*	BoCCI Green List				Observed in the overflow stream from the canal.
Dunnock	*Prunella modularis*	BoCCI Green List				Territories registered along the canal. Breeding

Great Black-backed Gull	*Larus marinus*	BoCCI Amber List	-	✓	-	Seen flying over the canal.
Great tit	*Parus major*	BoCCI Green List	✓	✓	✓	Territories registered along the canal. Breeding
Grey heron	*Ardea cinerea*	BoCCI Green List	✓		✓	Observed foraging along the canal.
Greenfinch	*Carduelis chloris*	BoCCI Green List	✓	✓	✓	Territories registered along the canal. Breeding
Grey wagtail	*Motacilla cinerea*	BoCCI Red List	✓	✓	✓	Territories registered along the canal. Breeding
Herring Gull	*Larus argentatus*	BoCCI Red List	✓	✓		Seen flying between the island and Knockaphort. Not breeding on the island.
Hooded crow		BoCCI Green List	✓	✓	✓	Territories registered along the canal. Breeding
House sparrow	*Passer domesticus*	BoCCI Green List	-	-	✓	Territories registered along the canal. Breeding
Jackdaw	*Corvus mondula*	BoCCI Green List	✓	✓	✓	Territories registered along the canal.
Kestrel	*Falco tinnunculus*	BoCCI Amber List	✓		✓	Hunting over grassland adjacent to the canal.
Long-tailed tit	Aegithalus caudatus	BoCCI Green List	✓	-	-	Territories registered along the canal. Breeding
Mallard	*Anas platyrhynchos*	BoCCI Green List	✓	✓	✓	Observed along the canal.
Meadow pipit	*Anthus pratensis*	BoCCI Red List	-		✓	Observed along the canal.
Mistle thrush	*Turdus viscivorus*	BoCCI Amber List			✓	Heard along the canal.
Moor hen	*Gallinula chloropus*	BoCCI Green List	✓	✓	✓	Territories registered along the canal. Breeding
Mute swan	*Cygnus olor*	BoCCI Green List	✓	✓	✓	Territories registered along the canal. Breeding
Pheasant	*Phasianus colchicus*	BoCCI Green List	✓	✓	✓	Territories registered along the canal. Breeding
Raven	*Corvus corax*	BoCCI Green List	✓	✓	✓	Observed flying over the canal.
Reed bunting	*Emberiza schoeniclus*	BoCCI Green List	✓	✓		Territories registered along the canal. Breeding

Robin	*Erithacus rubecula*	BoCCI Amber List				Territories registered on the island. Breeding
Song thrush	*Turdus philomelos*	BoCCI Green List				Territories registered on the island. Breeding
Starling	*Sturnus vulgaris*	BoCCI Amber List	-	-		Territories registered along the canal. Breeding
Stonechat	*Saxicola rubicola*	BoCCI Amber List	-	-		Territories registered along the canal. Breeding
Swallow	*Hirundo rustica*	BoCCI Amber List				Territories registered along the canal. Breeding
Tufted Duck	*Aythya fuligila*	BoCCI Red List				Seen foraging between the island and Knockaphort, to the north and east of the island. Seen with chicks in to the northwest of the island. Potentially breeding in the vicinity of the island.
Water rail	*Rallus aquaticus*	BoCCI Green List				Territories registered along the canal. Breeding
Whitethroat	*Sylvia communis*	BoCCI Green List				Territories registered along the canal. Breeding
Coal tit	*Periparus ater*	BoCCI Green List	-			Territories registered along the canal. Breeding
Willow warbler	*Phylloscopus trochilus*	BoCCI Green List				Territories registered along the canal. Breeding
Wood pigeon		BoCCI Green List				Territories registered along the canal. Breeding
Wren	*Troglodytes troglodytes*	BoCCI Green List				Territories registered along the canal. Breeding

4.2.4.6 White-clawed Crayfish

White-clawed crayfish were found to be abundant throughout the section of the canal between the 12th Lock and Hazelhatch. Adult crayfish were directly observed along the canal bed during visual surveys. Both adult and juvenile species were recorded at all broad grapnel sampling locations during instream vegetation sampling. Individuals were recovered from vegetation during analysis. All individuals were immediately returned to the canal. Estimated size ranged

from 2cm to 10cm. The presence of both juveniles and adults indicates the presence of a stable population within the canal.

White-clawed crayfish were also recovered from vegetation during sweep net samples of the canal margin. Adult and juvenile specimens were again recovered.

Crayfish remains were abundant in otter spraints recorded throughout the canal and they are considered to be an important and judging by the composition of spraints one of the primary food resources for otter along this section of the canal. Crayfish remains were especially plentiful on exposed mortar capped brick bankside, which possibility suggest that sections of the canal bank with exposed brick works and associated crevices provide important refuges for crayfish and foraging habitat for otters.

The 12th Lock millrace was previously surveyed for the presence of crayfish (Reynolds, 2012) and it was found to be plentiful at this location. Based on this survey Reynolds (2012) estimated a population of up to 10 crayfish per metre of bank, suggesting a large population along the Millrace.

4.2.4.7 Vertigo moulinsiana

A completed presentation of the *Vertigo moulinsiana* results are presented in the confidential Appendix 3 to this EcIA. *Vertigo moulinsiana* was found in emergent vegetation dominated by *Glyceria maxima* and *Typha latifolia* occurring along the margins of a pond to the west of Gollierstown Bridge. Both adult and juvenile specimens were identified at this location. None of the other patches of suitable habitat were found to support *Vertigo moulinsiana* during surveys in 2018. However it is noted that this is a very small species and the populations occurring in patches can also be small. As such it is noted that there is potential for this species to occur in other patches of suitable habitat, that were both sampled and un-sampled during the 2018 surveys.

4.2.4.8 Fish

The Grand Canal supports a range of coarse fish species. A comprehensive fisheries survey was not undertaken as part of the field survey but information for the main species supported by the canal has been gleaned from Inland Fisheries Ireland (IFI) records and from the 2015 ecological

assessment of the Grand Canal (ROD, 2016). The main species found within the Grand Canal are: Roach (*Rutilus rutilus*), Perch (*Perca fluviatilis*); Pike (*Esox lucius*); Tench (*Tinca tinca*); European Eel (*Anguilla anguilla*); Bream (*Abramis brama*); Rudd (*Scardinius erythrophthalmus*). Roach are the dominant species detected within the Grand Canal in terms of biomass and abundance. The Annex II listed River Lamprey (Lampetra fluviatilis) have been recorded at two locations on the Grand Canal, at the 11th Lock and 6th Locks. Suitable habitat for this species occurs upstream of these locations within the stretch of the canal adjacent to the proposed greenway.

4.2.4.9 Herpetofauna

Common frog was regularly recorded in the wetland habitats to the north of the canal during field surveys. This species was also recorded in the vicinity of Gollierstown Quarry. Smooth newt was observed along the bankside of the canal and also in association with the ponds at Gollierstown Quarry. A population of this species is known to be supported by these ponds. No common lizard were observed during the field surveys.

4.2.4.10 Terrestrial Invertebrates

Table 4.4 lists the butterfly, bee and Odonata species observed during field surveys in 2018. Beehives were noted as occurring along exposed section of bank on the northern verge of the canal. A wasp nest was identified on the south side of the pond to the north of the canal.

Anthills of the yellow meadow ant are prevalent throughout the calcareous grassland habitat to the northeast of the main pond, north of the canal at Gollierstown quarry. The location of the anthills is shown on Figure 4.11.

The Succisa pratensis the food plant of the marsh fritillary larvae occurs in the calcareous grassland around this pond. Searches of basal leaves for the presence of larvae were completed in September 2018 but none were recorded. There are no known colonies of marsh fritillary in the wider surrounding area, which suggests that its presence at this location is unlikely.


Gollierstown Bridge
Grand Canal Greenway
12th Lock to Hazelhatch
Figure 4.11
Location of Area supporting Anthills
Proposed Greenway
Anthills
0 0.010.02 0.04 Km
N
W
E
S
Drawn By PD
Date 25/11/2018
Data Source Bing

5.0 SITE EVALUATION: KEY ECOLOGICAL RECEPTORS

The key ecological receptors identified within the zone of influence of the project are listed in Table 5.1 and their nature conservation value is classified in accordance with the NRA site evaluation scheme, as described in Section 3.9 above.

All constituent parts of the receiving biodiversity along and immediately adjacent to the proposed greenway combine to form the Grand Canal pNHA. As noted in the site synopsis of this pNHA (see Section 4.1.1.1 above) its value lies in the diversity of species and habitats that occur along it rather than due to the presence of any rare species or individual habitats of national importance. It is the presence of these constituent elements along an uninterrupted linear corridor that lend conservation importance to canal corridor. This corridor in its totality is of national conservation importance (Rating B). The constituent elements of the pNHA that are considered to be representative of key ecological receptors along the section of the proposed greenway are evaluated below.

The canal and the fringing bankside habitats of tall reed swamp and tall herb swamp between Hazelhatch and the 12th Lock has been identified as an ecological sensitive area for the diverse vegetation within the open channel and the rich diversity and zonation of the canal verge. The aquatic diversity includes *Sagittaria saggitifolia* swamp amongst well developed fringes of *Nuphar-Potamogeton* communities. The *Phragmites australis* community is also well developed along sections of this stretch of the canal. However regular verge mowing and bankside maintenance result in disturbance to this community and the deposition of cuttings along the verge also leads to nutrient enrichment within and along the verge of the canal. This mosaic of open canal and fringing swamp habitat is of Count Importance Rating C.

The eroding watercourses crossed by the canal and the back-drain fed by the canal provide important linear corridors and foraging habitat for birds, bats and non-volant mammals including otters. They are also likely to support fish and possibly white-clawed crayfish. While the water quality of these surface drainage features may not be of high quality, the role they play in supporting the above fauna identifies them as features of local conservation importance, high value (Rating D).

The artificial pond habitats occurring at Gollierstown Quarry support a range of species of high nature conservation interest. The ponds provide habitat for at least two species listed on Annex

II of the EU Habitats Directive, namely otter and Vertigo moulinsiana. White-clawed crayfish may also occur in these ponds. Other species listed on Annex V of the EU Habitats Directive supported by the ponds include common frog and smooth newt. Waterbirds such as mute swan, coot, mallard and water rail were also recorded using these ponds as breeding habitats. Owing to the species supported by them and particularly the presence of Vertigo moulinsiana, whose populations at the ponds are conservatively considered to be representative of national importance, these pond habitats are of national conservation importance (Rating B).

The area of dry calcareous grassland at Gollierstown Quarry has affinity to the E.U. Habitats Directive Annex I habitat 6210. However it is likely to fail the test as a viable area of this habitat due to the high grass content of the sward which is greater that 30% (see JNCC, 2004), the presence of negative indicator grass species such as Arrhenatherum elatius, Dactylis glomerata and *Trifolium* sp. (see Martin et al. 2018) and the high sward structure. As such this habitat is of County Importance, Rating C.

Wet woodland occurring to the north of the towpath between Gollierstown Bridge and Hazelhatch is dominated by a number of species that are listed as indicator species of the Annex 1 woodland habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (91E0). These species include the positive indicator woody species *Salix cinerea, Alnus glutinosa, Fraxinus excelsior* and *Crataegus monogyna*. The examples of this woodland also support a range of positive indicator herb species such as *Filipendula ulmaria, Urtica dioica, Galium palustre, Iris pseudacorus, Mentha aquatica* and *Angelica sylvestris* and positive indicator bryophytes that include *Calliergonella cuspidata, Hypnum cupressiforme, Kindbergia praelonga* and *Ulota* species on trees. However negative indicator species also occur in the form of Acer pseudoplatanus, *Fagus sylvatica*, *Cotoneaster* spp. and *Symphoricarpos albus.* It is also noted that the woodland is not of ancient origin, having colonised the area following the construction of the canal in the early to mid-1800's. Nevertheless this woodland is likely to satisfy other criteria such as structure of the woodland with the age distribution targets for target woody species (Alnus glutinosa, Fraxinus excelsior and/or Salix cinerea) and the extent of dead wood within the woodland.

As the wet woodland habitat occurring to the north of the canal has strong affinities to the Annex 1 Alluvial Forests (91E0) they are of at least county to national ecological value (Rating C/B).

The hedgerows and treelines are an integral part of the surrounding landscape and provide important foraging, commuting and shelter habitat for a range of species. They are particularly important for facilitating the movement of bats, birds and other non-volant mammals such as badgers and foxes to and from the canal. These linear habitats are of local conservation value, high value (Rating D).

The dry verge vegetation occurring along the predominantly grassed section of the towpath is of low conservation value (Rating E). The sward here is dominated by a restricted range of commonly-occurring species and is subject to ongoing disturbance in the form of mowing, trampling and dunging by dogs.

The more species-rich example of dry verge habitat occurring along the northern verge/boundary of the towpath is of local conservation importance, higher value (Rating D). This example of dry verge is less regularly mown and supports a much greater diversity of species when compare to the adjacent short sward and species poor main section of the towpath to the south.

Groenlandia densa is a rare and protected species in Ireland. It is presence along the section of the canal adjacent to the proposed greenway is of national importance (Rating B).

Otters frequent the section of the canal between Hazelhatch and the 12th Lock. Two holts, one active, and two couches were identified along this section of the canal. There is also potential for additional holts to occur in dense scrub habitat either side of the canal. The otter population occurring along this section of the canal is considered to be of county importance (Rating C) on the basis that it is likely to support more than 1% of the county population.

This section of the canal supports a diverse range of bat species with a total of eight species being recorded during surveys. Consistently high levels of bat activity for Soprano pipistrelle, Common pipistrelle and Leisler's bat were recorded during surveys and medium to high levels were also recorded for Daubenton's bats. Given the diverse range of species recorded, the reliance of local population of at least four species on the habitats along the canal for foraging indicates that this section of the canal is of county importance (Rating C) for bats.

One badger territory was confirmed as occurring within the vicinity of the canal and it is possible that a second territory also occurs in the wider area. The numbers of badgers occurring

in the area are likely to represent more than 1% of the local population and are therefore of local conservation importance, higher value (Rating D).

The section of the Grand Canal supports a high diversity of bird species that includes, raptors, waterbirds and passerines. One species of high conservation concern, the barn owl was observed during surveys, while a second species, kingfisher was observed foraging along the canal to the east. In light of the species and diverse community recorded, this section of the canal is of local importance, high value (Rating D) for bird species.

Vertigo moulinsiana was found in tall reed swamp habitat to the north of the canal and this finding represents an important record for this rare and protected species. The population of this species listed on Annex II of the EU Habitats Directive occurring at this location is conservatively assessed as being important at the national level and as such this species represents a key ecological receptor of national importance (Rating A).

An abundant population of White-clawed crayfish is supported by the stretch of canal between the Hazelhatch and the 12th Lock. Based on the results of surveys along this section of the canal, previous surveys in the vicinity of the 12th Lock and downstream of the 12th Lock it is estimated that the canal supports an nationally important population of this species listed on Annex II of the EU Habitats Directive. As such white-clawed crayfish are a key ecological receptor of international importance (Rating A).

This section of the canal supports a range of terrestrial invertebrate species and as such it is of local conservation importance, high value (Rating D) for these species.

Common frog and smooth newt populations are supported by the canal, ponds at Gollierstown quarry and in the wet woodland and swamp habitat associated with the back-drain to the north of the canal. The numbers of common frog and smooth newt occurring in the area are likely to represent more than 1% of the local population and are therefore of local conservation importance, higher value (Rating D).

6.0 IMPACT ASSESSMENT

Potential impacts associated with the proposed development will have the potential to arise during both the construction and operation phases. Excavation works, the installation of cable ducting and the provision of the new surface path will result in direct and permanent habitat loss under the footprint of the development. As construction works are to be restricted to the footprint of the proposed greenway no further direct and temporary loss of habitat associated with areas for construction work will arise during the construction phase. Sections 6.1 to 6.3 describe the impacts associated with habitat loss, severance/fragmentation and disturbance that may arise during the construction and operation of the proposed development.

6.1 DESIGNATED CONSERVATION AREAS

The proposed greenway will not have the potential to result in likely significant effects to European Sites. A Screening Statement in support of Screening of Appropriate Assessment has been completed for the proposed greenway. This assessment found that the proposed greenway will not, alone or in-combination with other plans or projects have the potential to result in likely significant effects to European Sites occurring in the wider surrounding area.

The proposed greenway traverses the Grand Canal pNHA. The potential impacts to key ecological receptors that form part of this pNHA are assessed in the following sub-sections below that examine the potential impacts to key habitats and fauna supported by the pNHA.

6.2 CONSTRUCTION PHASE IMPACT TO HABITATS

The activities associated with the construction phase include:

- The excavation of soils and sub-soils for the cable trench within the construction footprint;
- The establishment of a construction compound;
- The operation of plant and machinery;
- The use and storage of construction material;
- The generation, storage and/or disposal of spoil material;

- The management of surface water generated in the construction footprint; and
- The crossing of surface watercourses.

Construction phase activities will also have the potential to result in the spread of non-native invasive species.

Finally the installation of the cable duct, which will be encased in concrete in the cable trench and the backfilling of the trench could result in changes to the existing hydrogeological regime to the north of the canal. Seepage from the canal is likely to influence the status of the artificial pond habitats occurring to the north of the canal.

6.2.1 Habitats

Direct habitat loss during the construction stage of the proposed development will be confined to areas occurring under the construction footprint, which will be restricted to the extent of the proposed greenway footprint throughout the length of the scheme. The only other area in which construction plant, machinery and staff will be permitted to undertake works will be at the construction compound, which is an existing compound located off the R120 Lucan Road.

Given that the construction footprint will be restricted to the extent of the proposed greenway, the habitats that will be directly affected by the project will be restricted to the low local value (Rating E) and high local value (Rating D) dry grassy verge habitat. Table 6.1 outlines the impacts associated with the habitat loss for these examples of dry grassy verge occurring within the construction footprint.

Other potential indirect impacts to habitats within and surrounding the proposed site are outlined in Table 6.1.

Table 6.1: Direct Habitat Loss resulting from the Proposed Greenway

Element or Infrastructure Feature responsible for habitat loss	**Habitats**	**Significance of Habitat Loss**
Construction Footprint: Excavations for Cable Trench and Provision of New Surface Path	Local importance, high value dry grassy verge (Rating E)	The loss of the majority of this habitat to the construction footprint, trench excavations and the provision of a new surface path will result in a low of high magnitude. An impact of high magnitude to this habitat of low ecological value, Rating E, will result in an impact of permanent, minor significance.
	Local importance, high value dry grassy verge (Rating D)	The loss of small areas of this habitat to the construction footprint, trench excavations and the provision of a new surface path will result in a low of moderate magnitude. An impact of moderate magnitude to this habitat of high local value, Rating D, will result in an impact of permanent, minor significance. It is also noted that much of this habitat was previously affected by excavations and trenching for a fibre-optic cable which runs the length of the proposed greenway. Since the completion of these works in c. 2010 the species-rich dry grassy verge bounding the northern verge of the towpath has become re-established, thus indicating the potential, with an appropriate management regime, for this habitat to be re-instated following completion of the proposed works.

Table 6.2: Potential Indirect Impacts to Habitats

Element	Details	Potential Impact	Habitats Affected	Habitat Value	Potential Significance of Impact without mitigation
Construction Compound	During the construction phase the existing construction compound, utilised for the R120 upgrade will be used for the proposed greenway. This is an existing compound located over 70m from the Grand Canal, whose use for the R120 upgrade has not result in any loss of semi-natural habitat or disturbance to flora or fauna.	The use of the existing compound on the R120 will represent a neutral impact to habitats.	No key habitat receptors will be affected by the use of the existing compound along the R120.	The habitats under the footprint of this compound were representative of artificial ground and the provision of the compound has not result in any change in land cover	Neutral.

				at this location.	
Operation of Plant and Machinery	Plant and machinery will be required for the construction phase of the project. The plant required will be restricted to one 8-ton excavator and two 6-ton dumper trucks.	The plant and machinery will be restricted to the construction footprint, and as such will not result in any further habitat loss or disturbance over and above that detailed in Table 5.1 above.	Dry grassy verge habitat.	Local, low value (rating E)	Minor, permanent[3] negative impact.
				Local high value (Rating D)	Minor, permanent negative impact.
Use and storage of construction material	Materials required for the construction phase, such as cement-based products, oils, lubricants and hydrocarbons are	Potential contamination of the Grand Canal and surface	Canals	B	Major, temporary to medium term, negative impacts.

[3] Permanent loss is related to the provision of the surface path, as detailed in Table 5.1, and not the operation of the plant and machinery.

	potentially polluting materials and pose a risk in particular to the aquatic environment.	watercourses crossed by the canal.	Eroding watercourses	D	Minor, temporary to medium term, negative impacts.
			Artificial Ponds	B	Major, temporary to medium term, negative impacts.
			Drainage ditch (i.e. Back-drain overflow)	D	Minor, temporary to medium term, negative impacts.
Generation, storage and disposal of spoil material	Spoil material will be generated during excavations of the cable trench.	The storage of spoil in inappropriate locations such as on the canal towpath, or on key habitat receptors will have the potential to result in temporary to short time habitat disturbance and loss.	Depending on storage locations, may include canals, artificial ponds, eroding surface watercourses, dry	D to B	Neutral Impact: All spoil arising from the construction works will be stored in the construction compound, well away from sensitive aquatic and terrestrial habitat receptors. As such this

			calcareous grassland.		element of the project will not have the potential to result in significant adverse effects.
Management of surface water generated within the construction footprint.	Surface water runoff from the works area and dewatering of excavation trenches.	Discharge of silt-laden surface water to waterbodies.	Canals, artificial ponds, eroding surface watercourses and drainage ditch	D to B	Minor to Moderate temporary to short term negative impact.
Crossing of surface watercourses	The proposed greenway will not require any new watercourse crossings. All watercourses flowing under the canal are existing.	Disturbance of watercourses during surface water crossings.	Eroding watercourses	D	Neutral. The proposed greenway will not result in any new surface water crossing. All works over and in the vicinity of the existing watercourse crossing will be within the existing aqueducts.

Spread of non-native invasive species.	Construction works along the canal could result in the spread of non-native invasive species.	The potential exists for construction plant and machinery to introduce non-native invasive species during construction works.	All habitats	E to B	Minor to major, negative long-term impacts.

6.3 OPERATION PHASE IMPACTS TO HABITATS

6.3.1 Habitats

The proposed greenway is already a recreational route and significant effects to key habitat receptors are not anticipated as there will be no additional loss or fragmentation of habitats associated with this phase of the proposed greenway.

6.4 CONSTRUCTION & OPERATION PHASE IMPACTS TO KEY FL,ORA & FAUNA

The potential construction phase impacts to key flora and fauna occurring along the proposed greenway are outlined in Table 6.3 below.

Table 6.3:

Receptor	Construction phase Impact	Operation Phase	Potential Significance of Impact without mitigation
Groenlandia densa	No construction activity will be undertaken in the canal and there will be no potential to disturb the extent and distribution of this species within the canal Potential impacts to water quality of the canal have been identified in Section 6.1.2 above. In the event of the emission of contaminants to the canal the potential will exist for indirect impacts to this protected species.	The operation phase of the proposed greenway will not have the potential to result in perturbations to water quality in the canal or surrounding watercourses	Temporary short term moderate magnitude effect to this species of national importance (Rating B) will result in a potential impact of temporary major negative impacts to this species.
Otters	Two holts and one possible couch were identified to the north of the canal. Both holts are located approximately 15m to the north of the canal towpath, while the surface couch is located approximately 6m	There will be no potential for the operation phase of the project to result in direct physical disturbance to otters or their holts and couches.	Habitat Disturbance The construction phase of the proposed greenway has the potential to result in disturbance to otter holts

	to the north. An additional couch has been located to the south of the canal. The entrances to both holts are located at more than 2m below the level of the canal towpath surface. Given the distance of the entrance from the towpath and the lower levels of the holt entrance it is not anticipated that excavations along the towpath will physically disturb or destroy any part of these holts. However, this cannot be confirmed with certainty prior to excavations and in any event the completion of works in close vicinity will have the potential to disturb otters should these holts be active. The level of disturbance will have the potential to be greater in the event that these holts support breeding otters during the period of adjacent construction works. No habitat upon which otters rely for foraging or commuting will be affected by the proposed greenway. As a 1m set back from the canal back has been designed into the proposed greenway it will not result any changes to the fringing emergent vegetation occurring along the edge of the canal. (It	There will be no loss of otter foraging, commuting or breeding/resting habitat during the operation phase. The proposed greenway surface will be confined to the existing towpath which is already well maintained and used as a recreational route. The operation phase of the proposed greenway will not have the potential to result in perturbations to water quality in the canal or surrounding watercourses. Surface water from the surface will either drain to ground or will drain to the north as the new trail surface will fall to the north. Also maintenance works associated with the new surface are anticipated to be infrequent. Disturbance during the operation phase is expected to be minimised as recreational use will be predominantly confined to day time while otter foraging and commuting activity will be	and a couch. As it is not predicted that the construction works will result in the destruction of these resting/breeding sites it is anticipated that this disturbance will represent a low magnitude effect on the basis that it will be of a short term duration (i.e. it is estimated that works in the immediately vicinity of the holts and couches can be completed within 48 hours) and is not predicted to result in lasting damage to holts or couches. A low magnitude effect to this receptor of county importance (Rating C) will result in an impact of minor significance. It is noted that detailed mitigation with regard to works in the vicinity of these identified holts and couches will be required to be implemented during the construction phase.

	is noted that current management operations mow the fringing vegetation to a short sward along much of the length of the canal). Potential impacts to water quality of the canal and watercourses flowing under the canal have been identified in Section 6.1.2 above. In the event of the emission of contaminants to these waterbodies the potential will exist for indirect impacts to otters. The potential for the construction phase to result in disturbance to otters in general (i.e. while foraging and or commuting) will be minor. This is due to the crepuscular foraging behaviour of otters along the canal, which will not overlap with daytime construction works. Also the construction works will be completed over an individual short section at any one time, thereby localising any disturbance from construction phase activity to a small area. Furthermore the canal is subject to regular maintenance and recreational activity, including	predominantly confined to dusk and night time hours. It is also noted in the NPWS Threat Response Plan for otters that "little evidence has come to light in recent studies to suggest that disturbance by recreation is a significant pressure" for otters. This statement is also supported by Chanin's (2003) review of a number of studies that found otters were not significantly disturbed by human activity (Jefferies, 1987; Durbin 1993; Green & Green, 1997). Based on these and other studies Chanin concluded that the recovery of the otter population in the UK was not being impeded by human disturbance. Otters have also been shown to demonstrate high levels of plasticity to the presence of humans in areas supporting high value foraging resources (MacDonald & Mason, 1992), such as those supported by the canal. The Irish Wildlife Manual 23 reported that no significance difference was found between sites with and without recreational disturbance and	

	angling and dog walking and it is likely that otters are already habituated to human activity.	stated that the lowest percentage ocurrence was found at the sites with the lowest recorded disturbance. Based on the scientific evidence cited above that has investigated the potential for recreational activity to disturb otters, it is predicted that the operation phase of the proposed greenway will not have the potential to result in significant ongoing disturbance to this species.	
Badgers	A badger sett has been identified immediately adjacent to the proposed greenway. There will be potential for short, temporary disturbance to badgers occupying this sett during the construction phase. It is not anticipated that the construction works will result in physical disturbance or destruction of the sett, but the presence of plant immediately adjacent	The badger population occurring along the canal is likely to be habituated to recreational activity and due to its crepuscular nature will not interact with daytime recreational activity along the proposed greenway.	A temporary disturbance to this sett during works in its vicinity over an estimated 48 hour period will have the potential to result in a low magnitude impact. A low magnitude impact to this species of high local value (Rating D) will result in an impact of minor negative significance.

	to the sett will have the potential to result in disturbance.		
Bats	No bats were found to be roosting at structures along the proposed greenway. No structures will be demolished or altered as a consequence of the proposed greenway. The Tobermaclugg aqueduct has low potential to support roosting bats and the works along this aqueduct are predicted to have the potential to disturb bats. The works of over the aqueduct to the west of the proposed greenway, near Hazelhatch will have will have the potential to result in minor disturbance to the arch barrel through vibrations during excavations. However this will be minimal and of a short, temporary nature (i.e. within 48 hours) and are not anticipated to have the potential to result in significant disturbance to roosting bats should they be present. It is further noted that no bats were	No operational effects are predicted for bats. No lighting will be provided as part of the proposed greenway and there will be no loss of habitat upon which this species relies.	Minor, temporary disturbance should bats roost in the aqueduct towards the west of the proposed greenway.

	identified as roosting in crevices in the arch barrel of this aqueduct during inspection surveys in July 2018. The proposed greenway will not result in the loss of any habitat upon which bats rely. There will be no removal of hedgerow, woodland or treelines.		
Vertigo moulinsiana	The fringing habitat within the pond to the north canal that support a population of Vertigo moulinsiana will not be directly affected by the construction phase of the project. There will be no physical disturbance to this habitat. However the results of trial pits completed on the towpath in the vicinity of the pond indicate that seepage occurs from the canal towards the pond and that the hydrology of the pond and fringing habitat may be influenced by this seepage. Any changes in the rate of seepage to the pond during the construction phase will have the potential to undermine the status of this fringing habitat and	The casing surrounding the cable duct in the trench will be impermeable and will not allow water to seep through it. In the absence of an appropriate backfilling under, around and above the cable duct casing the potential will exist for the new substrate under the proposed greenway to function as a barrier to the seepage of water from the canal to the pond. In such circumstance the hydrology of the pond's fringing habitat could change, resulting in desiccation and loss of suitable habitat for Vertigo moulinsiana.	The inadequate design of the cable trench to ensure continued seepage at a similar rate to the existing situation will have the potential to undermine the potential for the pond fringing habitat to support the population of Vertigo moulinsiana. This will represent an impact of high permanent magnitude. Such an impact to this key receptor of national conservation value (Rating A) will have the potential to result in severe permanent negative effects.

	negatively affect the status of the Vertigo moulinsiana population supported by it.		
White-clawed crayfish & Fish species	Direct impacts to these species will not arise during the construction phase as no instream works are required along the canal or watercourses flowing under the canal. Indirect effects have the potential to arise in the event of pollution emanating from the construction phase to the canal.	The operation phase of the proposed greenway will not have the potential to result in perturbations to water quality in the canal or surrounding watercourses. Surface water from the new path surface will either drain to ground or will drain to the north as the new trail surface will fall to the north. Also maintenance works associated with the new surface are anticipated to be infrequent.	The construction phase of the proposed greenway is predicted to have the potential to result in a low magnitude impact to water quality within the canal. A low magnitude impact to water quality and crayfish, whose population in the canal is of international value (Rating A) will result in a temporary to short-term impact of temporary to short-term moderate significance.
Birds	The construction phase will have the potential to result in localised disturbance to bird species occurring in the immediate vicinity of the construction works. However as these works will be completed section by section, with only one individual section being worked on at any one time	The operation is not predicted to have the potential to result in adverse effects to bird species.	The potential for disturbance to bird species during the construction phase will represent a low magnitude effect. A low magnitude effect to this key receptor of high local value (Rating D)

	there will not be potential for the project to result in significant effects to bird species. The proposed greenway will not result in the loss of any habitat upon which bird species rely for breeding and or foraging.		will represent an impact of temporary, minor negative significance.
Common frog & Smooth newt			
Terrestrial Invertebrates	The construction phase will not have the potential to result in direct or indirect effects to sensitive terrestrial invertebrates during the construction phase. No habitat upon which these specie rely will be lost to the construction footprint.	The operation phase will not have the potential to result in ongoing impacts to terrestrial invertebrates	No significant effects to terrestrial invertebrates are predicted to occur.

6.5 CUMULATIVE IMPACTS

6.5.1 Grand Canal Blueway

6.5.1.1 Designated Conservation Areas

A cumulative impact assessment (CIA) has been completed for the Grand Canal Blueway (ROD, 2016). This CIA found that Construction activities associated with all elements of the development of the scheme will result in temporary negative impacts on the ecology and/or habitats within the pNHA. However, these impacts will not be additive in terms of temporary loss (i.e. in combination they do not result in a greater impact) on ecological resources. In addition, each section of the proposed Grand Canal Blueway will require ecological constraints to be accounted for at design stage with the production of appropriate environmental reports, incorporating appropriate mitigation. It is therefore considered that the cumulative impact is no worse than each of the individual impacts associated with each scheme.

6.5.1.2 Habitats

Construction activities associated with the Blueway will result in some minor loss of habitat. Opportunities for a net overall improvement in habitat exist due to the implementation of IAS Management Plans and the provision of landscaping and compensation planting. Having considered the anticipated overall potential loss of habitat in view of the maintained state of the canal verge and towpath, it is considered that the effect of the Blueway will not be additive. It is therefore considered that the cumulative impact of the Blueway on the Grand Canal pNHA in combination with existing baseline actions is not significantly worse than any of the individual impacts associated with site preparation, construction and subsequent maintenance of the Blueway.

6.5.1.3 Protected Species

Construction activities associated with all elements of the development of the scheme will result in temporary negative impacts on the protected fauna species. The nature of this impact will generally be temporary disturbance. Otter and Bat species are unlikely to be greatly disturbed and construction management and lighting control measures (if required) in the design will limit any permanent negative impacts. Given that protected plant species are typically confined to the canal or rivers themselves, it is anticipated that complete avoidance will be achievable.

Ecological mapping of constraints (identified as ESA) will allow specific mitigation measures to be proposed for each of these protected species at design stage. Having considered each of these impacts, it is considered that none will be additive. It is therefore considered that the total impact of the Blueway in combination with adjacent developments is no greater than the sum of the individual impacts of each development.

6.5.2 R120 Upgrade

The proposed greenway will not overlap with the construction phase of the R120 upgrade. The operational phase of this new road will not result in any synergistic interactions with the proposed greenway that could result in cumulative impacts to the Grand Canal during the construction or operation phase of the greenway.

6.5.3 Grange Castle West Access Track

The proposed greenway will not overlap with the construction phase of the proposed Grange Castle West access track and as such will not have the potential to result in cumulative impacts as a result of construction phase disturbance to habitats or species.

Furthermore the proposed access road is well buffered from the canal to ensure that operation phase impacts associated with potential disturbance will not arise.

Given that the proposed greenway is not anticipated to have the potential to result in significant adverse effects to water quality and key habitat receptors and will not result in significant disturbance to key fauna receptors it will not have the potential to combine with this project to result in significant cumulative effects.

6.5.4 Clonburris SDZ

The Clonburris SDZ is proposed to the east of the proposed greenway. This project is located to the north of the canal and aims to convert existing greenfield land to residential land. The provision of housing in this area will result in an increase in the population in the vicinity of the canal to the east of the proposed greenway. With an increased population in the local vicinity of the proposed greenway it is reasonable to assume that there will in time be increased usage of the proposed greenway. However as noted above the operation phase of the proposed greenway will not have the potential to result in the loss of or disturbance to key habitats and

will not have the potential to result in significant disturbance effects to key species, the majority of which (i.e. birds and mammals) are already likely to be habituated to recreational activity along the canal. Given this assessment an increased usage of the proposed greenway arising from the an increase in the local population at Clonburris will not have the potential to result insignificant negative cumulative effects to the biodiversity occurring along and adjacent to the proposed greenway.

7.0 MITIGATION

7.1 HABITATS

The proposed greenway design has been underpinned by the mitigation hierarchy of avoidance, reduction and remediation. As such the final design of the greenway has been restricted to the footprint of the existing towpath and will avoid any areas of semi-natural grassland occurring along the northern bank of the canal. The approach will ensure that the project results in no loss of emergent reed and large sedge swamp habitat and tall herb swamp along the northern bank of the canal. Similarly there will be no loss of exposed banks, calcareous grassland, scrub and treelines bounding the northern side of the towpath. A topographical survey has been completed for the project and the construction phase will not require the removal of any trees during the construction phase.

The proposed greenway will not involve any new watercourse crossings and only existing crossing over the Tobermaclugg Stream and other minor watercourses will be utilised for the project. The absence of any new crossings will ensure potential habitat loss and disturbance to fauna along the canal is avoided.

7.2 BEST PRACTICE CONSTRUCTION MEASURES

All construction works, relating to the activities and construction sequence outlined in Section 2.1 above, will be undertaken in accordance with the following:

- Inland Fisheries Ireland's *Requirements for the Protection of Fisheries Habitat during Construction and Development Works.*
- CIRIA (Construction Industry Research and Information Association) Guidance Documents
    - Control of water pollution from construction sites (C532)
    - Control of water pollution from linear construction projects: Technical Guidance (C648)
    - Control of water pollution from linear construction projects: Site Guide (C649)
    - Environmental Good Practice on Site (C692)

- NRA Guidance Documents
    - Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes
    - Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads
    - Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, during and Post Construction of National Road Schemes.
    - All work completed should be in compliance with the Wildlife Acts, 1976 – 2012;
    - Guidance for the Treatment of Otters during the construction of national road schemes.
    - Guidance for the Treatment of Badgers during the construction of national road schemes.

An Ecological Clerk of Works (ECoW) will be appointed to oversee the construction phase. The roles and responsibilities of the ECoW are outlined in Appendix 4.

7.2.1 Best Practice Approach to Earthworks

- Excavation and infilling will be carried out in small progressive stages;
- Any topsoil that is of use for landscaping will be stored on the site. Where this is required during the construction phase, it will be stored suitably far away from the canal and other surface water features and covered to avoid excessive sediment run-off or wind blow;
- Given the proposed construction methodology the construction phase of the project is not anticipated to result in significant levels of silt laden run off, . Nevertheless the site will be regularly monitored by construction staff for signs of run-off such as silt in surrounding vegetation and measures will be put in place to prevent this where necessary. It is noted that for much of its length the southern side of the northern towpath is bounded by a vegetated bank that prevents the runoff of water from the towpath to the canal. This bank will be retained for its length adjacent to the proposed greenway. At locations where there is no bank present silt run off shall be captured using a toe board buried 50mm into the ground and fixed between the temporary construction boundary fencing posts at locations where the edge berm does not exist. The toe board will be required to tie-in with the existing vegetation bank at either end.;
- Excavations will be carried out using a suitably sized excavator;

- Any excavated soil that is not re-used will be disposed of to a Local Authority approved waste disposal facility;

- In all circumstances, excavation depths and volumes will be minimised and excavated material will be re-used where possible.

7.2.2 Best Practice Approach to Fuel Storage

- The works compound will be located off the R120 where the existing works compound was used for upgrading works to this road. This will ensure that all fuel and machinery are located greater than 70 metres from the Grand Canal. The use of machinery at the site carries the potential for accidental hydrocarbon contamination of the area, by fuel spillages or oil leaks for example. The works will be carried out in accordance with the following measures to avoid such impacts:

- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned.

- When not in use, all valves and fuel trigger guns from fuel storage containers will be locked.

- All plant refuelling will take place on site using mobile fuel bowsers. Only dedicated trained & competent personnel will carry out refuelling operations.

- Plant refuelling will take place as far as practicable from watercourses. A spill kit and drip tray shall be on site at all times and available for all refuelling operations. Equipment shall not be left unattended during refuelling.

- All pipework from containers to pump nozzles will have anti siphon valves fitted.

- Strict procedures for plant inspection, maintenance and repairs shall be detailed in the contractor's method statements and machinery shall be checked for leaks before arrival on site.

- All site plant will be inspected at the beginning of each day prior to use.

- Defective plant shall not be used until the defect is satisfactorily fixed.

- All major repair and maintenance operations will take place off site.

- Care will be taken at all times to avoid contamination of the environment with contaminants other than hydrocarbons, such as uncured concrete or other chemicals.

- The plant refuelling procedures described above shall be detailed in the contractor's method statements.

7.3 MEASURES TO PROTECT WATER QUALITY & SURFACE WATER BODIES

- A number of aqueducts occur along the Greenway Route. These aqueducts cross over watercourses such as the Tubbermaclugg Stream. To prevent the ingress of any surface water or dust emissions to these watercourses during the construction phase temporary silt trap and impermeable barrier will be placed along the edge of the aqueduct while dust screens will be placed over the aqueduct guardrails.

- Suitable prevention measures should be put in place at all times to prevent the release of sediment to the Grand Canal and other drainage channels associated with construction areas and migration to adjacent watercourses. It is noted that for much of its length the southern side of the northern towpath is bounded by a vegetated bank that prevents the runoff of water from the towpath to the canal. This bank will be retained for its length adjacent to the proposed greenway. At locations where there is no bank present silt run off shall be captured using a toe board buried 50mm into the ground and fixed between the temporary construction boundary fencing posts at locations where the edge berm does not exist. The toe board will be required to tie-in with the existing vegetation bank at either end.

- To reduce erosion and silt-laden runoff the existing vegetated raised bank along the canal bankside (on the southern side of the proposed greenway will be retained throughout the length of the greenway. .

- Disturbance to natural drainage features should be avoided during the construction and/or maintenance of routes.

- Excavated material will not be stored immediately adjacent to watercourses.

- During route maintenance no construction activities should be undertaken at watercourse crossing in wet weather conditions.

- Any refuelling or lubrication of machinery will not be undertaken within 50m of a watercourse

7.4 NON-NATIVE SPECIES

- While the presence of non-native invasive terrestrial plant species was not identified along the proposed Greenway Route during habitat surveys the proposed works will involve the movement of soil on the site and will create disturbed ground that may be subject to colonization with invasive species such as Japanese Knotweed and Butterfly Bush. In stream works are not proposed as part of the Greenway, but are proposed as part of the ongoing maintenance works. There will be no in-channel works as part of the scheme but there is considered to be some potential for the spread of aquatic invasive species (e.g. Zebra Mussel or Elodea spp).

- Any vegetation clearance or construction works to be undertaken in the vicinity of areas identified as supporting non-native species will be undertaken in accordance with the Transport Infrastructure Ireland (TII) (formerly the National Roads Authority (NRA)) guidance measures for the control and management of noxious weeds and non-native invasive species (see NRA, 2010). Sites of known infestation shall be clearly marked prior to works and avoided during construction. The importance of preventing the spread of these species will form part of a tool box talk to all personnel prior to construction commencing.

- In the event that additional topsoil and quarried stone is required on the site, it will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.

- Sites of known infestation shall be clearly marked prior to works and avoided during construction. The importance of preventing the spread of these species will form part of a tool box talk to all personnel prior to construction stage.

- All contractors should incorporate strict biosecurity protocols into their Construction Environmental Management Plans. This should include the thorough cleaning and disinfection of all machinery prior to arrival and departure from the site, to prevent the spread of invasive species.

- In the event that additional topsoil and quarried stone is required on the site, it will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.

7.5 FLORA & FAUNA

It is not proposed to include any public lighting along the greenway. The avoidance of lighting will ensure that potential adverse effects to light sensitive species, such as bats, badgers, otters, barn owl and a range of invertebrates will be avoided.

7.5.1 Groenlandia densa

The measures outlined in Section 7.2 and 7.3 above that aim to protect water quality will be implemented in full. The successful implementation of these measures will ensure significant effects to water quality and this species are avoided during the construction phase.

7.5.2 Birds

Impacts to breeding birds will be avoided by retaining all trees, scrub and woodland occurring either side of the greenway.

7.6 OTTERS

7.6.1 Construction Phase

7.6.1.1 Pre-Construction Surveys

Two holts and two couches were located along the canal adjacent to the proposed greenway.

Prior to any works being carried out, a pre-construction Otter survey will be undertaken. The survey will aim to establish the breeding and activity status of the holts and couches identified and to identify any other holts and/or couches along the northern towpath of the canal. These surveys will be conducted during January/February 2019 when vegetation has died back. This will facilitate the identification of holts and couches.

Camera trap monitoring will be included as a method of monitoring during these pre-construction surveys. Camera traps will be required to take still images at a scheduled time interval (i.e. every 5 minutes) to identify the presence of otters. This is required to offset the limitations of infrared camera traps being triggered by otters, whose body temperature, due to submersion in water, is frequently below that required to trigger cameras.

Based on the findings of otter surveys completed to date it is not predicted that the construction phase of the proposed greenway will result in direct disturbance to otter holts or couches and will not require otters to be excluded from such breeding/resting sites. However considering the proximity of the two holts and couches to the proposed greenway and also in the event that any holt or couch is identified within the footprint of the project site during pre-construction surveys a derogation licence under Section 25 of the Habitats Regulations, issued by the NPWS on behalf of the Department of Culture, Heritage and the Gaeltacht, will be required in advance of any works commencing. Such a derogation licence is required where a holt will be physically disturbed by works and/or where works may result in disturbance to an active breeding holt. Where works are to be undertaken within 150m of an active breeding holt the developer will be required to consult with the NPWS prior to such works commencing.

It the event that exclusions of an otter holt are required, they will be undertaken in accordance with the TII/NRA Guidelines (NRA, 2008).

It is noted that otters can breed at any time of the year, therefore in the event that otter holts are identified, it will be a requirement of the pre-construction surveys to establish the breeding status of such holts. The breeding status of a holt can be established by undertaking repeated monitoring of the holt over a number of consecutive days. Methods to monitor otter traffic at the holt can include camera traps and the placement of sand at entrances to record footprints. In the event that the holt is identified as inactive the entrance should be blocked to prevent the reoccupation of the holt by otters. The holt should be left blocked for another five days and if there are no signs of otter activity at the holt during this time then it should be destroyed immediately under licence. The destruction of any otter holt will be required to be supervised by the licence holder.

In addition to the above surveys the pre-construction phase survey will also seek to establish the size of the population occurring along this section of the Grand Canal. Repeat surveys will be completed prior to the commencement of the construction phase and spraints will be collected in the field. The spraints will be chilled/frozen and delivered to laboratory for genetic testing. The spraints will undergo testing with a view to establishing the population size, age and sex of otters occurring along the canal.

7.6.2 Protection of Water Quality

The measures outlined in Section 7.2 and 7.3 above that aim to protect water quality will be implemented in full. The successful implementation of these measures will ensure significant effects to water quality and otter habitat is avoided during the construction phase.

7.6.3 Operation phase

The proposed greenway is an existing way-marked way and is currently used by both cyclists, and walkers, including dog walkers. The bank sides are also used by anglers for fishing. In light of its current usage as a recreational trail and amenity it is not anticipated that any predicted increased use in the trail will result in significant disturbance to otters. Nevertheless the design of the proposed greenway has sought to minimise any potential disturbance to otters as a

consequence of the proposed trail surface upgrade through the provision of the following measures:

- The footprint of the proposed greenway will follow the footprint of the existing towpath and its extent will the restricted to the existing corridor occurring between the verge and bankside on the north side of the towpath and the existing verge and bank on the south side of the towpath.
- The emergent bankside vegetation occurring along the northern canal bank will be retained and the proposed greenway will be set back 1m from the canal throughout its length so that the existing shallow bank occurring along much of its length is retained in place. In addition enhancement management measures for the bankside emergent vegetation have been outlined (see Section 2.13 below) and the implementation of this management will enhance the cover afforded by this vegetation to the canal from the towpath.
- No habitats that provide potential cover for otters within the terrestrial zone 10m either side of the canal will be lost to the footprint of the proposed greenway.
- The project does not include any elements that will encourage access to the end of the canal bank. As stated above the emergent vegetation occurring along the canal will be retained.

Operation phase monitoring for otters is outlined in Section 9 below.

7.7 BADGERS

7.7.1 Construction Phase

7.7.1.1 Approach to Managing Disturbance to the Active Main Sett

An active main sett occurs along adjacent to the proposed greenway. One badger entrance emerges onto the northern side of the greenway. Due to the proximity of the construction footprint immediately adjacent to this sett the construction works will have the potential to result in temporary disturbance to this sett during the excavation of trenches and the laying of ducting and the new trail surface. The proposed works will not require the destruction of the sett or any of its entrances. It is also anticipated, based on distribution, levels and direction of travel of the sett entrances that tunnels or chambers associated with the towpath will not occur under the footprint of the towpath will not be physically disturbed by the excavations. In light

of this it is not proposed to exclude badgers from the sett during the construction works in the vicinity of the project. Nevertheless, whilst no sett structures are anticipated to occur under the construction footprint this cannot be confirmed with certainty until excavations are undertaken. In view of this a precautionary approach will be taken to the proposed works within a 50m buffer distance of the badger sett and works within this distance of the sett will only be completed upon receipt of a derogation licence issued by the NPWS, that permit the works and potential disturbance to badgers to proceed.

In the event that a derogation licence permitting the works to proceed is issued by the NPWS, these works will be required to conform to the following measures:

- A preconstruction survey for the status of the (currently active) main sett occurring adjacent to the towpath will be undertaken. This survey will be required to determine whether the sett is still active or inactive in advance of the construction works. The surveys should be completed within two weeks of the commencement of the construction. To establish the status of the sett continuous monitoring over a 5 day period will be required. Methods to establish badger activity at the site will include the deployment of camera traps monitoring traffic at sett entrances; the provision of sand pads at sett entrances to record footprints; the search of sett entrance for badger hair and signs of fresh excavations, spoil etc.

- All construction works associated with the proposed greenway within 150m of the active badger sett will be completed between the month of July and November, inclusive, so that disturbance to badgers during the breeding season is avoided.

- In the event that the known badger sett (or any other badger sett identified in the future during pre-construction surveys) is confirmed to be inactive then an application to the NPWS seeking a derogation licence for construction works at any time of the year can be made.

- All construction works associated with the stretch of the proposed greenway within a 30 metre buffer area of the badger sett will be completed within a period of 3 to 4 consecutive days between the months of July and November. Every effort will be made to minimise the time required to complete remaining construction works within

150m of the active sett. The project ECoW, who will also be the licenced scientific agent on an derogation licence will liaise with the construction contractor to ensure that the construction timeframe within 150m of the active badger sett is minimised.

- The badger sett will be fenced off with temporary construction fencing at the start of the construction phase. The fencing will no block badger access to the one entrance lying at the foot of the bank adjacent to the towpath and the proposed greenway.

- All construction staff will be notified of the presence of the badger sett, its significance in term of the conservation of the local badger population on site and its sensitivity to disturbance.

- All construction work associated with the proposed greenway within 150m the sett shall cease by 6pm between between the months of March and September and by 4pm on any day between the months of October and February. This is to ensure no construction activity occurs at dusk when badgers start to emerge from their setts.

- All construction staff and machinery will be prevented from entering the protection zone.

- All chemicals or other potentially polluting materials associated with the construction operation of the greenway will be stored in secure bunded containers and in a bunded area at the construction site compound, which will be located a significant distance from the known badger sett location.

- Trenches associated with the proposed ducting will either be required to be covered at the end of each working day or include a save means of escape for any badger falling in.

- No blasting or piling will be undertaken as part of the construction works along the proposed greenway.

- All construction works within 30m of the active badger sett will be monitored by the project ECoW who will be the named licence holder.

- In the event that a badger tunnel or chamber is found to occur within the excavation footprint, the ECoW will direct the construction crew to cease operations. The ECoW will survey the tunnel/chamber to ensure that no badgers are present or have been harmed by the excavations. Once the ECoW has confirmed that no badgers are present or have been harmed the newly exposed tunnel entrance will be blocked by the ECoW.

7.7.1.2 General Pre-Construction Badger Survey

Prior to any works being carried out, a pre-construction badger survey will be undertaken. This survey should be completed well in advance of the commencement of construction to allow for derogation licence applications in the event that additional badger setts are identified. In the event that additional setts are identified adjacent to the construction footprint then all measures outlined above for the known active main sett will be required to be implemented.

7.7.2 Operation phase

The proposed greenway is an existing way-marked way and is currently used by both cyclists, and walkers, including dog walkers. In light of its current usage as a recreational trail and amenity it is not anticipated that any predicted increased use in the trail will result in significant disturbance to badgers.

The design of the proposed greenway will minimise any potential operation phase disturbance to badgers and the known badger sett ensure that the existing high bank bounding the northern towpath in the vicinity of the badger sett is retained and that no vegetation occurring on the bank and surrounding the site is removed as part of the development. The absence of any proposal to include lighting along the canal will also ensure that existing night time light levels in the vicinity of the badger sett are retained.

7.8 WHITE-CLAWED CRAYFISH

The design of the project which will avoid any requirements for instream works along the canal will ensure that physical disturbance to crayfish and their habitat is avoided.

The mitigation measures outlined in Section 7.2 and 7.3 to minimise potential risks to water quality in the canal and along watercourses passing under the canal will protect crayfish against any potential adverse effect that could otherwise arise as a result of perturbations to water quality.

7.9 VERTIGO MOULINSIANA

This species has been recorded in association with fringing emergent vegetation around the pond to the north of the towpath in the vicinity of Gollierstown Bridge. The hydrology of this fringing area is influenced by seepage from the canal. Backfilling along the section of the trench opposite the artificial quarry ponds at Gollierstown quarry will be undertaken in accordance with design measures that aim to reinstate the existing towpath substrated around the cable duct. The existing substrate will be reinstated at this location to maintain seepage pathways between the canal and the artificial pond to the north where the rare species *Vertigo moulinsiana* was recorded.

8.0 RESIDUAL IMPACTS

In light of the design of the proposed greenway which has sought to avoidance the potential for significant effects to key habitat and species receptors the proposed greenway.

9.0 ENHANCEMENT

An opportunity for habitat enhancement has been identified in the vicinity of Gollierstown Bridge. The section of the northern canal bank either side of Gollierstown Bridge and between the existing ramps and the canal will be closed off to discourage access to the bankside in this area. It is proposed that tree planting be undertaken in this area to prevent access. Planting will be undertaken using thorny species and other thicket species, such as hazel that are typical of the canal verge. In addition to this an opportunity will be taken to provide an artificial holt in the fill material that underlies the ramp. Once surrounding scrub and woodland vegetation is established this will represent a suitable location for otters to use as breeding site.

During ecological surveys in 2018 management practices unsympathetic to the emergent tall reed and tall herb swamp habitat along the canal bankside. These practices included the close cropping of the vegetation associated with this habitat and the casting of cuttings on to this

habitat which in turn results in eutrophication of the habitat and adjacent canal waterbody. As part of the proposed greenway it is proposed that the management regime of these bankside habitats is enhanced by 1. Avoiding the close cropping of the bankside vegetation. This vegetation should not be cut to less than 0.5m and where the vegetation is less than 0.5m in height no cutting should be undertaken; 2. All cutting generated during ongoing vegetation management along this section of the canal will be collected and disposed of offsite at an approved waste disposal site.

10.0 MONITORING

Operational phase monitoring will be required for otters, badgers, Vertigo moulinsiana habitat and fringing all reed swamp habitat.

Otters will be monitored for a minimum period of three years after construction is completed. The first monitoring will take place in year two followed by a repeat in year three. The following are recommended for monitoring: Spraints will be used to determine the presence and distribution of otter along the Grand Canal. Spraints will again be collected for genetic analysis in the laboratory with a view to establishing the size of the population during the initial years of operation.

11.0 CONCLUSION

Following consideration of the residual impacts (post mitigation) it is noted that the proposed Greenway development will not result in any significant impacts to the Grand Canal pNHA or the key ecological receptors that occur along the canal. Provided all mitigation is implemented no potential for residual impacts on receptors of International, National or County Importance were identified.

Other than the identified Key Ecological Receptors, the ecological impacts on floral and faunal receptors of Local Importance (Lower Value) are not considered to be significant.

Provided design, best practice and mitigation measures that have been outlined in this EcIA are implemented in full, significant impacts on ecology are not anticipated at the international, national county or local scales or on any of the identified Key Ecological Receptors.

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APPENDIX 1: CONFIDENTIAL REPORT - OTTER & BADGER SURVEY REPORT

APPENDIX 2: CONFIDENTIAL REPORT - VERTIGO MOULINSIANA SURVEY REPORT

APPENDIX 3: BAT SURVEY REPORT

Bat Report

Grand Canal Greenway

12th Lock to Hazelhatch

Doherty Environmental

December 2018

Bat Report

December 2018

Document Stage	Document Version	Prepared by
Final	1	Pat Doherty MSc, MCIEEM

For and on behalf of

Doherty Environmental

Prepared By: Pat Doherty

Signed: 

This report has been prepared by Doherty Environmental with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for Clifton Scannell Emerson Associates Consulting Engineers on behalf South Dublin County Council and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

Table of Contents

1.0 INTRODUCTION

Doherty Environmental Consultants Ltd. (DEC) have been commissioned by Clifton Scannell Emerson Associates (CSEA) to undertake bat surveys between the 12th Lock and Hazelhatch to inform a the proposed Grand Canal Greenway (the project).

This report details the findings of a baseline assessment of bat roosting and foraging activity within and adjacent to the proposed greenway along this section of the canal. A desktop review, bat habitat assessment, roost surveys and foraging activity surveys were completed along and adjacent to this section of the Grand Canal between June and October 2018.

The proposed greenway location is presented in Figure 1.1.

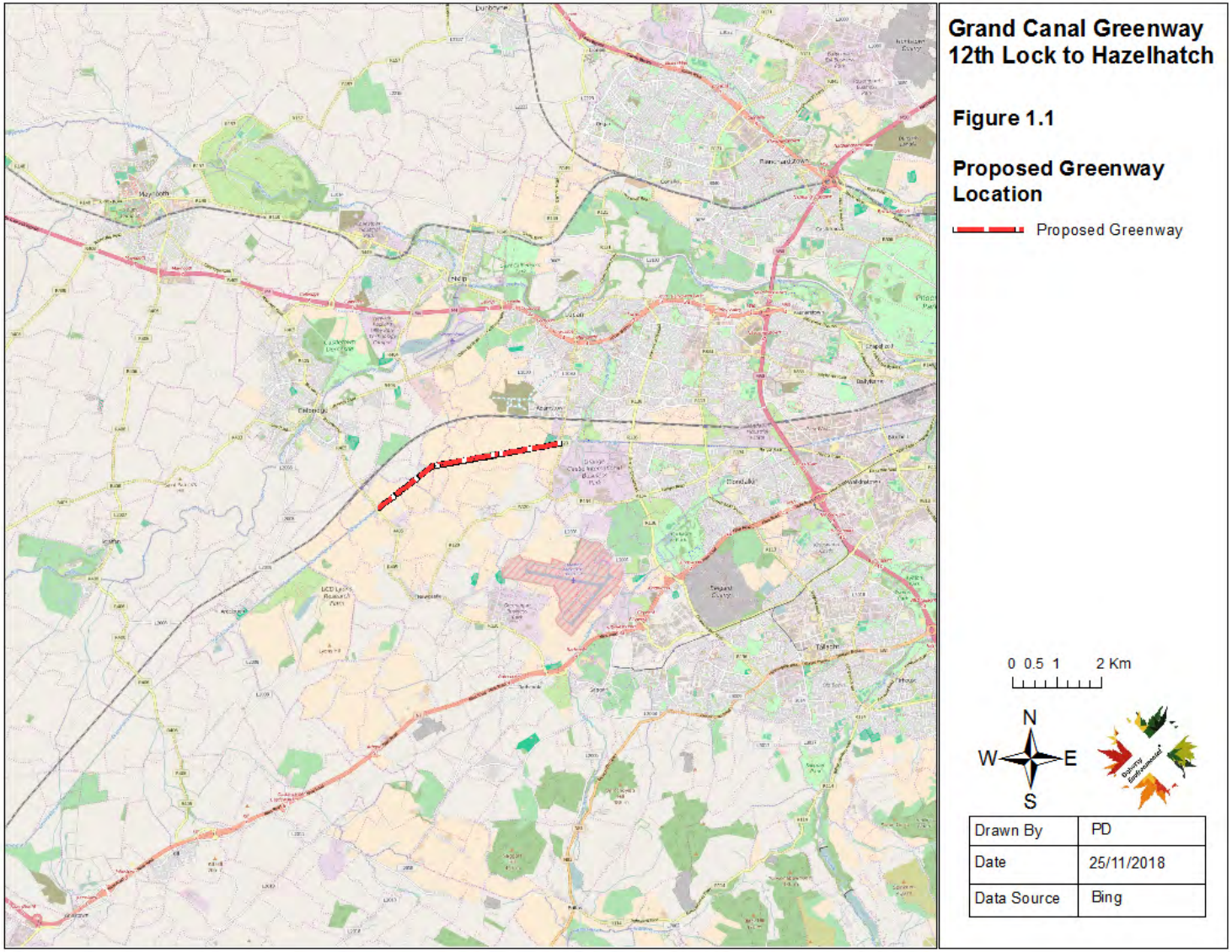
1.1 ASSESSMENT AIMS

The overall aim of the study was to identify how bats use the Grand Canal between the 12th Lock and Hazelhatch and associated area with particular reference to roosting, foraging and commuting. Particular attention was given to establishing the role of structures along and adjacent to the Grand Canal to function as bat roosts. Foraging and commuting activity was also assessed during field surveys.

The aim of the surveys was to gather sufficient baseline information to facilitate an evaluation of the study area's role in supporting bat species in the local area.

1.2 LEGISLATIVE REQUIREMENTS

All bat species occurring in Ireland are protected under both European and National legislation. All species are European Protected Species, listed on *Annex IV* of the *EU Habitats Directive (92/43/EEC)*, transposed into Irish law under the *European Communities (Birds and Natural Habitats) Regulations 2011*. Lesser horseshoe (*Rhinolophus hipposideros*) bats are afforded special protection as an *Annex II* listed species. At the national level all species are protected under the *Wildlife Acts, as amended (1976 and 2000)*.

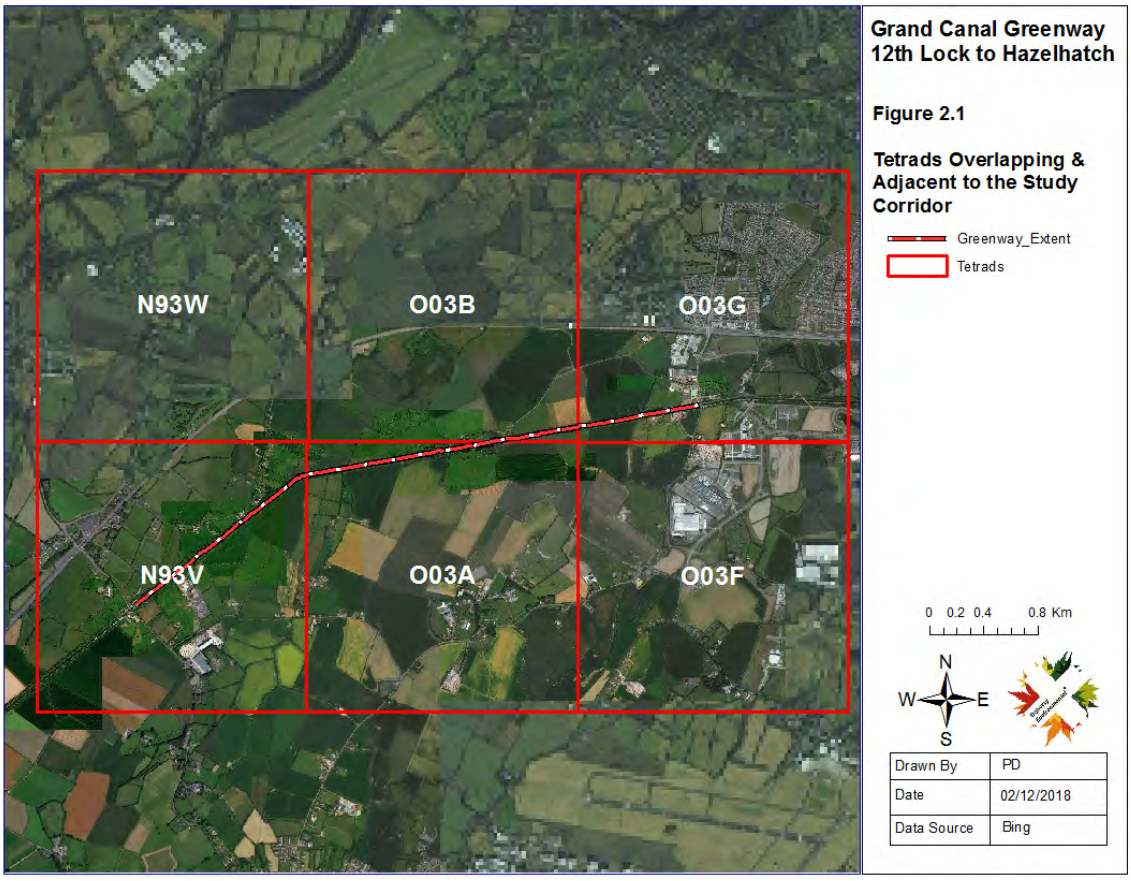

Grand Canal Greenway
12th Lock to Hazelhatch
Figure 1.1
Proposed Greenway Location
Proposed Greenway
0 0.5 1 2 Km
N
W
E
S
Drawn By PD
Date 25/11/2018
Data Source Bing

2.0 METHODOLOGY

2.1 DESK STUDY

The desk study involved reviewing and collating existing baseline ecological data held by the Biodiversity Ireland and Bat Conservation Ireland (BCI).

A search for records held by the National Biodiversity Data Centre (NBDC) website for the five tetrads (i.e. 2km^2 grids) O03A, O03B, O03F O03G, N93V and N93W was completed (last reviewed in December 2018). The location of these tetrads with respect to the study corridor is shown on Figure 2.1. A search of the BCIs online *Batlas* (published in 2010) was reviewed for historical records of bats within and surrounding the proposed site.



A review of the bat landscape classification was also completed. A landscape conservation guide for Irish bat species was published in 2011 (Lundy et al., 2011). This study identified

core areas of favourable habitat for bat species in Ireland. The publication was reviewed to identify the species whose core area overlap with the proposed site.

Ordnance Survey (OS) Maps, aerial photography and satellite imagery were reviewed to identify potential roost sites and high value bat habitat features in advance of field surveys.

2.1.1 Previous Bat Studies of the Grand Canal

All previous available surveys and studies of bats along the Grand Canal relevant to the proposed greenway section between the 12th Lock and Hazelhatch and surrounding environs were reviewed and used to inform the baseline data. The studies reviewed as part of this study are as follows:

Proposed foot/cycle path and cable laying development between the 3rd and 12th locks on the south side of the Grand Canal, Co. Dublin (Kelleher, C., 2009);

West Dublin 220kV/110kV Substation and Associated Works: Planning and Environmental Considerations Report (Tobins, 2015);

Assessment of bat usage of the Grand Canal between Hazelhatch Bridge and the 12th Lock Bridge (Adamstown) (FERS, 2016);

Clonburris SDZ Ecological Survey – Report September 2015 (FERS, 2015); and

Ecological Survey of Clonburris Strategic Development Zone (SDZ), Co. Dublin (FERS, 2018).

2.2 FIELD SURVEYS

A range of bat surveys were completed along the canal during the 2018 bat activity season. The bat field surveys were informed by a number of recognised guidance which include:

- Bat Survey Guidelines: Traditional Farm Buildings Scheme (Aughney, T *et al*. 2008, Heritage Council);

- Best Practice Guidelines for the Conservation of Bats in the Planning of National road Schemes. National Roads Authority. Ireland; and

- Bat Surveys: Good Practice Guidelines (3nd Edition) (Collins, 2016, Bat Conservation Trust (BCT), UK).

2.2.1 Bat Habitat Evaluaton

The evaluation of the potential suitability of the proposed greenway and the canal corridor for bats has been informed by the guidelines outlined by Collins (2016). The suitability of an area to support bats is based on the availability of suitable roosting habitat as well as the availability of suitable commuting and breeding habitat. The roosting, commuting and foraging habitats are considered when ranking bat habitat suitability. Collins (2016) classifies bat habitat suitability under four categories ranging from negligible, low, moderate and high value.

2.2.2 Identification of Potential Bat Roosts

During initial appraisal of the proposed greenway corridor an assessment was made of on-site features that have the potential to support roosting bats. These features include built structures and trees along and adjacent to the study corridor.

Built structures occurring within and adjacent to the proposed greenway were assessed for their potential to support roosting bats. Structures occurring immediately adjacent to the proposed greenway are concentrated to the western and eastern ends. Gollierstown Bridge and some older dilapidated buildings are the only other structures that occur in the immediate vicinity of the greenway. All structures inspected for their potential to support roosting bats are shown in Figure 2.2. No internal inspection surveys of occupied residential/commercial structures were undertaken. It is also noted that residential dwellings located to the north of the proposed greenway at its western end were appraised from the public road and/or from the back-drain and no detailed close up inspection was carried out for these structures.

External inspection surveys were carried out during the daytime of structures and involved inspecting the structure for:

- obvious exit/egress points for bats such as missing roof tiles, opening to the roof spaces, wall crevices, open windows & doors etc.; and

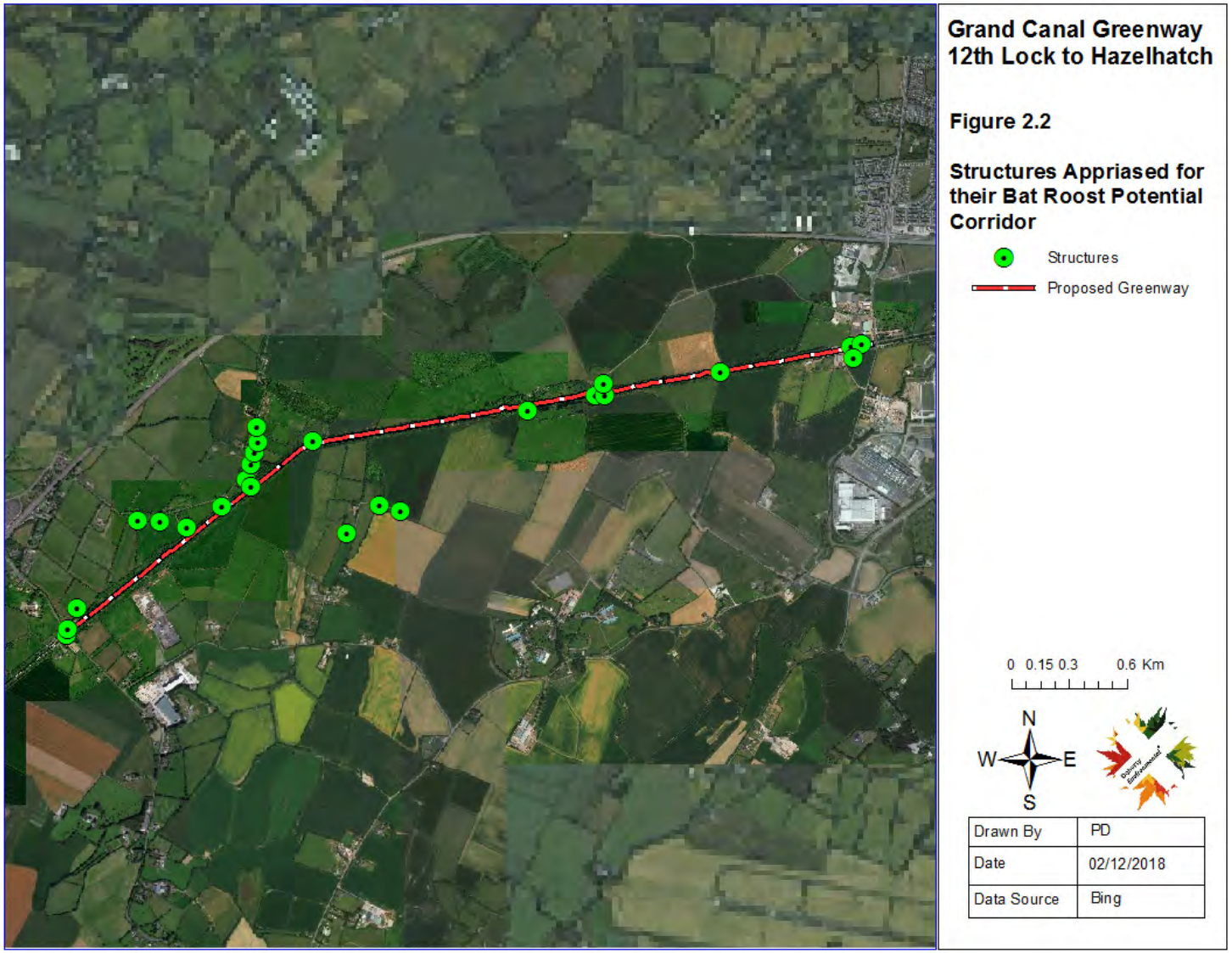
- field signs associated with bat activity such as faecal droppings, scratch marks, staining on walls etc.

Other structural features such as roof material, aspect and roof shape were also recorded. The roost potential of these structures was assessed with reference to features that are typically associated with bat roosts in buildings. Kelleher and Marnell (2006) and Collins (2016) outlined a series of factors associated with buildings that are more or less likely to support bat roosts. These factors are reproduced in **Appendix A**.

Trees occurring immediately adjacent to the northern towpath were inspected for their potential to support bat roosts. The inspection involved identifying trees that displayed features typically used by bats such as cavities, hollows, cracks in major limbs and dense ivy cover. The trees were also examined for evidence indicating the presence or use of the tree by bats. Such evidence includes:

- scratch marks and/or staining at hollows, cavities etc;
- bat dropping in, around, and/or below hollows, cavities etc.; and
- the smoothing of surfaces around hollows, cavities etc.

The roost potential of trees was graded according to the categories outlined in *Table 4.1* of the BCT Bat Surveys: Good Practice Guidelines (Collins, 2016).


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 2.2
Structures Appriased for their Bat Roost Potential Corridor
Structures
Proposed Greenway
0 0.15 0.3 0.6 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing

Binoculars were used during the daytime assessment. Photographs were taken of all structures and trees, which were deemed to have potential to support bat roosts, along with a GPS record of their locations.

2.2.3 Roost Surveys – Emergence/ Return Surveys

2.2.3.1 Structures

To determine the presence or absence of roosting bats, dusk emergence and pre-dawn roost surveys were undertaken at all structures occurring immediately adjacent to the proposed greenway. Other structures identified as being of higher potential for supporting bats in the wider vicinity to the north and south of the proposed greenway were also surveyed for roosting bats.

Structures adjudged to be of low value to the north and south of the canal were not subject to bat roost surveys. In general these structures supported one or more of the following unfavourable features for supporting roosting bats:

- Tiled or slate roofs with no obvious access points to the structures interior;
- Corrugated roofs; and
- Lofts converted for residential use i.e. bedrooms etc.

Dusk emergence surveys commenced a minimum 15 minutes before sunset and lasted for a minimum of two hours after sunset. Pre-dawn return surveys commenced a minimum of 1.5 hour before sunrise and were completed 15 minutes after sunrise. During surveys surveyors generally took up a position around the structure, paying particular attention to obvious gaps in the structures or to the gable ends of the building. An Echo Metre Touch, Peterssons D230 and Bat Box III bat detectors were used during the roost surveys.

2.2.4 Bat Activity Surveys

The survey effort for bat activity surveys along the proposed greenway were informed by the approach outlined in the BCT guidance (Collins, 2016). Transect and automatic detector surveys were undertaken throughout the activity season to assess the levels of foraging and commuting activity along the canal.

2.2.4.1 Transect Activity Surveys

A transect survey was completed along the northern towpath of the canal and also along hedgerow field boundaries within fields to the north and south of the canal. The transect survey involved surveyors walking along the canal and continuously monitoring for bat activity with hand held bat detectors. The surveyors walked each transect at an even pace and paused to undertake five-minute surveys at fixed spot survey locations. The fixed-point spot surveys were selected prior to commencing the first transect in June 2018 and were located at points along the transect that intersected with north-south orientated hedgerows and linked into the canal corridor and also (for comparison purposes) at points where no such hedgerows linked into the canal. The location of the spot survey points along the canal are shown on Figure 2.3. During the five-minute spot survey the surveyor took up a position on the canal bank and used high-powered LED maglite torches to visually monitor the canal water. The visual observations were undertaken to support the recording of any Daubenton's bats foraging or commuting over the canal.

Transect surveys were completed following the completion of dusk emergence surveys or commenced at sunset on nights where no emergence survey was completed. Transect surveys lasted for approximately 2 hours.

During spot surveys bat activity was recorded by counting the number of passes detected by different bat species. The number of passes recorded were used to categorise activity levels. One pass not repeated within 1 minute was recorded as a commuting pass. Where 2 to 5 passes were recorded during a spot survey bat activity was categorised as low activity. Where 5 to 10 passes were recorded during a spot survey bat activity was categorised as moderate activity. Where in excess of 10 passes were recorded during a spot survey bat activity was categorised as high activity. It is noted that no guidelines currently categorise bat activity into low, moderate or high activity classes. However, Matthews et al. (2016) categorised nightly bat activity into the following activity classes: Low - <3 passes; Moderate – 3 – 49 passes; High >50 passes. As such this approach informed the categorisation of activity during the transect surveys, but as the Matthews et al. activity categories apply to entire nights, the categorisation for high activity have been reduced to >10 passes, to reflect the short duration of the spot surveys along transects.


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 2.3
Bat Survey Locations
Spot Survey Locations
Automatic Survey Locations
MonitoringPointNo
MP1
MP2
MP3
MP4
Proposed Greenway
1
2
3
4
5
6
7
8
9
10
11
12
13
0 0.15 0.3 0.6 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing

Where bats were seen the number of individuals were recorded. The location of all bat passes was recorded using a hand-held GPS. Echo Metre Touch and Peterssons D230 bat detectors, featuring both heterodyne and frequency division were used during the activity surveys. Bats were identified in the field to species level, *Myotis* sp. were identified to family level.

During hand-held bat surveys species were identified in real time by recording peak frequency. Notes were also made on the time of recording and type of behaviour of each bat encountered during the activity surveys.

2.2.4.2 Static Automatic Activity Surveys

Automatic survey sessions were undertaken between June and October 2018. Song Metre 4 (SM4) remote bat detectors were used during the automatic static detector surveys. Monitoring points were selected along the canal and included positions along the northern towpath and also low over the canal itself. The monitoring points were selected to provide spatial coverage along the length of the proposed greenway corridor as well as providing coverage for bat activity low over the canal and at higher elevations along the canal towpath.

At points low over the canal the recording microphone was secured to an extension pole which was in turn secured to a strong tree limb or directly to the tree trunk. At high points along the northern towpath the microphone was secured via a pole to limbs overhanging or bounding the towpath. The microphones on these trees were positioned approximately 3m to 4m above ground.

The automatic recorders were set to record continuously throughout the night during each night of survey. Recording was programmed to start 30 minutes before sunset and finish 30 minutes after sunrise.

The dates, number of hours surveying per night and total number of hours survey completed per session are provided in Appendix B. The location of each automatic survey session is shown in Figure 3.3. MP2 to MP4 were positioned low over the canal, within approximately 50cm of the water surface. MP1 was positioned at an elevated position on a tree along the northern towpath.

2.2.5 Bat Call Analysis

Analysis of bat calls recorded during the transect surveys was undertaken using Song Scope and Analook software. Peak frequencies of bat calls were used to support the identification of bat species noted in the field.

All bat calls recorded during the automatic monitoring sessions in 2018 were analysed using Kaleidoscope Pro software (V.5). The bat call classifiers for British Bats provided by Kaleidoscope Pro were used to identify the species responsible for generating the bat call. These classifiers assign calls to species based on call characteristics, with the peak frequency of the calls being particularly important in distinguishing between species with similar call characteristics (i.e. Pipistrelle species).

The number of calls recorded by the automatic detectors is representative of bat activity in the area surrounding the automatic survey location. The amount of activity recorded does not allow a quantification of the number of individuals recorded at this location but does provide quantitative data on bat activity at this location during the surveys. The SM2 records ultrasonic sound, including bat calls, to a data file stored on a removal flash card. Upon completion of the automatic survey the data files were analysed for bat calls. Each continuous bat call of one second or greater was recorded as an individual bat pass. Bat calls separated by one second or more are recorded as individual bat passes. The data files were analysed as follows:

- The total number of bat passes recorded throughout the automatic survey period.
- The total number of bat passes recorded per species per survey night.

A Bat Activity Index (BAI) for each of the above is also provided by calculating the number of bat passes per hour throughout each discrete monitoring period. Although a useful index of bat activity, this index cannot be used to infer population abundance or the number of individuals using the site (Hayes 2000, Kunz et al. 2007).

Currently there is no accepted guideline for classifying levels of bat activity recorded during automatic monitoring sessions, in terms of low, moderate or high levels of nightly activity. However Matthews et al. (2016) recently categorised nightly activity into low, moderate and high groups with low activity assigned to <5 passes per night; moderate assigned to 5 – 49

passes per night; and high assigned to ≥50 passes per night. This activity hierarchy is used in the analysis and interpretation of automatic monitoring results.

2.2.5.1 Survey Personnel

Bat surveys were undertaken by Pat Doherty BSc, MSc, MCIEEM; Ruth Minogue BSc, MSc, MCIEEM; and Jim Minogue, BSc.

2.2.5.2 Limitations

Limitations during the identification of the bat roost potential of structures were experienced. Access permission was not sought from landowners of occupied residential properties located adjacent to the canal corridor. These properties were not entered and for thus that could not be viewed from the canal the rear could not be examined in detail.

Built structures were generally surveyed by one surveyor. In order to overcome any limitations relating to blind spots at these buildings during the emergence or pre-dawn surveys, the surveyor took up a position back from the structure that provided a commanding view of the structure. This afforded the surveyor a better view of the structure and enable the surveyor to identify bats emerging from or re-entering buildings.

Some transect surveys along the canal commenced after the completion of dusk emergence surveys at structures. It is acknowledged that the late start in the transect surveys may have resulted in the under-recording of bat activity along the transect at and shortly after dusk.

Automatic bat detector equipment failure also occurred during automatic surveys. This limited the data collected during the automatic detector monitoring sessions.

3.0 RESULTS

3.1 DESK STUDY

A review of protected species records held by the NBDC and the Bat Conservation Ireland Batlas website (published in 2010) identified records for five bat species within the five tetrads in which the project site is located. Table 3.1 lists these records.

Table 3.1: Records of Bat Species within the Study Corridor

Common Name	Status	Record Date	Likelihood of being supported by the project site and adjacent area
Daubenton's Bat	Protected Species; EU Habitats Directive Annex IV	2013 2014	Suitable foraging habitat is provided along the proposed greenway.
Leisler's bat	Protected Species; EU Habitats Directive Annex IV	2002 2009	Suitable foraging habitat is provided along the proposed greenway.
Soprano pipistrelle	Protected Species; EU Habitats Directive Annex IV	2009 2013	Suitable foraging habitat is provided along the proposed greenway.
Common pipistrelle	Protected Species; EU Habitats Directive Annex IV	2002 2009	Suitable foraging habitat is provided along the proposed greenway.
Brown long-eared	Protected Species; EU Habitats Directive Annex IV	2002	Suitable foraging habitat is provided along the proposed greenway.

3.2 BAT HABITAT ASSESSMENT

A review of Lundy et al. (2011) and the bat habitat suitability index for individual bat species within the tetrads along and adjacent to the project site has been completed. The bat habitat suitability index scores the suitability of habitats at the landscape level from 0 to 100 with areas scoring 0 being least favourable and areas scoring 100 being most favourable for bats. The bat habitat suitable scores for each of the individual bats are outlined in Table 3.2.

Table 3.2: Bat Habitat Suiitability Scores (from Lundy, 2011)

Species	Tetrad	Score
Common pipistrelle	O03A	47
	O03B	47
	O03F	47
	O03G	47
	N93V	47
	N93W	47
Soprano pipistrelle	O03A	37
	O03B	37
	O03F	37
	O03G	37
	N93V	37
	N93W	37
Nathusius pipistrelle	O03A	5
	O03B	5
	O03F	19
	O03G	19
	N93V	5
	N93W	5
Leisler's bat	O03A	44
	O03B	44
	O03F	44
	O03G	44
	N93V	44
	N93W	44
Daubenton's bat	O03A	29
	O03B	29
	O03F	19
	O03G	19
	N93V	29
	N93W	29
Natterer's bat	O03A	39
	O03B	39
	O03F	26
	O03G	26
	N93V	39
	N93W	39
Whiskered bat	O03A	23
	O03B	23
	O03F	19
	O03G	19
	N93V	23
	N93W	23

Brown long-eared	O03A	44
	O03B	44
	O03F	44
	O03G	44
	N93V	44
	N93W	44

The results of the review of the bat habitat suitability scores indicate medium levels of habitat suitability across all five tetrads for Common pipistrelle, Soprano pipistrelle, Brown long-eared and Leisler's bat. Very low levels of suitability for Nathusius pipistrelle in the tetrads O03A and O03B to the east of the study corridor near the 12th Lock were recorded. Low levels of suitability for Daubenton's bat and Whiskered bat in the tetrad O03F and O03G and low to medium levels of suitability in the remaining three tetrads. For Natterer's bat low levels of suitability were recorded.

However when the habitats occurring along the study corridor, which include open water and riparian woodland habitats with good linear connectivity in the landscape, are examined against the criteria used by Hundt[1] (2012) and Collins[2] (2016) to define habitat value for bats, they appear to be more representative of high value habitat for all of the above species, rather than low or medium value.

3.3 IDENTIIFICATION OF POTENTIAL BAT ROOSTS: ROOST INSPECTION SURVEYS

As noted in Section 2.2.2 above guidance provided by Kelleher and Marnell (2006) and Collins 2016 were used to guide the assessment of the roost potential of structures. The buildings occurring within the site and their associated roost potential are outlined in Table 3.3 below. Figures 3.2 and 3.3 show the location of buildings and the potential roost potential categorisaiton referred to in Table 3.3.

[1] See Table 4.2 of Hundt (2012)

[2] See Table 3.4 of Collins (2016)

Table 3.3: Roost Potential of Structures occurring along and adjacent to the Study Corridor

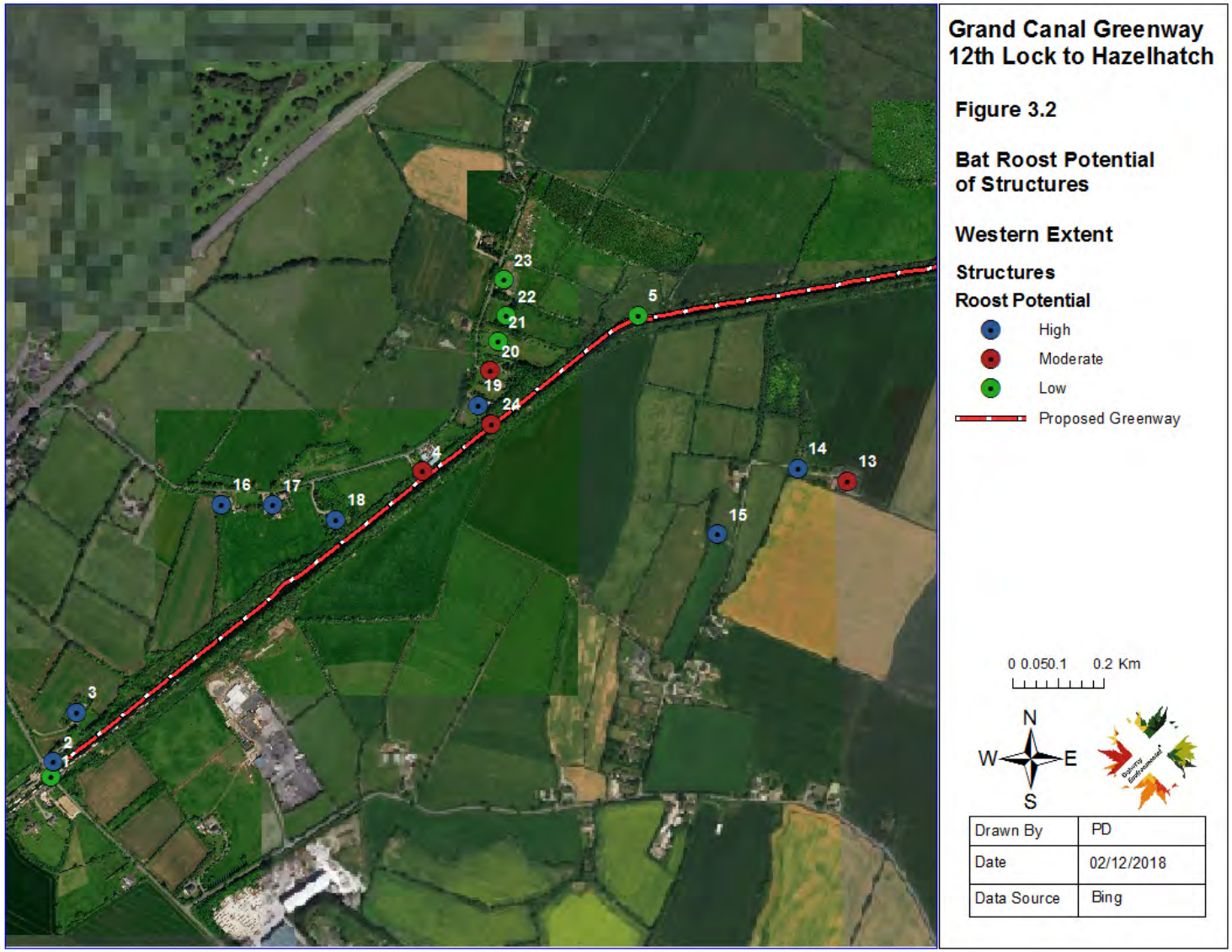
Structure No.	Roost Potential	Description
1	Low	Hazelhatch Bridge: Low number of suitable crevices for roosting present. High night time light levels adjacent to the bridge.
2	High	McEvoys Pub: Slate roof with loft space. Night time lighting in the surrounding area is likely to detract from its use as a roost.
3	High	Number of sheds and dwellings with high potential to support roosting bats.
4	Moderate	Residential dwelling adjacent to the to the canal. Night time security lighting may detract from use as a roost site.
5	Low	Tower ruin. Dense Ivy cover.
6	Low	Ruined lime kiln structure, likely associated with the quarry.
7	Low	Gollierstown Bridge. Few crevices and none deemed of good value for roosting. Grade 0 as per the Norman & Billington (1998) bats in bridges classification scheme.
8	Low	Ruined structure, likely associated with the quarry.
9	Low	Ruined structure with ivy cover.
10	High	Disused dwelling along the canal with slate roof.
11	Low	Delapidated structure with much of the roof exposed.
12	Moderate	Older, pre-1950's structure with slate roof.
13	Moderate	Old, pre-1950s farm shed with good shelter and low daytime light levels. Surrounding corrugated hay sheds of low value.
14	High	Older, pre-1950's farm house that is unoccupied.
15	High	Older, pre-1950's farm house that is unoccupied.
16	High	Numerous structures in yard, some of which are of high potential.
17	High	Numerous structures in yard, some of which are of high potential.
18	High	Modern structure close to the canal with apparent separate loft space. High potential in the event of access points to loft being present.

19	High	Large modern building with apparent separate loft space. High potential in the event of access points to loft being present.
20	Moderate	Likely c. 1970's. 1980's bungalow with tiled roof in good condition.
21	Low	Modern structure with living quarters in loft space.
22	Low	Modern structure with living quarters in loft space.
23	Low	Corrugated farm shed.
24	Moderate	Aqueduct over the Shinkeen Stream. Bridge arch barrel in good condition with previous mortar spraying over masonry evident. However some suitable crevices present. Grade 1 bridge as per Norman & Billington (1998) bats in bridges classification scheme.
25	Low	Aqueduct over the Tobermaclugg Stream. Low culver style crossing. Grade 0 bridge as per Norman & Billington (1998) bats in bridges classification scheme.

Of the structures occurring along the canal corridor only three were identified as being of high potential to support bats. These structures are located at either end of the study corridor. No structures occurring towards the centre of the study corridor were identified to be of high value.

3.4 ROOST SURVEY RESULTS

Dusk emergence and/or pre-dawn roost surveys were undertaken at the following structures: 1; 2; 5; 6 ; 7; 8; 9; 10, 11, 12, 13, 14 and 15. Details of the roost surveys are provided in Table 3.4.


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.2
Bat Roost Potential
of Structures
Western Extent
Structures
Roost Potential
High
Moderate
Low
Proposed Greenway
1
2
3
4
5
13
14
15
16
17
18
19
20
21
22
23
24
0 0.050.1 0.2 Km
N
W
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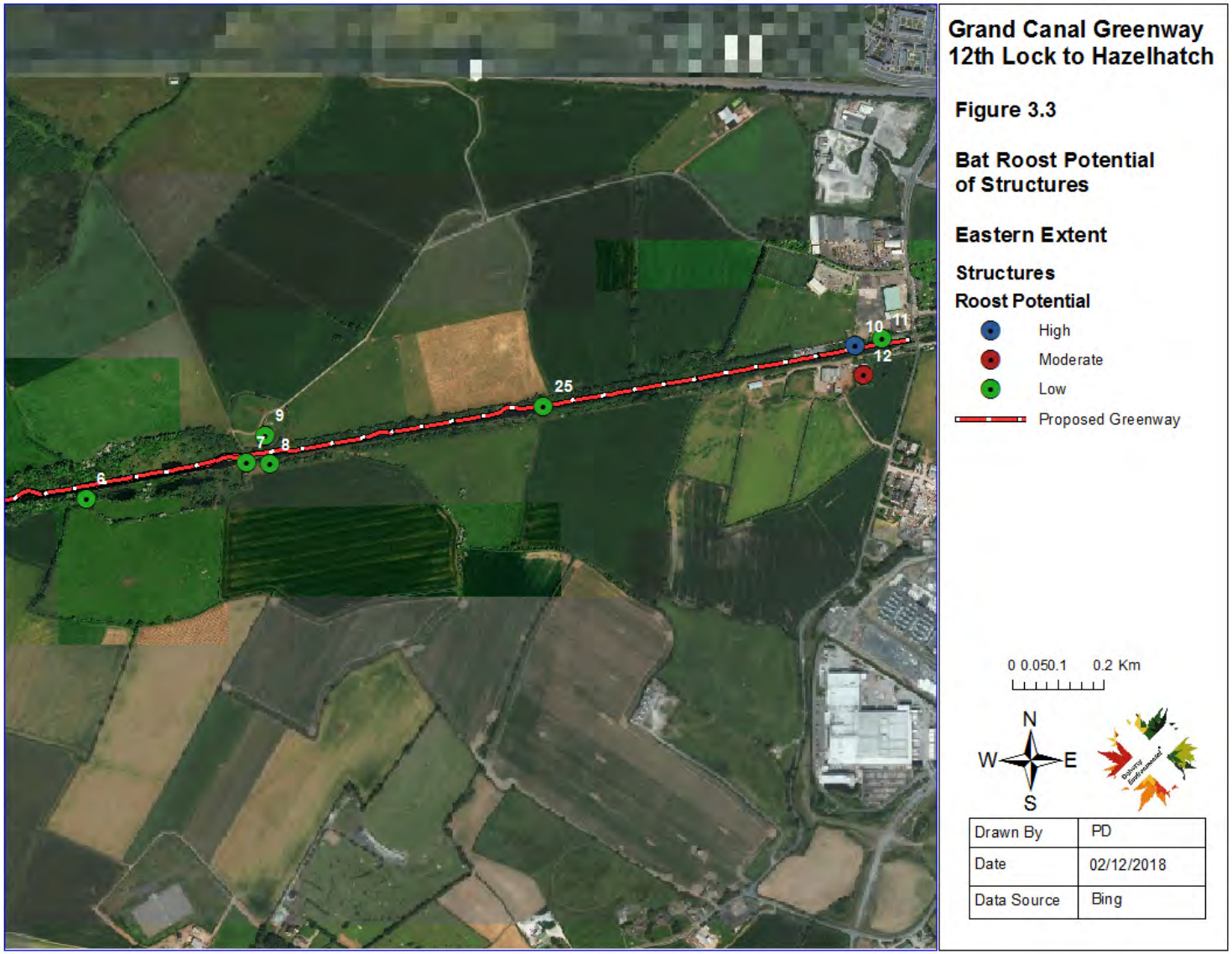
Drawn By PD
Date 02/12/2018
Data Source Bing


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.3
Bat Roost Potential of Structures
Eastern Extent
Structures
Roost Potential
High
Moderate
Low
Proposed Greenway
6
7
8
9
25
10
11
12
0 0.050.1 0.2 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing

Structure	Roost Potential	Survey Date & Survey Type	Results
1	Low	02/08/18 Pre-Dawn	Conditions: Mild; 16C; No Rain; Cloudy; Slight breeze No bats recorded entering the bridge to roost.
2	High	02/08/18 Pre-Dawn	Conditions: Mild; 16C; No Rain; Cloudy; Slight breeze No bats recorded entering the pub to roost.
5	Low	18/06/18 Emergence	Conditions: Mild; 18C; Low cloud cover; Dry and still. No bats recorded emerging from the structure.
6	Low	20/08/18 Emergence	Conditions: Mild; 20C; Overcast; Dry and still. No bats recorded emerging from the structure.
7	Low	24/07/18 Emergence	Conditions: Mild; 17C; Clear; Dry and still No bats recorded emerging from the bridge.
8	Low	20/08/18 Emergence	Conditions: Mild; 20C; Overcast; Dry and still. No bats recorded emerging from the structure.
9	Low	21/08/18 Pre-Dawn	Conditions: Mild; 21C; Calm; Dry. No bats were recorded entering this structure during the pre-dawn survey.
10	High	11/09/18 Emergence	Conditions: Rain shows; Cool at 12C. Cloudy; Moderate breeze. No bats recorded emerging from the structure.
11	Moderate	11/09/18 Emergence	Conditions: Rain showers; Cool at 12C. Cloudy; Moderate breeze. No bats recorded emerging from the structure.
12	Moderate	10/09/18 Pre-Dawn	Conditions: Dry; Cool at 9C; Cloudy; Still No bats were recorded entering this structure during a pre-dawn re-entry survey.
13	Moderate	17/07/18 Emergence	Conditions: Mild; 17C; Dry; Calm . No bats recorded emerging from the structure.
14	High	01/08/18 Emergence	Conditions: Mild; 15C. Cloudy; Slight breeze; Light rain shower. No bats recorded emerging from the structure.
15	High	01/08/18 Emergence	Conditions: Mild; 15C. Cloudy; Slight breeze; Light rain shower. No bats recorded emerging from the structure.

3.5 BAT ACTIVITY SURVEYS: TRANSECTS

Bat activity transect surveys along the northern towpath were completed on the 18th June; 24th July; 15th August; 28th August; 7th September; 5th October 2018; and the 10th October 2018. Each transect involved walking the length of the towpath either from Hazelhatch to the 12th Lock or vice-versa.

3.5.1 18th June Survey Results

Following the completion of the emergence survey at structure no. 5 a transect was undertaken from this structure to the 12th Lock. The results of the transect survey are shown on Figure 3.4. Bat activity was dominated by Soprano pipistrelle, followed by Common pipistrelle and Leisler's bat. Daubenton's bat was recorded commuting along the canal but was not recorded foraging along the canal during any of the spot surveys on the canal bank.

Bat activity was highest in the vicinity of Gollierstown Bridge. Foraging by Soprano pipistrelle and Common pipistrelle was also high immediately to the west of the 12th Lock over the wider “ponded” section of the canal.

3.5.2 24th July Survy Results

Following the completion of the emergence survey at Gollierstown Bridge a transect was undertaken from the structure to Hazelhatch. At Gollierstown bat activity was dominated by Leisler's bat and Soprano pipistrelle. At least two Leisler's bat were visually observed foraging over the ponds and the canal. Numerous Soprano pipistrelle (more than five seen at any one time) foraged over the canal and the ponds.

Common pipistrelle and Myotis species were also recorded along the transect. Higher levels of bat activity were recorded at stops associated with north south hedgerow connections linking into the canal than at stops where no such connections occur.

3.5.3 15th August Survey Results

The transect commenced at sunset at the 12th Lock and terminated at Hazelhatch. Bat activity was low along the transect and at spot surveys between the 12th Lock and Gollierstown with only individual passes for Leisler's bat, Myotis species and Natterer's bat recorded. At Gollierstown high levels of Soprano pipistrelle foraging was recorded alongside the ponds and a little further to the west at spot survey no. 6, where at least three individuals were recorded foraging.

Soprano pipistrelle were again recorded foraging at and to the east of spot survey no. 8. Further west at spot survey no. 9 three Daubenton's bats were visually observed foraging over the canal. One Daubenton's bat was again recorded foraging at spot survey no. 11. An individual Soprano pipistrelle was recorded foraging along the transect between spot survey no. 10 and 11.

3.5.4 28th August Survey Results

The transect commenced at sunset at the 12th Lock and terminated at Hazelhatch. High levels of consistent foraging by Soprano pipistrelle and Common pipistrelle were recorded along the canal from immediately west of the 12th Lock at the wider “ponded’ section of the canal until spot survey no. 1. At spot survey no. 1 an individual Daubenton's bat was visually recorded foraging along the canal.

One Soprano pipistrelle was recorded foraging at spot survey no. 4 location. Soprano pipistrelle foraging was again recorded at spot survey no; 6 to the west of Gollierstown, but levels were lower that those recorded on the 15th August. An individual Leisler's bat was recorded foraging over the pond to the north of the canal. Further west along the transect Soprano pipistrelle and Common pipistrelle dominated activity with foraging of an individual Soprano pipistrelle recorded near the end of the transect at Hazelhatch.

3.5.5 7th September Survey Results

This transect commenced at the 12th Lock and terminated at Hazelhatch. Soprano pipistrelle and Common pipistrelle dominated activity to the east of the transect in the vicinity of the 12th

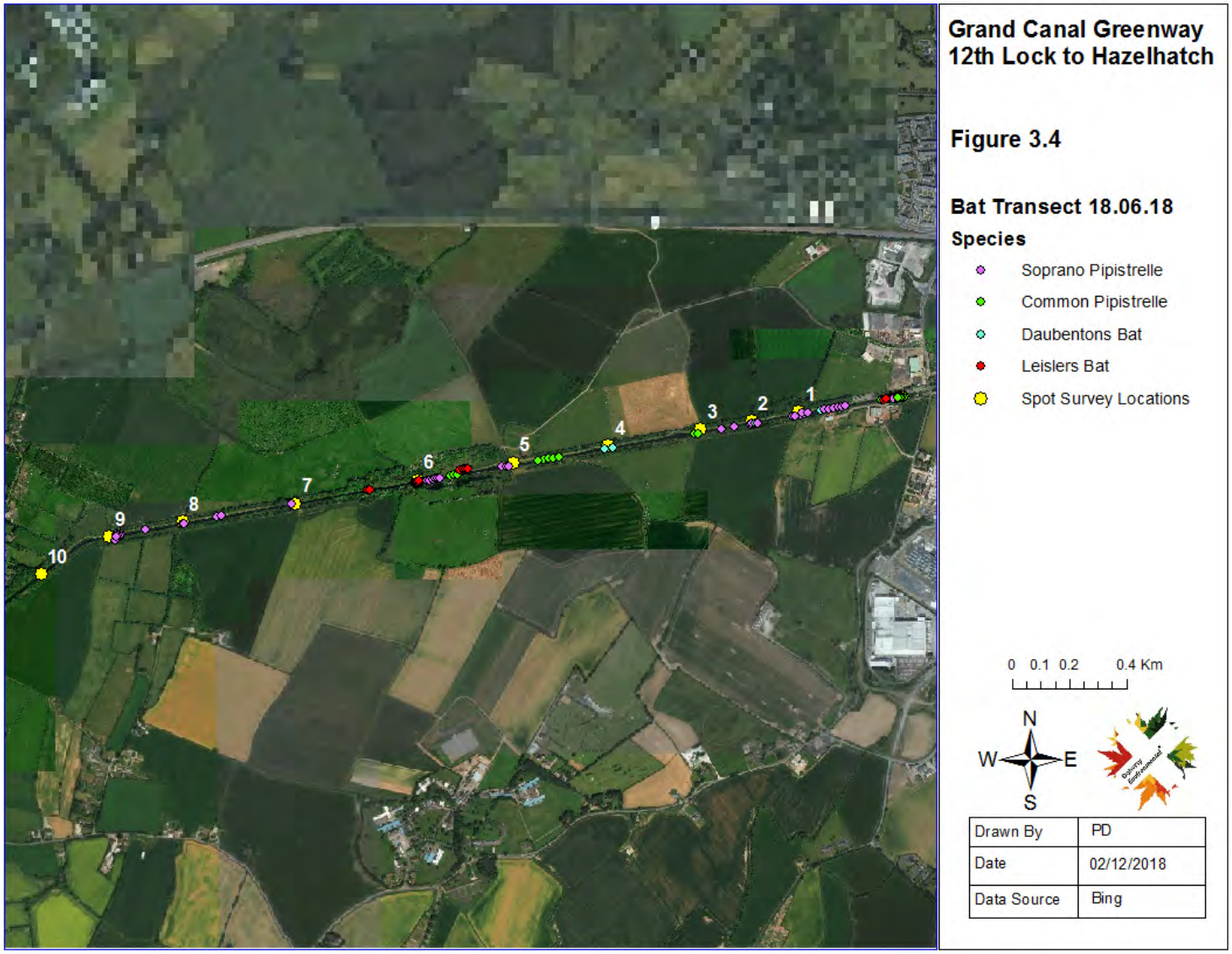
Lock. Soprano pipistrelle dominated activity at Gollierstown. Both pipistrelle species were also dominated to the west in the vicinity of Hazelhatch, however there was a greater variety of species recorded here. Other species recorded include Nathusius pipistrelle, Brown long-eared and Daubenton's bat.

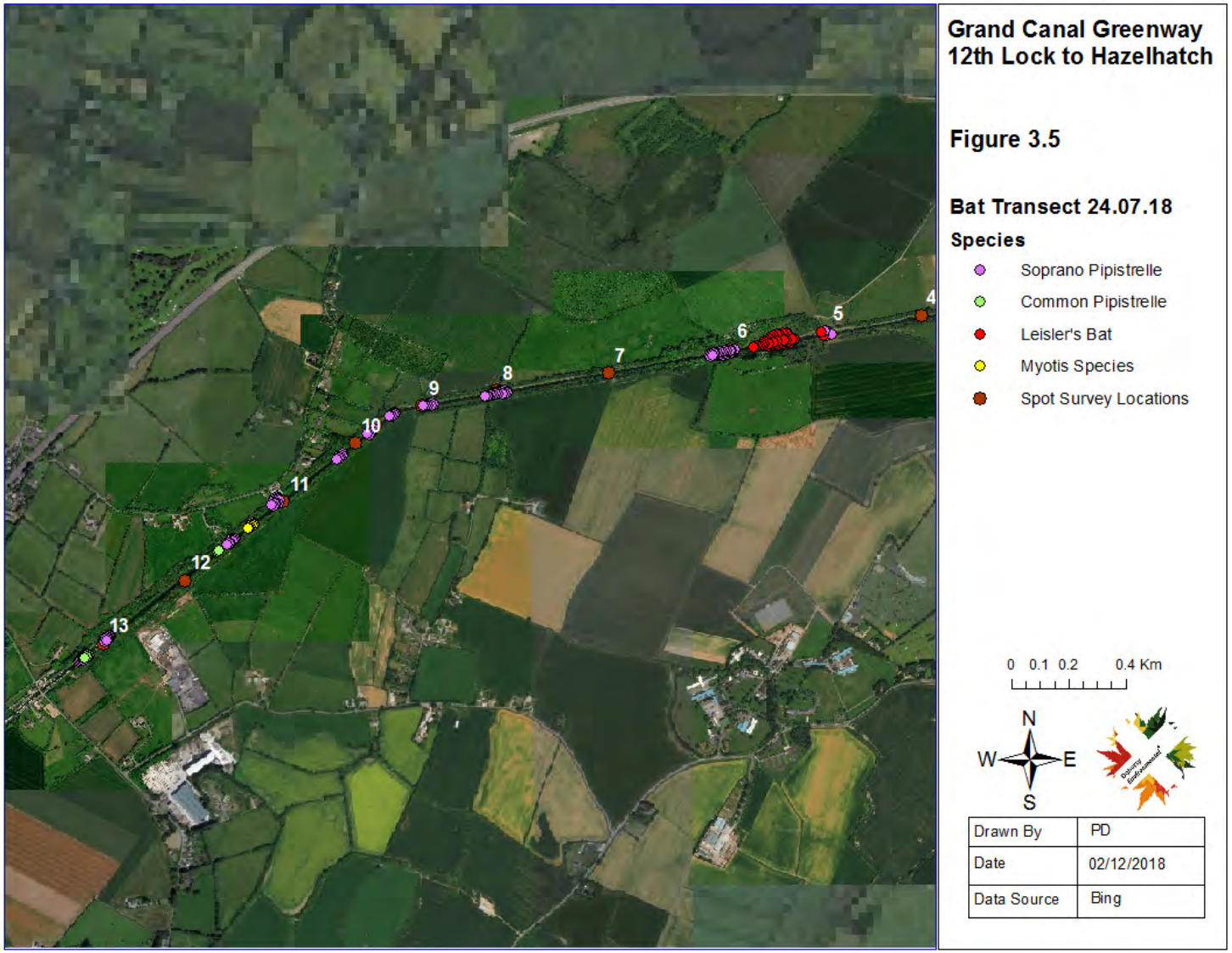
3.5.6 5th October Survey Results

Activity during this transect survey which commenced at the 12th Lock and terminated at Hazelhatch was predominantly focused towards the east of the transect between the 12th Lock and Gollierstown. Further west activity levels were much lower than those previously recorded.

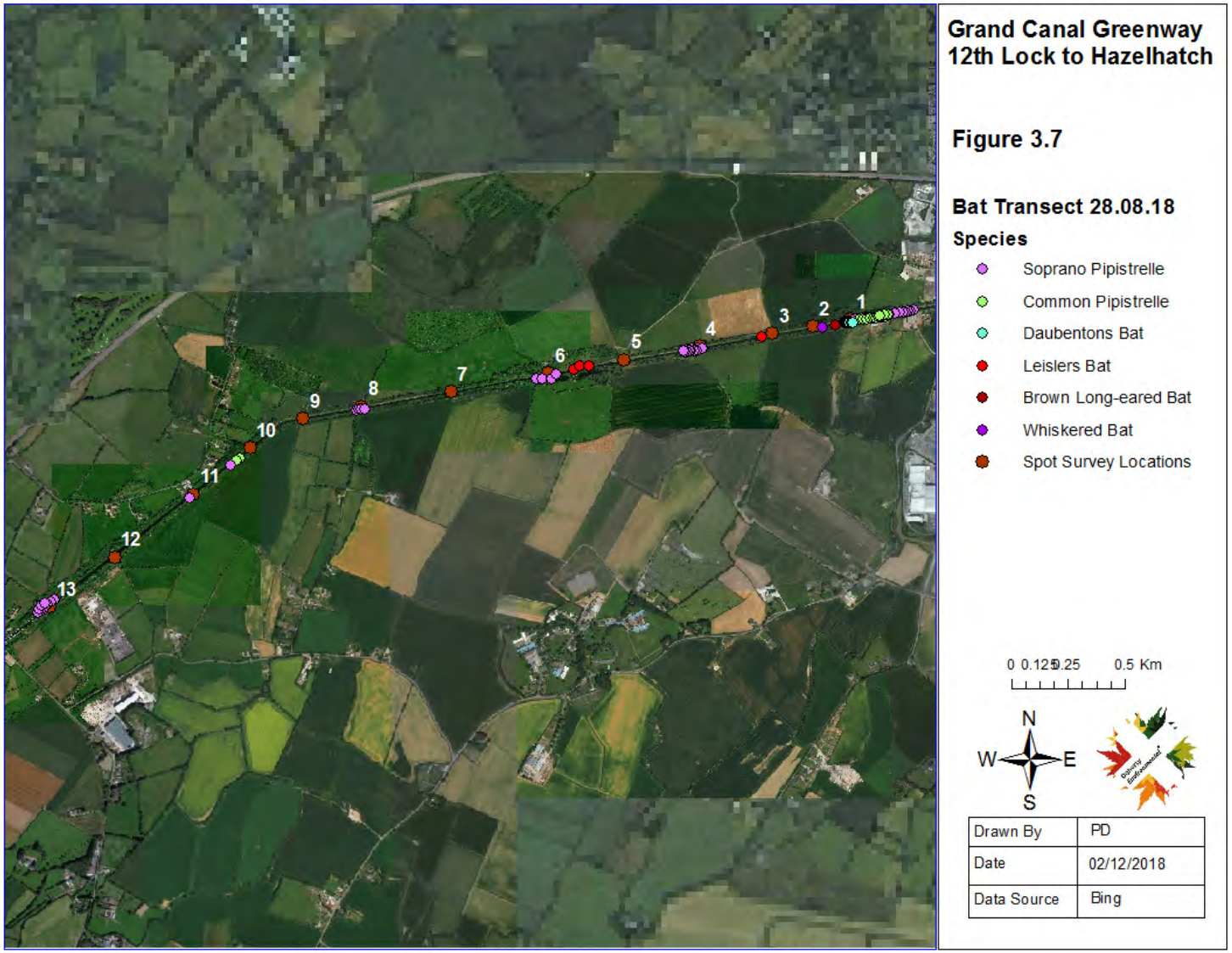
3.5.7 10th October Survey Results

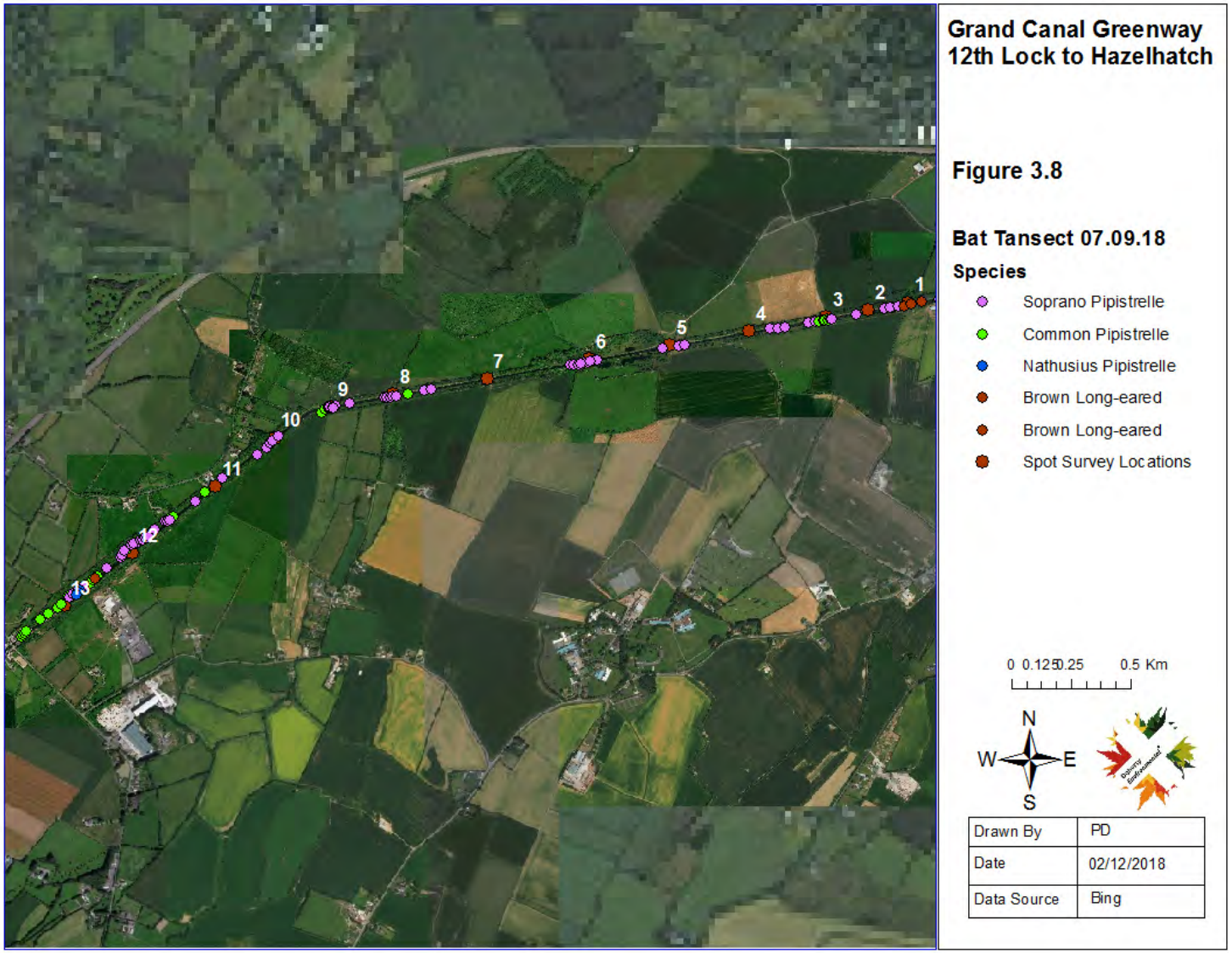
Activity during this transect survey was comprised of lower levels when compared to thouse recorded during earlier transects. This transect commenced at Hazelhatch and the activity was dominated by Soprano pipistrelle until Gollierstown Bridge. Levels of foraging were lower with passes being more fleeting and more representative of commuting bats.


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.4
Bat Transect 18.06.18
Species
Soprano Pipistrelle
Common Pipistrelle
Daubentons Bat
Leislers Bat
Spot Survey Locations
1
2
3
4
5
6
7
8
9
10
0 0.1 0.2 0.4 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.5
Bat Transect 24.07.18
Species
Soprano Pipistrelle
Common Pipistrelle
Leisler's Bat
Myotis Species
Spot Survey Locations
4
5
6
7
8
9
10
11
12
13
0 0.1 0.2 0.4 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.6
Bat Transect 15.08.18
Species
Soprano Pipistrelle
Leislers Bat
Daubentons Bat
Natterers Bat
Myotis Sp.
Spot Survey Locations
1
2
3
4
5
6
7
8
9
10
11
12
13
0 0.125 0.25 0.5 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.7
Bat Transect 28.08.18
Species
Soprano Pipistrelle
Common Pipistrelle
Daubentons Bat
Leislers Bat
Brown Long-eared Bat
Whiskered Bat
Spot Survey Locations
1
2
3
4
5
6
7
8
9
10
11
12
13
0 0.125 0.25 0.5 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing


Grand Canal Greenway
12th Lock to Hazelhatch
Figure 3.8
Bat Tansect 07.09.18
Species
Soprano Pipistrelle
Common Pipistrelle
Nathusius Pipistrelle
Brown Long-eared
Brown Long-eared
Spot Survey Locations
1
2
3
4
5
6
7
8
9
10
11
12
13
0 0.125 0.25 0.5 Km
N
W
E
S
Drawn By PD
Date 02/12/2018
Data Source Bing

3.6 BAT ACTIVITY SURVEYS: STATIC AUTOMATIC MONITORING

This section outlines the results of the automatic bat detector surveys undertaken between June and October 2018. Table 3.4 below provides a summary of bat passes recorded during automatic monitoring along the canal. Monitoring was completed from four points along the canal with a total of 188 monitoring nights completed. This resulted in a total number of 43,258 passes being recorded. Between the months of June and September, with the exception of one monitoring session bat activity recorded was consistently high within an overall nightly average of over 200 passes per night being recorded between the months of June and October. The highest levels of bat activity between June and August inclusive was consistently recorded at MP3, located low over the canal towards the western end of Gollierstown quarry. This point of high activity corresponds to the spot survey no. 6 along transect surveys where Soprano pipistrelle activity was consistently recorded and predominantly at high levels.

Table 3.4: Summary of Bat Activity

Month	MP No.	No. Night	No Hours	Total Passes	Average Passes/Night	Bat Activity Category
Jun	1	8	56	3767	471	High
Jun	2	9	63	2840	316	High
Jun	3	9	63	4590	510	High
Jun	4	9	63	1219	135	High
Jul	2	12	96	3255	271	High
Jul	3	24	192	11160	465	High
Jul	4	20	160	2785	139	High
Aug	1	10	80	60	6	Low
Aug	2	12	96	2207	184	High
Aug	3	19	152	5866	309	High
Aug	4	14	112	1798	128	High
Sept	2	26	234	3217	124	High
Oct	2	16	160	494	31	Medium
Total		**188**	**1527**	**43258**	**230**	

3.6.1 June Automatic Surveys

3.6.1.1 MP1

Table 3.5: Results of June Monitoring at MP1

Date	MYDAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total	Bat Activity Category
20180622	0	2	181	1	41	127	1	353	High
20180623	0	4	144		336	324	3	811	High
20180624	0	2	98		24	332		456	High
20180625	1	15	218		199	589	2	1024	High
20180626	0	0	203	1	45	112		361	High
20180627	0	1	189	1	12	123		326	High
20180628	0	2	140		4	64	1	211	High
20180629	0	4	45		101	71	4	225	High
Total	1	30	1218	3	762	1742	11	3767	

MP1 was positioned elevated over the northern towpath on a tree. Bat activity was dominated by Leisler's bat and Soprano pipistrelle with medium to high levels also recorded for Common pipistrelle. Low activity levels were recorded for all other species during the monitoring survey.

3.6.1.2 MP2

Table 3.6: Results of June Monitoring at MP2

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180622	89	1	13	1	35	126	0	265	High
20180623	64	0	24	0	14	50	0	152	High
20180624	49	3	178	0	92	230	2	554	High
20180625	43	1	69	1	70	177	1	362	High
20180626	53	0	56	0	54	130	2	295	High
20180627	32	2	81	1	88	164	1	369	High
20180628	23	0	3	0	15	145		186	High
20180629	13	2	0	0	10	159	1	185	High
20180630	24	1	22	1	113	310	1	472	High
Total	390	10	446	4	491	1491	8	2840	

Bat activity was dominated by Soprano pipistrelle with high levels of nightly activity recorded throughout the session. High activity was also recorded for Common pipistrelle and more sporadically for Leisler's bat and Daubenton's bat. Activity for Brown long-eared and Myotis species was low.

3.6.1.3 MP3

Table 3.7: Results of June Monitoring at MP3

Date	MY SP	MYDAU	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180622	5	117	11	1	25	113	16	288	High
20180623	5	101	31	0	11	246	18	412	High
20180624	0	73	242	0	17	111	59	502	High
20180625	1	44	136	2	9	295	32	519	High
20180626	6	81	103	3	828	161	23	1205	High
20180627	5	45	70	2	40	101	5	268	High
20180628	1	84	10	0	6	110	3	214	High
20180629	4	58	13	0	9	104	2	190	High
20180630	7	34	99	2	51	769	30	992	High
Total	34	637	715	10	996	2010	188	4590	

Activity at MP3, which was positioned low over the canal water to the west of Gollierstown Bridge, was dominated by Soprano pipistrelle, while Common pipistrelle activity ranged from low to medium with the exception of the night of the 26th when particularly high activity levels were recorded. Daubenton's bat were mostly activity at high levels, while a greater range in nightly activity was recorded for Leisler's bat. Brown long-eared activity was predominantly low to medium.

The highest levels of activity during June surveys was recorded at this monitoring point.

3.6.1.4 MP4

Table 3.8: Results of June Monitoring at MP4

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180622	26	0	5	0	1	17	1	50	High
20180623	71	1	44	0	2	15	0	133	High
20180624	94	1	73	1	45	50	1	265	High
20180625	45	1	53	1	57	62	0	219	High
20180626	67	0	35	0	17	30	0	149	High
20180627	28	0	19	5	33	62	0	147	High
20180628	29	0	3	0	1	19	0	52	High
20180629	29	0	4	0	6	18	0	57	High
20180630	27	0	14	0	42	64	0	147	High

Total	416	3	250	7	204	337	2	1219	

MP4 was positioned low over the canal to the east of Gollierstown Bridge, adjacent to the Tobermaclugg aqueduct. The activity at MP4 during the June survey were much lower that those recorded at MP3 and MP2. Activity here was dominated by Daubenton's bat which was recorded at medium to high levels. Soprano pipistrelle activity was recorded at medium to high levels. Medium to high activity levels were also recorded for Common pipistrelle and Leisler's bat although nights of low activity were also recorded.

3.6.2 July Automatic Surveys

3.6.2.1 MP2

Table 3.9: Results of July Monitoring at MP2

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180701	6	0	3	0	1	21		31	Medium
20180702	27	3	61	0	114	100	1	306	High
20180703	26	1	19	0	31	93	1	171	High
20180704	24	1	37	2	165	127	2	358	High
20180705	13	0	76	0	51	93	1	234	High
20180706	26	1	129	0	142	286	3	587	High
20180707	35	2	178	0	181	74	4	474	High
20180708	26	0	43	2	135	125	4	335	High
20180709	13	2	32	0	139	126	3	315	High
20180710	10	0	37	0	68	154	1	270	High
20180711	8	1	29	0	9	94	1	142	High
20180712	4	0	3	0	3	20	2	32	Medium
Total	218	11	647	4	1039	1313	23	3255	

Nightly activity for all species was again high during this monitoring session with Soprano pipistrelle and Common pipistrelle dominating activity. Medium to high levels were also recorded for Leisler's bat while medium levels were recorded for Daubenton's bat. Activity for Brown long-eared, Myotis species and Nathusius pipistrelle were low.

3.6.2.2 MP3

Table 3.10: Results of July Monitoring at MP3

Date	MY SP	MYDAU	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180701	1	34	12	0	4	76	7	134	High
20180702	5	37	87	0	23	305	21	478	High
20180703	7	35	45	0	71	661	18	837	High
20180704	4	36	138	0	57	198	14	447	High
20180705	2	18	99	1	47	271	14	452	High
20180706	6	46	357	1	62	729	42	1243	High
20180707	8	38	393	0	30	548	27	1044	High
20180708	0	29	106	2	65	94	12	308	High
20180709	0	15	64	1	62	95	36	273	High
20180710	4	5	128	0	46	243	42	468	High
20180711	1	14	140	0	11	113	30	309	High
20180712	0	10	37	1	16	248	14	326	High
20180720	26	0	176	0	20	230	45	497	High
20180721	5	2	74	0	30	194	24	329	High
20180722	10	1	24	0	23	79	12	149	High
20180723	5	0	18	0	0	100	8	131	High
20180724	0	0	18	0	5	70	18	111	High
20180725	14	4	67	0	22	165	38	310	High
20180726	8	0	91	0	43	147	34	323	High
20180727	83	5	38	0	25	139	27	317	High
20180728	3	0	120	0	49	220	30	422	High
20180729	74	6	330	0	30	246	104	790	High
20180730	19	4	538	1	20	324	197	1103	High
20180731	2	1	84	0	25	220	27	359	High
Total	287	340	3184	7	786	5715	841	11160	

Activity at this location was dominated by Soprano pipistrelle, with particularly high levels of activity being recorded on a number of nights earlier during the survey period. High Leisler's bat activity was also recorded while medium to high levels were recorded for Common pipistrelle. Activity for Daubenton's bat was at medium levels during the start of the survey but then decline later as the session progressed.

3.6.2.3 MP4

Table 3.11: Results of July Monitoring at MP4

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Categor

									y
20180701	7	0	4	0	6	10	0	27	Medium
20180702	29	0	33	1	16	42	0	121	High
20180703	26	0	26	0	10	33	0	95	High
20180704	17	0	27	0	65	52	0	161	High
20180705	19	0	38	2	18	35	2	114	High
20180706	34	0	62	2	174	111	1	384	High
20180707	43	0	156	0	86	71	0	356	High
20180708	23	0	17	6	212	129	3	390	High
20180720	10	0	23	2	20	74	1	130	High
20180721	5	0	20	1	0	20	0	46	Medium
20180722	5	0	4	0	9	25	0	43	Medium
20180723	4	0	3	0	4	4	0	15	Medium
20180724	3	0	11	1	8	6	0	29	Medium
20180725	9	0	1	1	7	18	2	38	Medium
20180726	5	0	8	0	5	17	0	35	Medium
20180727	17	0	10	0	14	19	1	61	High
20180728	1	0	23	0	5	6	0	35	Medium
20180729	29	1	173	3	136	53	1	396	High
20180730	10	0	183	0	76	20	3	292	High
20180731	0	0	3	0	4	9	1	17	Medium
Total	296	1	825	19	875	754	15	2785	

Common pipistrelle, Soprano pipistrelle and Leisler's bat accounted for the majority of the activity recorded. The activity was higher during the early July monitoring session with nightly numbers being recorded later in July at much lower levels.

3.6.3 August Automatic Surveys

3.6.3.1 MP1

Table 3.12: Results of August Monitoring at MP1

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180803	0	0	0	0	0	0	0	0	Low
20180804	0	0	0	0	0	0	0	0	Low
20180805	0	0	0	0	0	0	0	0	Low
20180806	0	0	0	0	0	0	0	0	Low
20180807	0	0	0	0	0	0	0	0	Low

20180808	0	0	0	0	0	1	0	1	Low
20180809	0	0	0	0	0	0	0	0	Low
20180810	0	0	0	0	1	0	0	1	Low
20180811	1	0	0	0	2	26	0	29	Medium
20180812	1	0	0	0	1	27	0	29	Medium
Total	2	0	0	0	4	54	0	60	

Low activity levels were recorded during this monitoring session along the northern towpath. A change in weather conditions during early August and this may have influenced the results during this session.

3.6.3.2 MP2

Table 3.13: Results of August Monitoring at MP2

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180820	11	3	59	6	100	134	0	313	High
20180821	3	0	106	0	11	42	0	162	High
20180822	0	0	6	0	8	51	0	65	High
20180823	3	0	72	0	19	9	0	103	High
20180824	2	1	14	0	4	90	0	111	High
20180825	13	0	7	0	9	66	1	96	High
20180826	4	0	31	0	8	214	0	257	High
20180827	7	2	31	0	23	152	0	215	High
20180828	0	0	28	1	10	39	0	78	High
20180829	10	1	99	0	211	187	3	511	High
20180830	9	2	140	1	60	69	0	281	High
20180831	1	0	4	0	0	10	0	15	Medium
Total	63	9	597	8	463	1063	4	2207	

Soprano pipistrelle, Common pipistrelle an Leisler's bat again accounted for the vast majority of activity at this monitoring point. Daubenton's bat activity was low while activity for all other species was also very low.

3.6.3.3 MP3

Table 3.14: Results of August Monitoring at MP3

Date	MY SP	MYDAU	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180801	13	5	20	0	3	52	24	117	High
20180802	72	2	0	0	0	0	0	74	High

20180803	215	18	37	0	6	212	15	503	High
20180804	153	24	83	2	20	117	19	418	High
20180805	104	14	16	0	4	120	9	267	High
20180806	192	28	7	2	6	258	10	503	High
20180807	3	9	12	0	15	501	7	547	High
20180808	210	26	308	0	23	165	75	807	High
20180809	51	3	122	0	53	82	26	337	High
20180810	19	7	16	0	22	189	7	260	High
20180811	51	4	25	0	12	128	6	226	High
20180812	52	9	18	0	0	91	7	177	High
20180813	0	2	46	0	1	46	31	126	High
20180814	157	8	49	0	7	85	18	324	High
20180815	93	13	245	0	32	213	65	661	High
20180816	31	5	3	0	0	2	1	42	Medium
20180817	66	6	12	0	21	47	3	155	High
20180818	23	6	5	0	3	25	2	64	High
20180819	3	3	92	0	6	141	13	258	High
Total	1508	192	1116	4	234	2474	338	5866	

Soprano pipistrelle and Leisler's bat were dominant in the vicinity of MP3 during the monitoring session. This is consistent with the results of the transect surveys which frequently recorded and observed Soprano pipistrelle and Leisler's bat activity at this location. There was a greater range in Daubenton's bat activity but some nights of high activity was recorded.

3.6.3.4 MP4

Table 3.15: Results of August Monitoring at MP4

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180801	1	0	2		1	11		15	Medium
20180802	9	0	5					14	Medium
20180803	41	0	8		1	11	1	62	High
20180804	51	2	10	1	40	45	2	151	High
20180805	29	0	10		7	10		56	High
20180806	82	0	22		18	17		139	High
20180807	1	0	8	1	2	6		18	Medium
20180808	65	2	39	16	335	132	5	594	High
20180809	11	0	24	1	259	110	2	407	High
20180810	15	0	7		12	17		51	High
20180811	9	0	21		107	31		168	High

20180812	6	2	8			10		26	Medium
20180813	0	0	3		68	11		82	High
20180814	0	0	5	1	2	7		15	Medium
Total	320	6	172	20	852	418	10	1798	

Common pipistrelle was dominated at this location. Common pipistrelle activity was also dominant at this location during the July survey. Daubenton's bat were active at low to medium levels with some nights of high activity also recorded. No nights of high Leisler's bat activity were recorded while activity for Myotis species, Brown long-eared and Nathusius pipistrelle was again very low.

3.6.4 September Automatic Surveys

3.6.4.1 MP2

Table 3.16: Results of September Monitoring at MP2

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20180901	6	0	0	0	1	15	3	25	Medium
20180902	3	0	1	0	0	0	0	4	Low
20180903	72	1	27	0	1	48	1	150	High
20180904	31	5	25	0	12	62	2	137	High
20180905	52	2	16	0	14	38	0	122	High
20180906	68	3	70	0	15	34	2	192	High
20180907	0	0	2	0	10	18	0	30	High
20180908	47	5	144	1	230	163	2	592	High
20180909	32	2	38	3	90	100	1	266	High
20180910	9	0	5	0	4	26	1	45	Medium
20180911	22	0	3	0	6	26	2	59	High
20180912	21	1	0	0	2	10	1	35	Medium
20180913	0	0	1	0	1	8	0	10	Low
20180914	28	1	8	0	7	37	1	82	High
20180915	38	1	19	0	48	148	1	255	High
20180916	15	0	3	0	2	4	0	24	Medium
20180917	59	1	3	0	8	56	4	131	High
20180918	32	0	1	0	4	25	0	62	High
20180919	39	1	0	0	7	23	0	70	High
20180920	2	0	4	0	0	15	0	21	Medium
20180921	14	1	32	0	199	194	2	442	High
20180922	4	2	18	0	52	101	3	180	High
20180923	20	2	8	0	7	35	1	73	High

20180924	8	2	2	0	7	16	4	39	Medium
20180925	0	0	1	0	0	0	0	1	Low
20180928	16	0	12	0	11	131	0	170	Low
total	638	30	443	4	738	1333	31	3217	

Overall nightly bat activity was not as consistently high as during previous sessions at MP2. Soprano pipistrelle and Common pipistrelle were dominant but Leisler's bat and Daubenton's bat were recorded consistently during the survey low levels of activity were recorded for Nathusius pipistrelle, Brown long-eared and Myotis species.

3.6.5 October Automatic Surveys

3.6.5.1 MP2

Table 3.17: Results of October Monitoring at MP2

Date	MY DAU	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/Night	Bat Activity Category
20181001	49	0	2	1	23	82	0	157	Low
20181002	30	0	11	0	10	184	0	235	High
20181003	0	0	6	0	13	76	0	95	Low
20181004	0	0	0	0	0	0	0	0	Low
20181005	0	0	0	0	0	0	0	0	Low
20181006	0	0	0	0	0	0	0	0	Low
20181007	0	0	0	0	0	0	0	0	Low
20181008	0	0	0	0	0	0	0	0	Low
20181009	0	0	0	0	0	0	0	0	Low
20181010	0	0	0	0	0	0	0	0	Low
20181011	0	0	0	0	0	0	0	0	Low
20181012	0	0	0	0	0	0	0	0	Low
20181013	0	0	0	0	0	0	0	0	Low
20181014	0	0	0	0	0	0	0	0	Low
20181015	0	0	0	0	0	0	0	0	Low
20181016	5	0	0	0	0	2	0	7	Low
Total	84	0	19	1	46	344	0	494	High

Activity dropped off abruptly at the start of October. In the first two nights Soprano pipistrelle were active at high levels but then were until mid-October. The abrupt decrease in activity may be indicative of seasonal changes and changes in bat activity behaviour during the autumn months.

4.0 SUMMARY & CONCLUSION

While no bats were identified as roosting in structures surveyed along or in the immediate vicinity of the study corridor the results of the activity surveys indicate that roosts for bat are located within a relative short distance of the canal. This is based on the time of the first bat recording during multiple nights of surveying, which was at or shortly after sunset. There are numerous other structures as well as trees that could function as a roost sites for bats in the immediate vicinity of the canal.

The results of transect and automatic monitoring surveys indicate that the canal is an important foraging habitat for the local populations of Common pipistrelle, Soprano pipistrelle Leisler's bat and Daubenton's bat. These species were consistently recorded foraging along the canal and activity was generally at medium to high levels, with some nights of particularly high activity being recorded.

The surveys indicate that the area around and to the west of Golliersotwn Bridge is a particularly important habitat for the local Soprano pipistrelle and Leisler's bat populations.

Other species recorded at low levels along the canal include Nathusius pipistrelle, Natterer's bat, Whiskered bat and Brown long-eared. A total of eight species were recorded during activity surveys.

The results of transect surveys indicate that hedgerow links from the north and south into the canal provide connectivity to the canal. At locations where hedgerow, intersection the canal from the north or south bat activity was higher. Bat activity was also high in the vicinity of wet woodland habitat adjoining the canal to the west of the study corridor.

Overall the canal represents an important habitat for the local population of Common pipistrelle, Soprano pipistrelle, Daubenton's bat and Leisler's bat and is relied upon as a key foraging habitat for these species.

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APPENDIX A: FACTORS AFFECTING THE POTENTIAL OF BUILDINGS TO SUPPORT BAT ROOSTS

Table 0.1: Factors Affecting the potential of a building to support a bat roosts, as described by Kelleher & Marnell (2006)

Increase Potential	Disused or little used; largely undisturbed Large roof void with unobstructed flying spaces Large dimension roof timbers with cracks, joints and holes Uneven roof covering with gaps, though not too draughty Entrances that bats can fly in through Hanging tiles or wood cladding, especially on south-facing walls Rural setting Close to woodland and/or water Pre-20th century or early 20th century construction Roof warmed by the sun
Decrease Potential	Urban setting or highly urbanised area with few feeding places Small or cluttered roof void Heavily disturbed Modern construction with few gaps around soffits or eaves Prefabricated with steel sheet materials Active industrial premises Roof shaded from the sun

Table 0.2: Suitabiliy of a Structure to support roosting bats, as described by Collins et al. 2016

Suitability Category	Description
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats.
Moderate	A structure within one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

APPENDIX 4: ECOLOGICAL CLERK OF WORKS

ECOLOGICAL CLERK OF WORKS

Background

An appropriately qualified Environmental/Ecological Clerk of Works (ECoW) will be employed for the duration of the Civil Works Contract. The ECoW must be a member of the Chartered Institute of Ecology and Environmental Management (CIEEM) or equivalent body. The ecologist performing the ECoW role will attend the site on a weekly basis to check that all works are being completed to the appropriate standards.

As the delivery of the environmental protection measures outlined in this Appendix is highly dependent on the roles and responsibilities of the ECoW some detail is provided here regarding this position.

Term of Appointment

The ECoW will be on site for minimum 1 day per week during the construction works, provision will be made for an initial briefing to all contractors, and a final visit to report on the ecological aspects of construction. Some office time is also required for weekly reporting.

ECoW Tasks

Overview

The provision of an ECoW helps to monitor, control, and direct the ecological and environmental protection aspects of the Ecological Impact Assessment and EIA Screening documentation, Construction Environmental Management Plan and Construction Method Statements (CMS) to ensure that all measures are fully adhered to during construction. It also allows any issues arising to be dealt with in an appropriate manner.

Taking account of the requirements set out in the list of measures outlined above and also in the EcIA and the EIA Screening documentation, the following are deemed to be required services under the ECoW.

a) Construction surveys.

b) Visual inspection of construction safeguards such as temporary construction boundary fencing.
c) Monitoring environmental controls (including briefing of digger drivers).
d) Monitoring of construction activity in the vicinity of badger setts.
e) Monitoring of construction activity in the vicinity of Vertigo habitat
f) Maintaining records of checks and issues.
g) Providing a report detailing the implementation of all ecological and environmental protection measures during the construction phase.
h) Survey the site for sensitive and protected species prior to construction (due diligence survey).

Pollution Prevention Plan

a) Review, agreement and approval of Contractor's pollution prevention plan prior to commencement of work.
b) Conduct weekly inspection of site pollution prevention measures (silt traps boards, etc.) and visually assess their effectiveness. This will include inspection of water management measures installed by Contractor such as excavation pumping and diversion channels, as well as containment of silt away from watercourses and advice on micro-siting of mitigation measures.
c) Maintain a Pollution Prevention Measures Register of the weekly inspections, to include an inventory of all measures on the site, their effectiveness, as well as any advice provided.
d) Suspension of work where potential risk from pollution is identified, or where construction methods and mitigation measures are not specified in construction method statements and/or plans as agreed at commencement of works.
e) Provide advice and recommendation to the wind farm owner and its contractors regarding the above.

Waste Management

a) Review, agreement and approval of the Contractor's Site Waste Management Plan
b) Review of the Contractor's records for all inspections of fuel, oil or chemical storage areas, including the integrity of storage facilities.

Drainage Management

a) Review, agreement and approval of the Contractor's Site Drainage Management Plan
b) Inspection of drainage management works.
c) Liaison with Planning / NPWS / IFI.
d) Agreement of monitoring standards to be applied by Contractor's personnel.

e) Assessment in advance of habitats and species for ground to be affected by drainage management.
f) Review of Contractor's records for plant inspections, evidence of contamination and checks made after extreme weather conditions.

Water Quality Monitoring

a) Review, agreement and approval of the Contractor's and independent Site Water Quality Monitoring Plans where undertaken.
b) Inspection of Contractor's records for water environmental monitoring and comparison of those records with independent records.
c) Presentation of independent water environmental monitoring results at weekly site meetings.

Excavated Materials and Reinstatement

a) Review, agreement and approval of the Contractor's Spoil Management and Reinstatement Plan.
b) Marking working areas and route corridors, in consultation with the Geo-technical/Civil Designer and/or Archaeologist as necessary.
c) Granting permission to work outside the temporary construction corridor, in the event that such a requirement arises. No works will be undertaken outside this corridor until permission is received by the ECoW. Where necessary the ECoW will liaise with the Planning Authority and the NPWS prior to deciding on the acceptability of any works outside this corridor.
d) Agreeing proposals temporary storage areas as development proceeds.
e) Agreeing timing of restoration and reinstatement of path surfaces.
f) Monitoring the condition of stored turf.
g) Issuing instruction to cease work if unexpected risks arise, until an agreed alternative solution is identified and risks are avoided or minimised.

Recording

The ECoW will keep a record of the following:

a) notable animal sightings and signs (including birds, in addition to other site ornithological monitoring);
b) The Pollution Prevention Measures Register (as detailed above);
c) The habitats and soil (including peat depth) of ground to be developed via survey at least a week in advance of construction work;
d) record of tasks carried out;

e) written record of all oral advice given

The ECoW will maintain a GIS database of key recordings made during the construction period. ECoW weekly site visit notes will be made available for all personnel on site to consult and incorporates the following:

- Monitoring of requirements listed under the EcIA, EIA Screening, CEMP and CMS
- Pollution Prevention Measures Register

On-Site Communication

The success of ECoW appointment is largely dependent on well-defined lines of communication. In theory, robust construction method statements will incorporate many of the areas of ECoW concern into the daily activities of construction personnel. However, the ECoW will always inform the Civil Contractor and their Designer of areas of particular concern, who will then make a decision as to the subsequent action.

The ECoW will be involved in the delivery of biodiversity-related Toolbox Talks as part of the site induction process Toolbox talks will be given to the work force at regular intervals to highlight the environmental issues that are unique to the wind farm located at Seegronan Extension. All staff will know of the circumstances when the ECoW will be contacted, and the relevant phone numbers.

Liaison with Consultees

The ECoW will provide a liaison between the Planning Authoirity, NPWS and the IFI.

Final Report

The ECoW will produce a final report documenting the environmental and ecological effects of the construction period. The evidence for effects will be based on findings included in the minutes of weekly meetings, together with other recording information maintained by the ECoW. The report will be made available to the Contractor, the Planning Authority, NPWS, IFI and other external agencies where appropriate.

Appendix C – Archaeological and Cultural Heritage

COURTNEY • DEERY

ARCHAEOLOGY & CULTURAL HERITAGE

Cultural Heritage Study

Grand Canal Greenway Extension,

12th Lock Bridge to Hazelhatch Bridge,

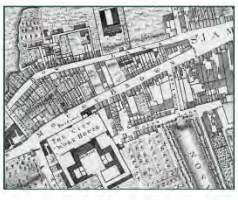
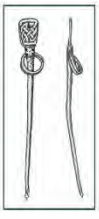
Co. Dublin

Author: Dr Clare Crowley

Date: 27th November 2018

On behalf of

Clifton Scannell Emerson & Associates

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EXECUTIVE SUMMARY

This report examines the cultural heritage potential for the proposed Grand Canal Greenway Extension, from the 12th Lock Bridge to Hazelhatch Bridge in Co. Dublin. It aims to establish the potential significance and sensitivity of the existing cultural heritage environment along the Grand Canal and to identify the issues this potential presents for the proposed scheme.

The 18th century Grand Canal plays a significant role in the cultural heritage of this area. It is an important feature of the historic landscape and a prominent reminder of our industrial past. There are no RMP sites recorded along the Grand Canal or within c. 100m of it and no archaeological constraints were identified. Given the level of disturbance required to construct the canal in the 18th century, any earlier archaeological deposits would not survive intact within its bounds. While the canal itself and its associated infrastructure are a feature of our industrial archaeological heritage, they will not be negatively impacted by the proposed scheme.

Significant architectural heritage constraints were identified at Gollierstown Bridge and Hazelhatch Bridge, both protected structures and the proposed crossing points for the Greenway Extension.

Gollierstown Bridge is set within an idyllic, remote location, and the vista along the canal is of particular importance; this would be adversely affected by the introduction of a new bridge structure for services. In order to avoid negative impacts on the setting of the protected structure, the proposed services crossing will utilise an engineering solution (e.g. directional drilling). With regard to provision of ramp access on all approaches to the existing bridge, an appropriate design should be agreed in consultation with the conservation officer of South Dublin County Council to avoid any potential indirect impacts to the protected structure.

Hazelhatch Bridge forms the focal point of the historic setting at Hazelhatch, which is enhanced by the varied group of 18th and 19th century buildings that cluster around it. These include McEvoy's Pub, with its stables and rear courtyard (protected structure) and derelict canal company warehouse and attached outbuilding which stand in its rear yard (NIAH). No adverse impacts were identified in relation to the works proposed in the current planning application.

1. INTRODUCTION

1.1. General

This report examines the cultural heritage potential for the proposed Grand Canal Greenway Extension, from the 12th Lock Bridge to Hazelhatch Bridge in County Dublin (Figure 1).

The main purpose of the report is to assess the potential significance and sensitivity of the existing archaeological, architectural, and cultural heritage environment along the Grand Canal and to identify the issues this potential presents for the proposed scheme.

The cultural heritage study will also address the architectural heritage constraints presented by Hazelhatch Bridge and Gollierstown Bridge, which cross the canal within the proposed greenway and are included in the Record of Protected Structures for South County Dublin (RPS Nos 131 & 168).

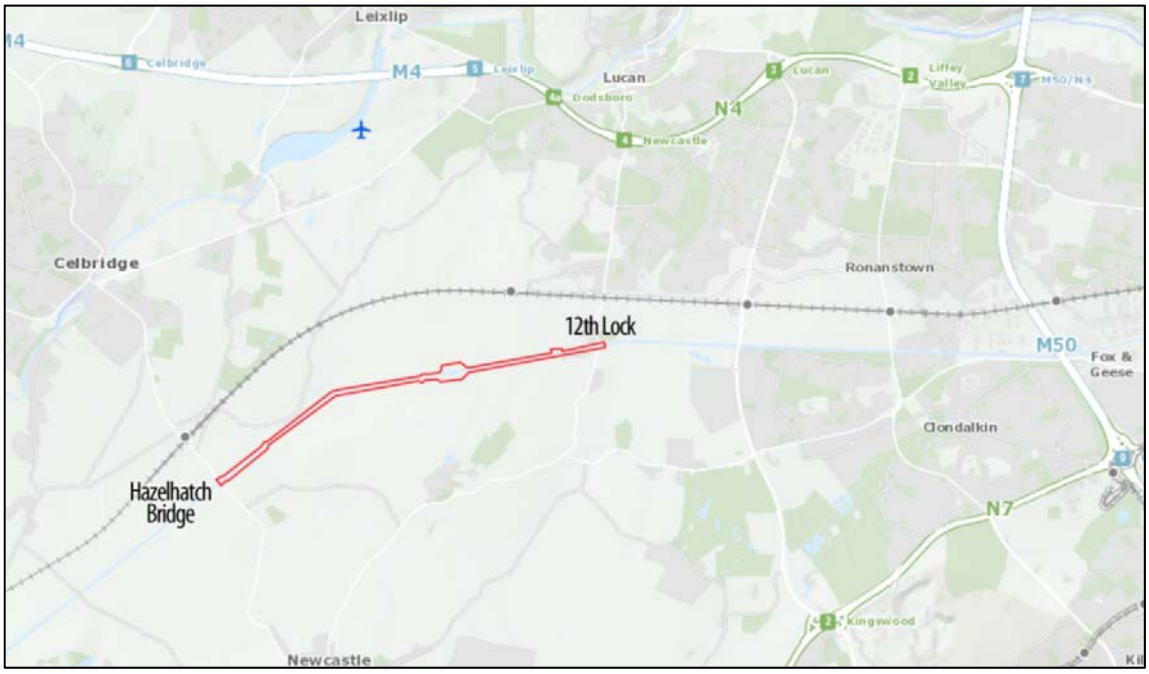

Figure 1 Site location

1.2. Description of Proposed Scheme

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme is located within the townlands of Ballymakaily, Gollierstown, Coolscuddan, Brownstown, Mullauns, Loughtown Lower, Stacammy Cottage, Balscott and Hazelhatch respectively. The proposed scheme is located along the entire extents of the existing northern tow path attributed to the Grand Canal and traverses in and east to west direction for approximately 4.6km in total length.

From the most eastern commencement location of the proposed scheme, access to the northern towpath is gained from the R120 Regional Road located adjacent to the existing 12th Lock. Access from the most western point of the scheme is gained from the existing Hazelhatch public house premises which is located adjacent to the existing Hazelhatch Road/Bridge. Internal site access to both the northern and southern towpaths attributed to the Grand Canal is provided by the existing Gollierstown Bridge. Access at this location of the proposed scheme is predominately utilised by local landowners/farmers. Furthermore, a small portion, approximately 0.48km, of the proposed scheme traverses through County Kildare lands with the remaining footprint located within County Dublin lands.

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme is primarily located along the northern tow path of the existing Grand Canal.

The proposed Grand Canal Greenway – Hazelhatch Bridge to 12th Lock will include the following features:

- 4.6km of shared walking and cycling Greenway along the existing northern Grand Canal towpath.
- Path widths will vary from 2.5m to 3.5m in width. Widths will be dictated by existing on site features.
- Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust or Asphalt Tarmac depending on local conditions for pedestrian and cyclists use.
- Provision of access controls such as pedestrian and cycle friendly gates along the route.
- Underground utilities and services including: Power ducting, telecom ducting, Public Lighting ducting & CCTV ducting.
- All associated ancillary works and integrated landscape plans.

1.3. The Study Area

The proposed Grand Canal Greenway extension runs along the canal from the 12th Lock in Grange townland to Hazelhatch Bridge in Hazelhatch townland, with almost the entire length located within the boundaries of County Dublin. The exception is a short stretch through the townland of Balscott in County Kildare.

Archaeological investigations in the surrounding area – particularly in relation to the Grange Castle Business Park located to the south / southeast of the 12th Lock and east of the R120 road – have added a great deal to the archaeological record in the last two decades. The numerous sub-surface and previously unknown sites that have been identified date from the neolithic through to the early modern periods. They point to this being an archaeologically rich landscape and their discovery has added significantly to our understanding of this area, where the upstanding archaeological remains largely reflect the medieval/post-medieval occupation of the area.

The construction of the Grand Canal in the late 18th century carved a path through what was then a largely rural landscape. It was an engineering project that was unprecedented in scale and which had a lasting impact on the areas through which it travelled, with associated industries developing along it.

2. METHODOLOGY

2.1. Introduction

The assessment is based on a desk-based study, comprising an examination of published and unpublished documentary and cartographic material, supported by a field survey.

2.2. Desk-Based Study

In order to understand the character of the proposed greenway route and its vicinity, all designated cultural heritage sites and monuments located within c. 100m of the Grand Canal were assessed (RMP, RPS, NIAH sites). This served to establish the existing archaeological, architectural and cultural heritage environment along the canal, and to provide an understanding of the cultural heritage constraints for the proposed scheme. The desk-based study also facilitated an examination of the historic development of the two protected bridges (Gollierstown an Hazelhatch) through cartographic analysis and documentary research.

The material sources consulted as part of the desk study are as follows:

- National Monuments, Preservation Orders, Register of Historic Monuments lists for County Dublin, sourced from the Department for Culture, Heritage and the Gaeltacht (DCHG);
- Record of Monuments and Places (RMP) and Sites and Monuments Record (SMR), DCHG;
- Record of Protected Structures (RPS), South Dublin County Council Development Plan 2016-2022;
- South Dublin County Council Heritage Plan, 2010-2015;
- National Inventory of Architectural Heritage (NIAH, www.buildingsofireland.ie);
- The topographical files of the National Museum of Ireland (NMI);
- Documentary sources (see references section at the end of the report);
- Cartographic sources, including Down Survey barony and parish maps (c. 1656), Rocque's map of County Dublin (1760), Taylor's map of the environs of Dublin (1816), Ordnance Survey mapping 1843, 1906-9, 1939-40);
- Excavations Bulletins and Excavations Database (1970-2018), Dublin Excavations GIS project;
- Aerial imagery (OSi 1995, 2000, 2005, 2011, 2013 & Google Earth 2017).

2.3. Field Survey

A cultural heritage inspection was carried out along the Grand Canal between the 12th Lock and Hazelhatch Bridge on 24th May 2018. Its aim was to assess present topography and land use along the canal banks and to identify any areas of archaeological potential and previously unknown cultural heritage features which may be present. In addition, a photographic survey of the protected canal bridges and any adjacent associated structures or features of interest was undertaken. along with a brief description of their current condition and setting.

3. ARCHAEOLOGICAL AND CULTURAL HERITAGE

3.1. General Archaeological Background

3.1.1. Prehistoric Period

Excavations in Grange, Nangor, Kishoge and Kilmahuddrick townlands to the southeast of the study area have revealed previously unknown prehistoric sites dating to the neolithic period, the Bronze Age and Iron Age.

The Neolithic (c. 4000-2500 BC) represents a key period in the evolution of society and civilisation, with the advent of farming and permanent settlements promoting a more sedentary lifestyle and new social and cultural developments. This level of organisation required a focal point for settlement and a neolithic house (Licence No. 01E0061), which may be an indication of this, was excavated in Grange townland (close to its boundary with Kishoge) to the northeast of Grange Castle (O'Donovan 2001).

A substantial ring-barrow and a fulacht fia were uncovered during excavations in Kilmahuddrick and Grange townlands (Licence Nos 00E0448 & 00E718, SMR DU017-080 & -084; Doyle 2000a, 2001b, 2001c). In addition, two ring-ditches have been identified through aerial survey, in Keeloges townland (SMR DU021-110 & -111). Archaeological investigations further west, in Ballybane and Grange townlands, revealed three burnt mounds during the realignment of the Griffeen river (Licence No. 04E0299). More recently, two fulachta fia were excavated in Ballybane townland (Licence No. 13E0471). Together, these monument types typify a Bronze Age landscape (c. 2500 to c. 500 BC), the ring-barrow (a burial site) representing a ritual deposition of cremated human remains, and the fulachta fia indicating Bronze Age habitation activity. The presence of burnt mounds or fulachta fia is often indicative of Bronze Age seasonal communal activity in river valleys (as here along the River Griffeen and its environs, lakeshores and boggy ground). There is no agreement that burnt mounds were cooking places, although it does seem that they were used to prepare large quantities of boiling water and that they were repeatedly used, resulting in a large mound of heat shattered stones accumulating. Other theories for the use of these sites include bathing, saunas or sweathouses, washing or dyeing large quantities of cloth, the preparation of leather and brewing.

Although the Iron Age is not well-represented in the study area, a furnace pit representing iron smelting was excavated along the route of a proposed central carriageway in Grange Castle Business Park in 2013 and was dated to the early Iron Age (732-400 BC; Licence No. 13E0435, McLoughlin 2013).

There are four enclosures recorded within c. 500m of this section of the canal (SMR DU017-089, -093, -095, DU021-021), all of which were identified through aerial survey. While similar examples in the wider landscape have been proven to date to the early medieval period (e.g. DU021-108 & -109), the others may represent either ploughed-out ringforts or ring-barrows (e.g. the proximity of enclosure site DU020-021 to a ringfort, DU020-001, in Ringwood townland may suggest that the enclosure is also an early medieval in date). These sites generally possess no diagnostic features which would allow for a definitive classification within another monument category; they are of unknown date and function and may date to any period from prehistory onwards.

3.1.2. Early Medieval Period

This period saw the development of a mixed-farming economy managed by kings, nobles and free farmers. Additional improvements in agriculture from the 5th century AD resulted in a further wave of settlement expansion and population increase in rural Ireland, leading to the construction of the modern landscape's most common archaeological site: the ringfort, or its Irish equivalent, the rath. Ringforts are circular enclosures, essentially habitation sites or farmsteads. They were not simple isolated homesteads, however, and should be considered within their contemporary settlement landscape, which would have consisted of unenclosed settlements, farms and fields, route ways and natural resources (Stout 1997).

Despite being the numerous archaeological site type in Ireland, there is only one upstanding ringfort recorded within the study area (DU020-001 in Ringwood townland, c. 245m west of Hazelhatch Bridge), which is typical of the general paucity in the county. This is undoubtedly the result of intensive agricultural practices, with ploughing removing surface traces of the monuments (the far more numerous enclosures recorded in the study area – including one close to the ringfort in Ringwood – may represent denuded or destroyed ringforts).

There is considerable evidence for occupation in the wider area during the early medieval period. Geophysical survey and subsequent archaeological testing in the vicinity of Nangor Castle identified the remains of a ploughed-out ringfort (Licence No. 96E273, McConway 1996). Human skeletal remains were also uncovered, as were numerous charcoal-flecked irregular features (McConway 1996). Geophysical survey was undertaken in 2015 in Ballybane townland, in an area containing two recorded sub-surface archaeological sites that were identified through aerial survey (SMR DU021-108 & DU021-109). Subsequent archaeological testing and excavations identified an early medieval settlement complex comprising at least four separate enclosures (Licence No. 16E0531). Archaeological investigations further east / northeast in

the same townland identified several early medieval enclosures (dated to the 7th and 8th centuries AD) that appear to represent ritual and ceremonial activities (Licence No. 13E0471).

Where ringforts were the major secular component of early Christian settlement, ecclesiastical centres became the focus of the new religion that was readily adopted in the 5th and 6th centuries. Early medieval monastic settlements tend to be defined by a large curvilinear bank and ditch or stone enclosure (topography permitting), enclosing an area c. 90-120m in diameter, often preserved in the line of townland or field boundaries and roads (Swan 1988). The majority of ecclesiastical settlements had one or more concentric curvilinear enclosures, with the church placed at the centre, in the inner sanctum (frequently preserved in the surviving graveyard boundary), with more secular activities (domestic, commercial and industrial) reserved for the outer enclosures. They often had associated farms, field systems, and agricultural features such as watermills and cereal drying kilns, either within the outer enclosure or in its immediate environs. They usually had a network of radiating roads, with the principal approach road (often from the east) terminating in a triangular market place. Features commonly found to be associated with early ecclesiastical sites include holy wells (usually outside of the main settlement), bullaun stones, high crosses, cross-inscribed stones, and round towers.

An ecclesiastical enclosure is recorded in Loughtown Lower townland (DU021-001001), while the medieval parish church at Kilmactalway is encircled by an ecclesiastical enclosure which might indicate that it originated in the early medieval period (DU021-003). This may also be the case for the medieval parish church in Aderrig townland, where an ecclesiastical enclosure is visible on aerial imagery (DU017-028).

3.1.3. Medieval Period

The constant skirmishes with the Irish on the southern limits of the Pale (a boundary designed to protect the lands and interests of individual landowners) brought about a frenzy of castle building (as evidenced by the number of tower houses in this area). This was supported by the 1429 Pale Statute of Henry IV that offered to subsidise the cost of your castle by £10. This incentive led to the widespread incastellation of south county Dublin in the 15th and 16th centuries with what are known as '£10 castles'. It is likely that the first stone castle at Nangor dates to this period, with Grange Castle erected up to 100 years later. The castles, while structurally defensive were, in effect, fortified farmhouses and also represent the agricultural expansion required to feed the markets of Dublin. As new military technologies such as gunpowder rendered thick walls less useful as a defence, houses gradually became less defensive and more comfortable. Tower houses were replaced in some areas by hall houses and fortified houses, similar to tower houses but less strongly fortified. Eventually, from the 17th century onwards, larger, more comfortable houses became the norm, and large houses such as those at Grange and Nangor, were built onto the existing castles

Numerous castle sites are recorded in the wider landscape, to the north and south of the canal, testifying to the extent of the medieval activity here: at Nangor (DU017-037, c. 1.9km southeast), Grange (DU017-034, c. 935m southeast), Adamstown (DU017-029, c. 365m north / northeast), Hynestown (DU021-002, c. 1km south), and Kilbride (DU021-004, c. 2.2km southeast). These are all examples of tower houses (though not all are upstanding) – small, fortified residences of the gentry dating to the 14th to 16th centuries.

The archaeological investigations in the vicinity of Nangor and Grange castles have added to our understanding of the medieval landscape. while there are no upstanding remains of the medieval Nangor Castle, for example, a medieval field system which produced over 1500 sherds of 13th century pottery was revealed in Nangor townland, to the north of the castle site and was probably associated with it (Licence No. 00E0754; SMR DU017-082). Similarly, archaeological investigations in the vicinity of Grange Castle in 2001 uncovered a medieval field system and part of a possible enclosing ditch (Licence No. 01E0754). A field system associated with the castle site in Hynestown townland is visible on aerial imagery, which is further indication of the nature of these sites as fortified farmhouses (DU021-002002). The topographical files of the Irish Antiquities Division of the National Museum of Ireland also record the discovery of pottery sherds of medieval date in the townland of Grange (NMI 1972:92-104).

3.2. National Monuments

There are no national monuments along or in the vicinity of the Grand Canal.

3.3. Recorded Archaeological Monuments

There are no RMP / SMR sites recorded along the Grand Canal or within c. 100m of it, with the nearest being an enclosure in Coolscuddan townland (DU017-089, c. 190m north of the canal) and a ringfort and nearby enclosure in Ringwood (DU020-001 & DU020-021, c. 245m west of Hazelhatch Bridge). Those sites recorded in the wider landscape are discussed above in the context of the general archaeological and historical background.

3.4. Previous Archaeological Investigations

There have been no previous archaeological investigations carried out along this section of the Grand Canal and only one in the immediate environs. Archaeological monitoring of the Lucan to Palmerstown Water Supply Scheme pipeline in 2002 uncovered a previously unknown cemetery site c. 100m south of the canal in Milltown townland (Licence No. 02E1281; Figure 2).

Monitoring of the removal of topsoil along the pipeline corridor at Milltown revealed a burial site, which was located in open farmland and not directly close to any known historic monument. Preliminary recording

of the extent and apparent east-west orientation of the burials, within the pipeline corridor, suggests an early Christian date, however this could only be proven conclusively through any future excavation.

The burials appeared to extend westwards outside the pipeline corridor and may indicate other associated archaeological features present in this field. The skeletal material exposed appeared to have been partially disturbed, most likely from past ploughing, and were generally in a poor state of preservation. There were no finds noted which may have been associated with the burials. In agreement with the relevant authorities, the skeletal deposits remain *in situ*, and the pipeline route was redirected 10m east into the adjacent eastern field, in which no evidence for skeletal deposits was found during archaeological monitoring (Kehoe 2002).

Given the level of disturbance wrought by the construction of the Grand Canal in the 18th century – which included large areas of quarrying along its length – is highly unlikely that any significant archaeological features survive intact within the canal banks and towpaths.

Figure 2 Map showing cemetery site to south of Gollierstown Bridge

3.5. Place-Name Evidence

Townland names are a valuable source of information, on topography, land ownership and land use, as well as on the history of an area, its archaeological monuments and folklore. While most place names were anglicised or translated relatively accurately, some were corrupted virtually beyond recognition. Townland names can incorporate Irish names, preserving a reference to native Gaelic land-ownership, as appears to be the case with Brownstown and Colganstown (see Table 1). They can also contain English language personal or family names, indicating the Anglo-Norman and/or later English settlement of the area (e.g. Gollierstown, and perhaps Coolscuddan). Other townland names along the canal refer to topography (e.g. Loughtown Lower) and land usage (e.g. Commons).

Townland	**Irish name**	**Translation / Derivation**	**Archival Records** (Cf.www.logainm.ie)
Ballymakailly	*Baile Mhic Caollaí*	Mac Kealy's townland/ homestead	A charter of 1174 states that Henry II confirmed St Mary's Abbey's land to include '*Balimacheilmer*'. Mentioned again in 1540 in the list of Irish Monastic Possessions as 'Ballichelmer'
Balscott	*Baile an Scotaigh*	Scott's / Scot's townland/ homestead (possibly a reference to a family name or their nationality)	First documented as *Balscote* in 1315-6
Brownstown	*Baile an Bhrúnaigh*	Townland / homestead of ó Brún	Possible reference as '*Obrun'* in 1287. Documented as 'Brownsland alias Brownstown' in 1582 and Brownstowne in 1598 & 1670.
Colganstown	*Baile Uí Cholgan*	Colgan's townland/ homestead	First documented as *Balycolgen* in 1286
Commons	-	Common land associated with Newcastle	'Common of Newcastle' in 1604
Dangan	An Daingean	A fastness	Le Dengyn in 1497 & Aghdengen in 1641
Coolscuddan	*Cúil Scadán*	'Corner or angle of the herrings'. Alternatively it may derive from an Anglo-Norman family name Scadan. (OS Name Book)	n/a
Gollierstown	*Baile Gallrath*	According to O'Donovan, Galrett is a family name.	St Mary's Abbey acquired 'Galrothentown' (Gollierstown) in the mid-15th century, formerly the property of the bishop of Killaloe. Appears in 1547 as 'Gallrowtheston' (under 'Adderge demesne') & in the same year is referenced as a hamlet ('Gallonteston') forming part of the Prebend of Castleknock. Various references in 17th & 18th centuries.
Kearneystown Lower	*Baile Uí Chearnaigh*	Kearney's townland/ homestead	First documented as *Kerlingestown* in 1301 & in 1332 '*in villa de Molafernan et Kernese*'.
Hazelhatch			
Loughtown Lower	*Baile an Locha*	Townland of the lake	n/a
Mullauns	*Na Mulláin*	Flat hills, sometimes a sloping green field	n/a
Ringwood	*An Choill Chruinn*	Possible that the prefix 'ring' is a reference to the ringfort (& enclosure site) in the townland	n/a
Skeagh	*An Sceach*	Hawthorn or thorn bush	Noted as part of *Tibberbride* in 1641 (reference to holy well of St Bridget – *Tobar Brighde*)
Stacumny Cottage	*Steach Cuimne*	From *Teach Cuimne*, meaning St Coman's House (i.e. church). 19th century house known as Stacumny Cottage presumably gave the townland the second part of its name.	n/a

4. ARCHITECTURAL HERITAGE

4.1. Historical Development of the Grand Canal

4.1.1. Construction of the Canal

The Grand Canal dates from the mid-18th century and formed a crucial role in the industrial development of the rural landscape of the county. The canal began construction in 1756, following the passing of an Act in 1715, proposing a link between Dublin and the Rivers Shannon and Barrow. Interest waned, until 1755, when Thomas Omer, an engineer was finally appointed to the project. The building of the canal caused a major change to the landscape and the initial twelve-mile stretch began at Clondalkin in 1756 and was completed in 1773.

The earliest locks built by Omer at Clondalkin (11th lock), Lucan Road bridge or Leck Bridge (12th lock) and Lyons (13th lock) were shortened and narrowed in subsequent years by John Trail and later still by John Smeaton to conform to the lock dimensions of the rest of the line. They were originally 137ft long and 20ft wide (41.75m -6.09m) but now have an unusual shape, with the original lower gate recesses still visible today below the 11th and 12th locks. The primary considerations for these alterations were twofold: the large amount of water required to fill such locks, and the size of the boats suitable for the Irish canal trade. Smeaton argued that, as boats carrying upwards of 40 tons would be most suited to the volume of trade that could be expected on Irish canals, locks measuring 60ft by 14ft 918.28m – 4.26m) would suffice (Delany 1973). These became the standard dimensions of the Grand Canal.

4.1.2. Canal Bridges

The canal and its associated structures became an integral part of the development of this area. The line of the canal, through both open country side and urban area, inevitably intersected many roads. Thus, the construction of the canal required the erection of many bridges in order that existing roads would be carried over it and on the other hand to accommodate landowners whose land was bisected by it. The vast majority of the surviving 18th and early 19th century Irish canal bridges are single-span, masonry arched structures. A number of Omer's early bridges on the Grand Canal near Clondalkin were constructed with timber, although these were removed when passenger services were first introduced, owing to their restricted headroom (Delany 1995).

Two basic varieties of masonry arched bridge were built over the Grand Canal, the first, and more common, is the distinctive hump-backed, narrow-waisted bridge, which spanned both canal and towpath (e.g. Gollierstown Bridge, RPS No. 131, and those at Hazelhatch and Lyon's Estate). The second variety was used to span the tail of a lock chamber, where the fall of the ground was used to obviate the need for a steep approach ramp (e.g. Leck Bridge at the 12th Lock, RPS No. 127).

4.1.3. Lock-Keeper's Houses

Most of the canal navigation locks required full-time operators, known as lock keepers. As they might even be called upon to open the lock during the night, accommodation was provided at the lock itself. Despite poor wages, the position of lock keeper was considered a secure one, coming as it did with a free house and small garden (canal locks were often operated by the same family for many generations). The houses provided varied considerably in design and size, though they were frequently small, single-storey cottages. Thomas Omer designed a distinctive lock-keeper's house in the 1750s, which is known to have been used in at least seven different canal locks around the country.

Omer's lock-houses all followed a similar design comprising a two-storey house, with pitched roof and a chimney stack at each gable end. Blind recessed arches were a common motif in canal architecture and on Omer's houses in particular, where they were repeated on each façade. The entrance elevation was three-bay to ground floor, with a central square-headed doorway and two square-headed window openings, and two (often smaller) windows to first floor and a string course separating the two floors. The other elevations usually had two square-headed windows, centrally placed, one above the other. At first floor level the window was set within the crown of the arch.

The Lock-Keeper's Cottage at the 12th Lock was built c. 1765 and is thought to have been designed by Thomas Omer, though this is not necessarily a good thing; it was noted by John Brownrigg in 1801, engineer to the Grand Canal Company, that Omer's lock-keeper's house at Clondara on Shannon navigation, like his others 'smoaks so dreadfully as to be scarcely habitable at some times' (Delany 1988). A derelict remains of a two-storey canal-side house in Stacumny Cottage townland (BH 3), although not positioned at or near a lock, displays many of the features common to Omer's design.

4.1.4. Associated infrastructure

The construction of the canal also precipitated the construction of additional associated industrial structures such as flour mills, water mills, mill races and warehouses, which took advantage of the direct link with Dublin and the midlands. Examples of mill buildings, warehouses, stables and a public house are clustered at two points along the proposed Greenway Extension, at 12th Lock and at Hazelhatch, which serve as a reminder of the former variety of functions associated with the canal network. A number of mills are located in the vicinity of the 12th lock and are marked on various map editions of the Ordnance Survey, with a flour mill immediately to the northwest of the 12th lock (RPS No. 118; the now derelict mill building still stands on the north bank of the canal). At Hazelhatch, a canal company warehouse (now derelict) survives in the large yard behind the 18th century public house (McEvoy's).

4.1.5. Passenger Service

The construction of the canal was taken over by Dublin Corporation, but nine years later, the canal was in private hands again. It was opened to cargo boat traffic on February 2, 1779; the first passenger service began in 1780 between Dublin and Sallins.

From the time table of the Grand Canal Company, we find that three passenger boats travelled each way daily between Dublin and Tullamore, and averaged a speed of between three and four miles an hour. Meals were served on board, the dinner almost invariably consisting of boiled mutton and turnips; a meat dinner was served up every day in the week, Fridays included. No wine was sold to passengers in the second-class cabin, and the charges for meals there were somewhat lower (Tobin 2004). The maximum number of passengers was 45 1st class and 35 2nd class, 'and should any persons above that number force themselves into the boat, the boat-master is not on any account to proceed until they are removed' (Joyce 1913). The passenger boats consisted of a cabin, which extended nearly the whole length of the vessel. This was divided into two parts, 1st and 2nd class, each having two rows of seats with a table between, on which meals were served and games were played by the passengers. The roof of the cabin was flat so as to form a deck, which, being railed around and furnished with seats. This area was reserved for 1st class passengers.

The canals were superseded by the railways in the 19th century and by 1854 most of the mail railway routes had been established. The introduction of the railways brought about a decline in traffic on the canals and the last boats were withdrawn in 1959-60 (Bennett 1991). The canal is now operated as a leisure amenity.

4.1.6. The 12th Lock and its environs

The 12th lock is a single-stage canal lock and is a protected structure (RPS No. 125). The lock gates, located to the west of the road bridge, are of timber and iron construction with coursed granite inner walls. Painted timber mooring posts are situated at intervals between the gates. It is a good example of a standard-type 18th century canal lock, which enhanced by its setting among such a rich group of canal structures that include a Lock Keeper's Cottage, two former mill buildings, and Leck Bridge (the majority of these are protected structures and/or listed in the NIAH; Cf. Table 1 below). The latter is a road bridge that is contemporary with the construction of the canal lock. In 1932 the bridge was widened to the east and refurbished to allow for the widening of the R120 road. The earliest section of the bridge is the segmental arched west elevation with dressed voussoir stones. The east elevation, dating to the 1930s is flat-arched. Both east and west parapets are roughcast rendered and are topped with semi-circular coping stones.

4.1.7. Gollierstown Bridge

Gollierstown bridge, a protected structure (RPS No. 131) is a single-arch road bridge over canal, built c. 1780. It has coursed ashlar piers and dressed voussoirs to semi-circular arch and rubble parapets with

coping terminating in curves to canal banks. This noticeably elevated bridge is a fine example of the canal bridges to be found on the Grand Canal. It is all the more stunning due to its remote location and idyllic setting amongst the lush natural environment.

4.1.8. Hazelhatch Bridge and its environs

Hazelhatch Bridge, a protected structure (RPS No. 168) is a single-arch road bridge over the canal, built in 1791. It has coursed rubble walls with dressed ashlar quoins, parapet and voussoirs to segmental arch. There is a towpath to the south, pier bearing rope-cut grooves and a benchmark. A pipe is attached to the west face over the arch. Carved granite plaques are set above the keystones, with now illegible inscriptions. This bridge is a fine example of a rural canal bridge, retaining its narrow width where others have been widened for modern traffic needs. This enhances the sense of history which the bridge contributes to the vicinity. Though modest in size, it is the focal feature of the area, visible from a distance along the canal corridor and necessitating the rise in road level on each approach.

There is varied group of structures clustered around Hazelhatch Bridge, which add significantly to the setting of the bridge and the character of this stretch of canal (as at the 12th Lock, many of these are protected structures and/or listed in the NIAH; Cf. Table 1). These include McEvoy's, which was built c. 1780 to serve the canal and shows a long continuity of use. The building retains its original proportions, while the rere yard and basement stables further demonstrate the importance of this site in the wider canal-related infrastructure. There is also a derelict two-storey canal company warehouse with attached outbuilding, built c. 1760. This structure provides valuable evidence of the former activities of a working canal, as does the early 19th century former blacksmith's forge and stables situated on the southwest side of the bridge. The simple vernacular forge retains many original materials and is a valuable document of the industrial heritage and social history of the Hazelhatch area. It is sited close to the stables which were extended c. 1860, a reflection of the prosperity of this area in the mid-19th century.

A large detached house, built c. 1760, stands on the northwest side of the bridge, located prominently at the junction of the road and the canal; it retains its original proportions and focal importance as the highest structure in the area. A short distance southwest along the canal, Bank House is picturesquely sited parallel to the waterway and although it is a more modest house, its mature, well-maintained garden adds great charm to this stretch of canal. On the southwest side of the bridge there is another former dwelling that is contemporary with the canal. The detached three-bay two-storey house has a public house to top floor (The Hatch Bar, with its simple Art Deco façade) and an adjoining three-bay single-storey cottage to west. Each has further floor below to rere, due to level change, and is entered at upper storey from the built-up canal embankment. The combination of changing levels and façade articulations creates a highly individual building which contributes to the character of this canal complex, particularly the unusual public house at

road level with a valuable surviving interior. Along with the outbuildings nearby, the house adds another dimension to this varied canal-side group.

An elaborate cast-iron water-pump, c.1850, stands in the yard, just south of The Hatch Bar. It has fluted and banded decoration with a floral collar to spout, though the handle is missing and the pump is now disused. It is larger than some roadside examples and adds to the character of the cottage garden and yard. Though now disused, it appears to remain in its original location and is a valuable social document in this extended canal-side group.

Hazelhatch House, a mid-19th century farm house, is set apart from the complex of buildings that cluster around the bridge. It replaced an earlier house of the same name and is situated within a farmyard c. 135m northeast of Hazelhatch Bridge. The house is not a protected structure but is listed in the NIAH. Although only c. 55m north of the canal, it is well screened by the hedgerow and trees that line the canal and enclose the field within which Hazelhatch House is sited.

4.2. Protected Structures (RPS Sites) and NIAH Sites

Three of the bridges crossing the canal within the proposed greenway extension are protected structures: Leck Bridge at 12th Lock (RPS No. 127), Gollierstown Bridge (RPS No. 131) and Hazelhatch Bridge (RPS No. 168).

In addition, there are groups of protected structures clustered around both Leck Bridge and Hazelhatch Bridge (Table 1 below). The majority of these are roughly contemporary with the canal and are associated with the workings of it, such as the former company warehouse and stables at Hazelhatch and the Lock Keeper's Cottage at 12th Lock. Others are representative of the various industries and commercial enterprises that developed alongside the canal, such as the mill buildings at 12th Lock, and the public house and former blacksmith's forge at Hazelhatch.

The majority of the NIAH sites located along the canal are also protected structures (discussed above), with the remaining five being a former stables, canal company warehouse, farm house and water-pump at Hazelhatch and a disused mill building at 12th Lock (Table 1 below).

Table 1 RPS and NIAH Sites within 100m of proposed scheme

RPS No.	NIAH Reg. No.	Structure Description	Location
127	11204052	Leck Bridge. Single-arch road bridge over canal, c.1770.	12th Lock
125	11204053	Single-stage canal lock, 12th lock, c.1770.	12th Lock
118	11204054	Former mill building, detached seven-bay two-storey over basement, c.1860, now in use as offices. Despite alteration and conversion, this former mill building retains its elegance and dominance over the 12th Lock and bridge.	12th Lock

n/a	11204055	Detached multiple-bay three-storey over basement former mill building, c.1860, now derelict. Though in poor condition, it retains its imposing volume and some materials.	12th Lock
119	11204056	Lock Keeper's Cottage. Detached three-bay two-storey gable-fronted classical style former lock keeper's house, c.1765, now derelict. This attractive former lock-keeper's house of a standard design retains much of its original architectural impact and style (though this has been lessened by the boarding up of windows and general air of neglect it now suffers).	12th Lock
131	11208014	Gollierstown Bridge, stone canal bridge, built c. 1780.	Gollierstown
164	11207016	McEvoy's. Detached 3-bay single-storey with attic public house, c.1780, with stables to basement accessed from rere. High rubble walls with multiple blocked openings enclosing former courtyard to east. Blocked carriage arch to north in rendered wall.	Hazelhatch Bridge (NE side of bridge)
n/a	11207015	Detached three-storey former canal company warehouse, c.1760, with attached two-storey outbuilding, both now derelict. Canal front overgrown, though possibly built up to embankment and incorporating level change.	Hazelhatch Bridge (N side of canal, to NE of McEvoy's Pub, c. 45m NW of bridge)
167	11207014	Detached 3-bay 2-storey over basement house, c. 1760. Roughcast rendered walls, smooth rendered to east side, with render quoins.	Hazelhatch Bridge (NW side of bridge)
168	11207006	Hazelhatch Bridge, stone canal bridge, 1791.	Hazelhatch Bridge
169	11207017	Bank House. Detached 5-bay 2-storey house, c. 1820.	Hazelhatch Br. (N side of canal, c. 77m SW of bridge)
171	11207019	Detached 5-bay single-storey former blacksmith's forge, 1820, now disused.	Hazelhatch Br. (S side of canal, c. 45m SW of bridge)
n/a	11207020	Detached three-bay two-storey former stables, c.1820, with upper floor added, c.1860. Now used as a store. External rubble stone staircase with wrought-iron handrail. A simple, functional stable building retaining much original fabric.	Hazelhatch Bridge (SE of forge)
425	11207018	The Hatch Bar. Detached 3-bay 2-storey house, c. 1760, with public house to top floor, and adjoining three-bay single-storey cottage to west.	Hazelhatch Bridge (SW side of bridge)
n/a	11207003	Cast-iron water pump, c.1850.	Hazelhatch Bridge (S side of The Hatch Bar)
n/a	11207021	Hazelhatch House. Detached three-bay two-storey former farm house, c.1840, now used as a private house.	Hazelhatch Bridge (c. 55m N of canal & c. 135m NE of bridge)

4.3. Undesignated Sites

Seven undesignated sites of built heritage interest were identified along the south side of the Grand Canal (see Figure 17):

- BH 1 – A farmstead to the west of the 12th Lock Bridge, which is depicted on the first edition OS map (1843) and is still in use;

- BH 2 – The ruined remains of a single-storey structure depicted on the first edition OS map (1843), to the east of Gollierstown Bridge;
- BH 3 – The ruined remains of a two-storey house depicted on the first edition OS map (1843), at the bend of the canal in Stacumny Cottage townland, Co. Kildare;
- BH 4 – Single-arch culvert and stone-lined channel, c. 473m northeast of Hazelhatch Bridge;
- BH 5 – 'The Quay' as named on Rocque's map, a semi-circular infilled area at a canal lay-by, c. 635m northeast of Hazelhatch Bridge, at the junction of Hazelhatch and Loughtown Lower townlands;
- BH 6 – Overflow weir at Balscott;
- BH 7 - The ruined remains of a single-storey cottage depicted on the first edition OS map (1843), in a farm yard at Balscott.

5. CARTOGRAPHIC SOURCES

5.1. Pre-Ordnance Survey Cartographic Sources

5.1.1. Down Survey Barony and Parish Maps, c. 1656

There is little of interest on the Down Survey mapping, which pre-dates the construction of the canal by over a century. The map for Newcastle and Uppercross barony in County Dublin names several of the townlands through which the canal now travels, including Grange, '*Adamstowne'* (Adamstown), '*Gallretts tonne'* (Gollierstown, a large land holding belonging to '*Lord Rannelane'*), '*Bronnestonne and Part of Loughtonne'* (Brownstown and Loughtown Lower) and '*Hasilhast'* (Hazelhatch). A small portion of the canal passes through the townland of Balscott in the Barony of Salt in County Kildare, which is subdivided on the baronial map and named '*bigg Balstott'* and '*Litle balstott'*. The neighbouring townland of Stacumny Cottage appears as '*Stacomny tonne'*. There is little information of interest in the surviving parish terriers (of Newcastle and Kilmactalway in County Dublin; no parish maps are available within the Barony of Salt in Kildare). The small townland of Hazelhatch, comprising 35 acres of arable land, was forfeited by its Irish Papist owner, Patrick Skurlock [Scurlock]. The latter is also named as owning land in Loughtown, along with a Richard Jacob Symon.

5.1.2. Noble and Keenan's map of County Kildare, 1752

The canal is as yet unbuilt and this mid-18th century map provides little of interest. It does, however, confirm the presence of some dwellings at Hazelhatch prior to the introduction of the canal. The scale and accuracy of the map, however, prevents further analysis. A house is also shown at Stacumny, presumably Stacumny House, a country house located just under a kilometre north of the canal.

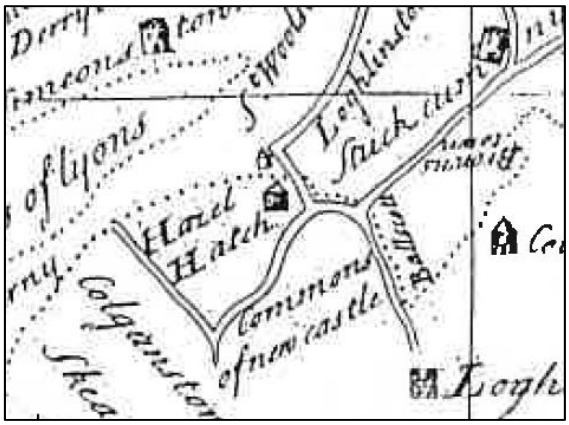

Figure 3 Noble & Keenan's map of County Kildare, showing buildings at Hazelhatch

5.1.3. Rocque's map of County Dublin, 1760 (Figures 4 & 5)

John Rocque, on his 1760 map of County Dublin, shows the landscape as being clear of trees, enclosed into a regular field system and predominately under pasture. The Grand Canal - shown as the 'new canal' - is a dominant feature in the landscape. The map was surveyed prior to the completion of the waterway, as evidenced by the absence of new roads, bridges and even the locks along its length. No detail besides the line of the canal itself is shown in the areas beyond the county boundary. A small cluster of buildings, with a yard and garden, is shown immediately north of the canal at *Gallers Town* (Gollierstown); there is no associated road or trackway depicted.

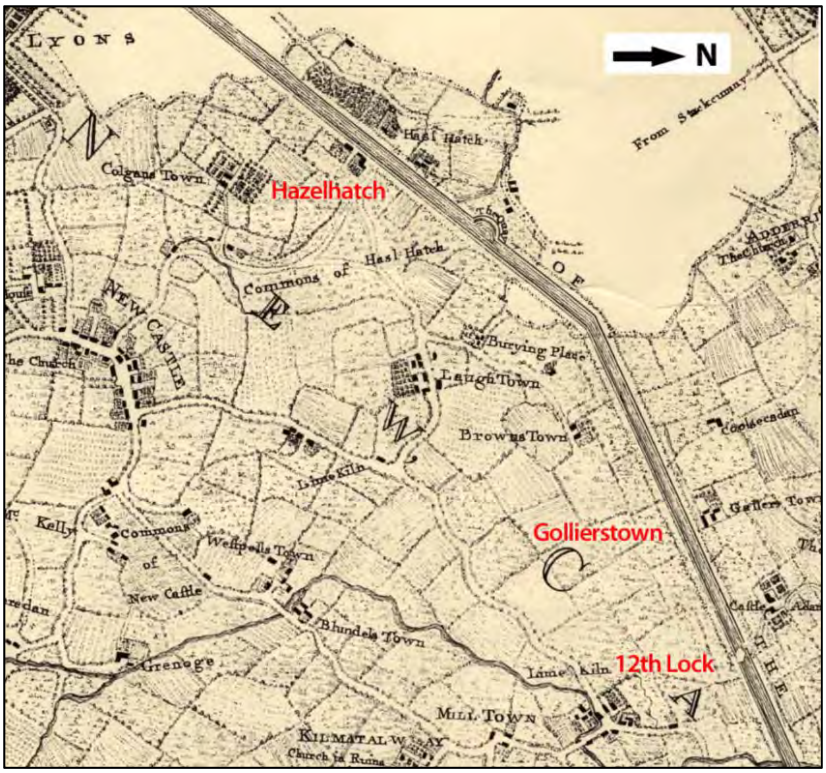

Figure 4 Rocque's map of County Dublin, 1760, showing relevant locations along Grand Canal

At Hazelhatch (‘*Hasl Hatch’*), the bridge is not yet shown, but the road that it would carry across the canal is depicted. There are already several buildings in place on either side of the canal and their situation in relation to both canal and roadway suggests that at least some of them represent the protected structures that are clustered around the bridge. Rocque’s map shows an interesting feature downstream of Hazelhatch, a semi-circular lay-by annotated ‘The Quay’. It is unique as the one feature along the entire length of canal through County Dublin that Rocque both depicts and labels. It presumably represents a lay-by, a widened section formed to one side of the narrow canal, providing a mooring place for boats while leaving the channel free. Although lay-bys are commonly used along canals, in much the same way as along roadways, and other examples exist along the Grand Canal, this is the only one depicted by Rocque.

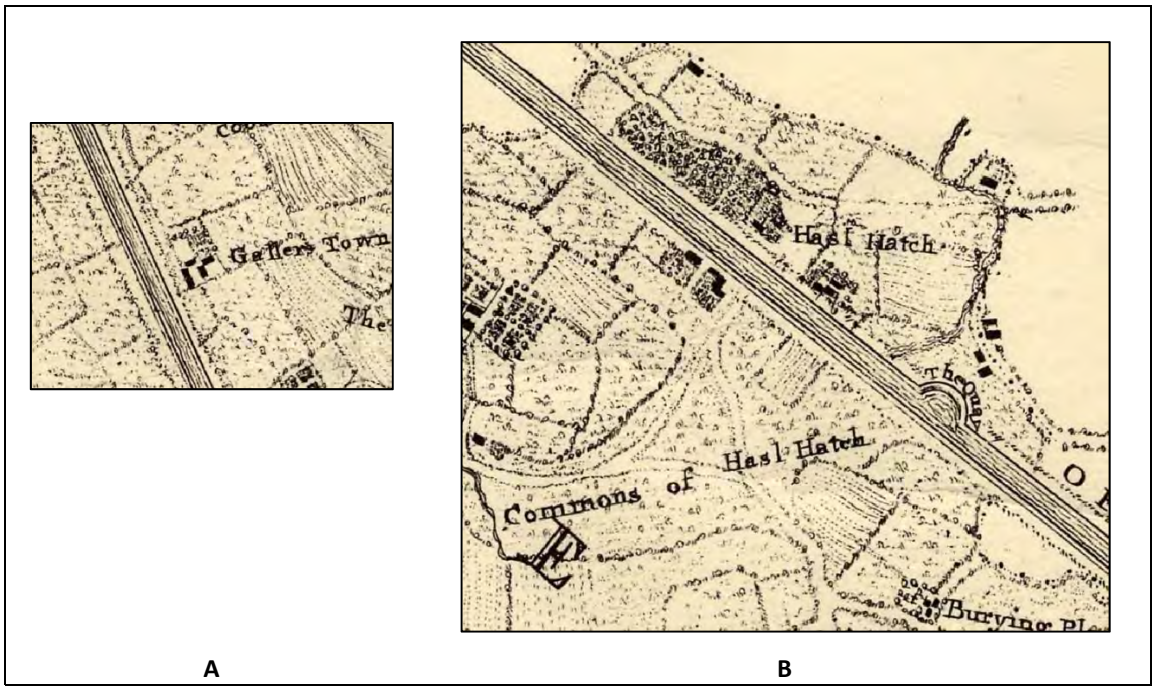

Figure 5 Rocque’s map of County Dublin, 1760, showing Gollierstown (A) and Hazelhatch (B)

5.1.4. Taylor’s maps of County Kildare (1783, Figure 7) and of the Environs of Dublin (1816, Figure 8)

Taylor’s maps are less detailed than Rocque’s, but they provide some new information. A new road has been constructed, crossing the canal at the 12th Lock, with a mill indicated on the north bank on the 1816 map. A road crossing at Gollierstown Bridge connects to Lucan to the north and appears to provide access to the rear of the Peamount estate on the south side of the canal. The bridge is named ‘Gullierstown Bridge’ on the 1783 map and ‘Gollardstown Br’ on the 1816 map. One quarry area is depicted on the southwest side of Gollierstown Bridge in 1783 and by 1816 there are large quarries shown along the north and south banks of the canal at this point, with a kiln also marked on the south bank. Hazelhatch Bridge is noted and some of the structures around it are shown on the 1816 map, with considerably less detail here on the earlier map. The house at the bend in the canal at Stacumny is depicted, just west of the 7th milestone. Unlike the house at the 12th Lock, this dwelling is not indicated as a Lock House.

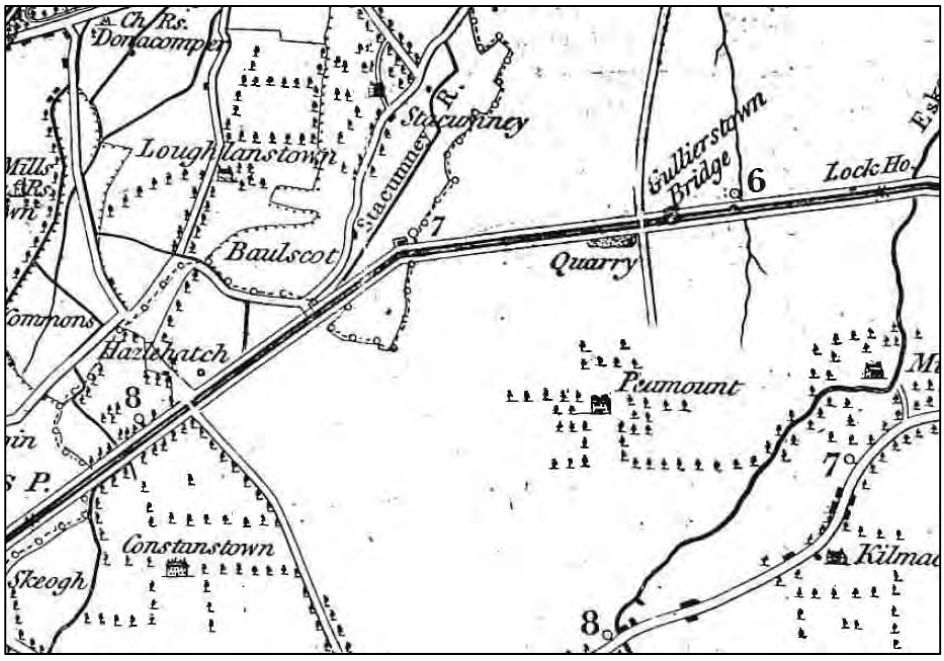

Figure 6 Taylor's map of the County of Kildare, 1783

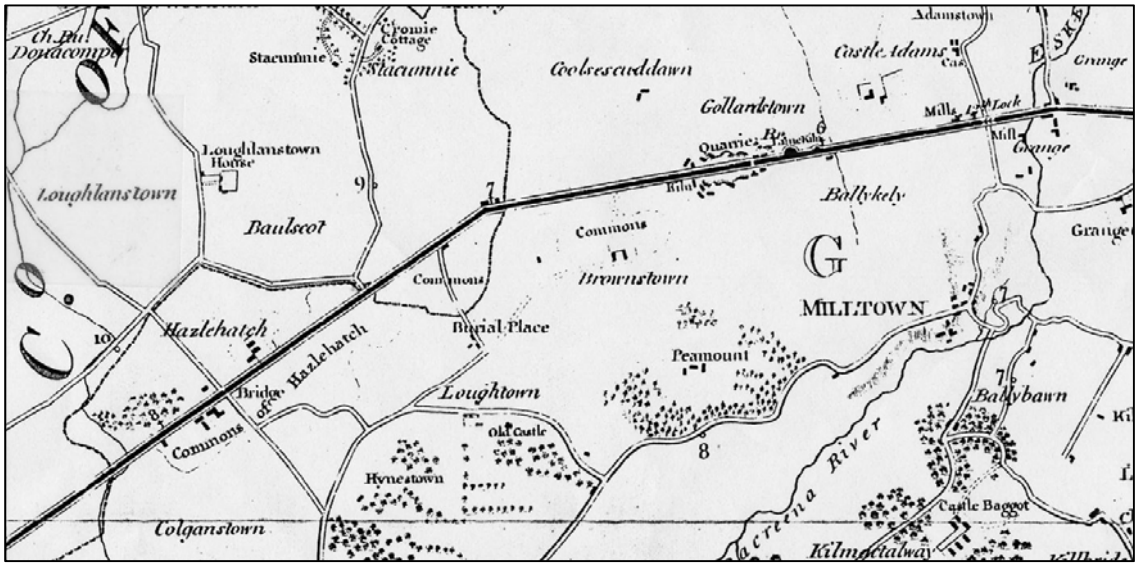

Figure 7 Taylor's map of the Environs of Dublin, 1816

5.2. Ordnance Survey mapping

5.2.1. First edition OS six-inch map, 1843 (Figures)

The first edition six-inch OS map represents the earliest accurate and detailed cartographic source for the study area.

The **12th Lock**, the associated road bridge and nearby mill are depicted in greater detail on this map. There are several structures clustered to either side of the bridge, including a large mill-building which is named as a Flour Mill. A small farmstead is depicted on the south side of the canal, to the west of the bridge (BH 1, which is still in use). Several small quarries also depicted just west of the lock.

Several small cottages are clustered around **Gollierstown Bridge** (including BH 2, which survives as a ruin), with the bridge itself serving as a crossing for a local road / laneway; in contrast to Taylor's maps, this road does not approach the Peamount estate, but instead veers south-eastwards to connect with the Milltown road. There is evidence of significant quarrying in areas along the banks of the canal, most obviously at Gollierstown. A lime kiln is depicted on the south side of the canal, in the area of quarries. A number of small structures located in and around the quarries presumably represent dwellings or workshops associated with the quarry workers.

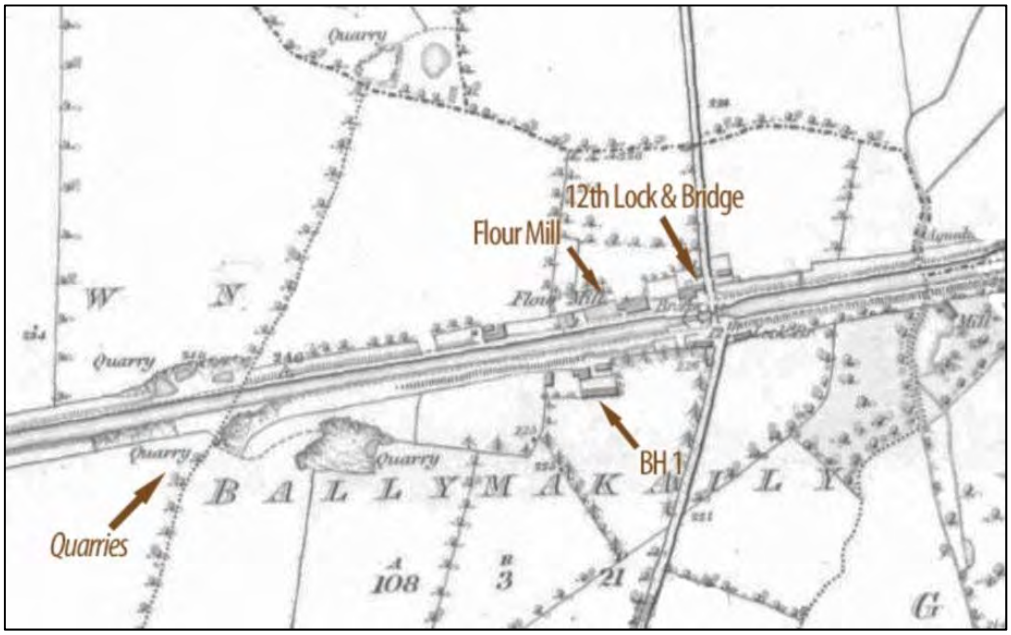

Figure 8 First edition OS six-inch map, showing 12th Lock

A small scattering of houses is depicted on either side of the canal at the Kildare / Dublin county boundary. These include a house with projecting porch set at an angle to the canal in Stacumny, which has a yard and outbuildings on its east side (BH 3).

A farm house and adjoining outbuildings occupy a yard on the north side of the canal at the Balscott / Hazelhatch townland boundary (BH 7). A second structure is aligned with the canal on the opposite side of the laneway, with a small water channel flowing north from the canal at this point. An arch in the canal bank on the south side suggests a culvert (an overflow weir is indicated on the north bank on the later mapping – BH 6).

Approximately mid-way between Balscott farm and Hazelhatch Bridge is a lay-by, in roughly the location of 'The Quay' Rocque's map (BH 5, Figures 5B & 10). Three others are depicted on the first edition map, one immediately west of Gollierstown Bridge, the second c. 450m west / southwest (Figure 9), and the third c. 550m to its east / northeast.

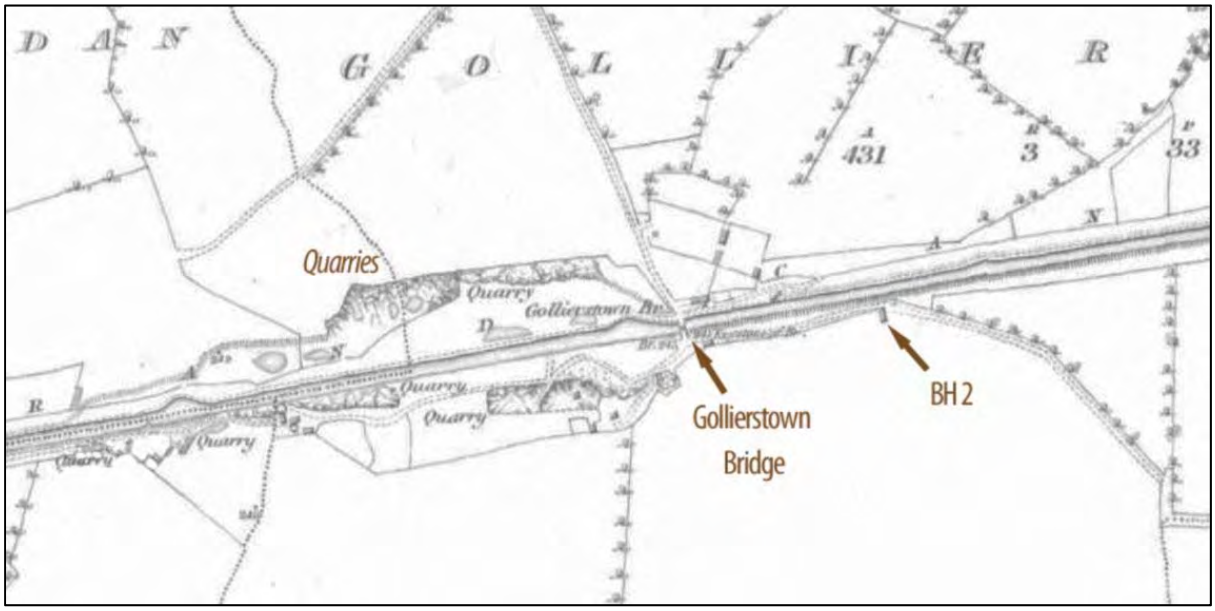

Figure 9 First edition OS six-inch map, showing Gollierstown Bridge

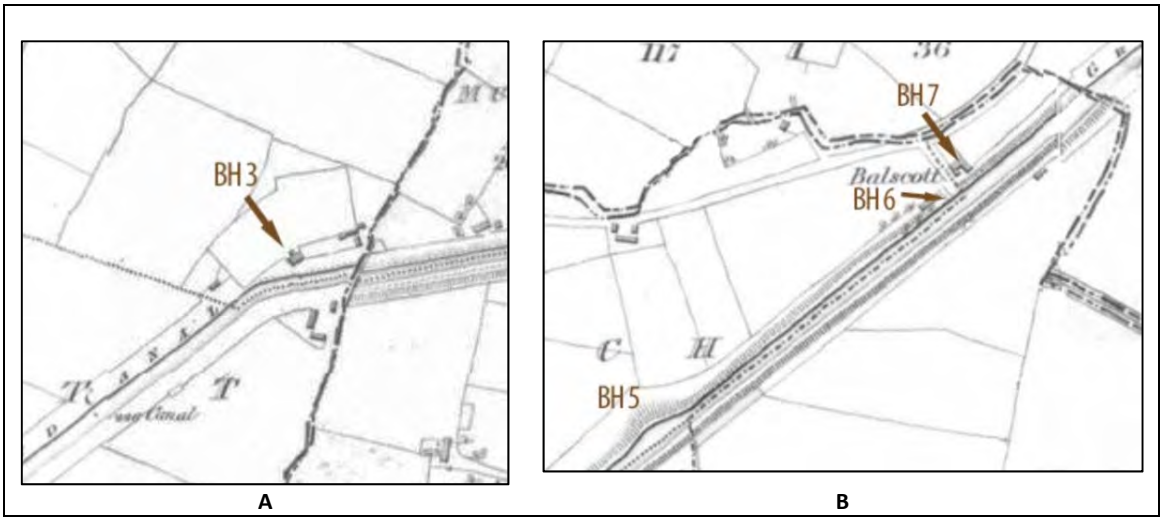

Figure 10 First edition OS six-inch map, showing (A) BH 3 at Stacumny and (B) BH 5, 6, 7 at Balscott / Hazelhatch

Hazelhatch Bridge is named (Figure 11), with structures occupying canal-side plots to the northeast, northwest and southwest sides of the bridge; although none are named, the alignment of most with the canal is indicative of their association with it. Hazelhatch House is shown to the northeast and one small dwelling is depicted at the roadside to the southeast of the bridge, though set well back from the canal.

Figure 11 First edition OS six-inch map, showing Hazelhatch Bridge

5.2.2. Revised edition OS 25-inch map (1907-09) & six-inch map (1935-38)

There are few significant changes on the early 20th century 25-inch OS map, though it does show some additional detail for the features along the canal. Several 'aqueducts' are indicated, though these are more correctly culverts running beneath the canal, rather than bridged crossings to carry the canal over a river or road (e.g. BH 4 near Hazelhatch, Figure 12A).

The additional detail of the 25-inch scale reveals a difference between the lay-by first shown on Rocque's map as 'The Quay' (BH 5) and the others along the canal (Figure 12A). At the 'The Quay', the towpath forms a more exaggerated curve than that of the lay-by itself – in contrast to the other lay-bys – giving it a far wider berth than is strictly necessary. This may suggest that the feature was partly filled in at some point. The culvert and channel at Balscott are also shown in greater detail, with the slight indent of the canal wall representing an overflow weir (BH 6, Figure 12B).

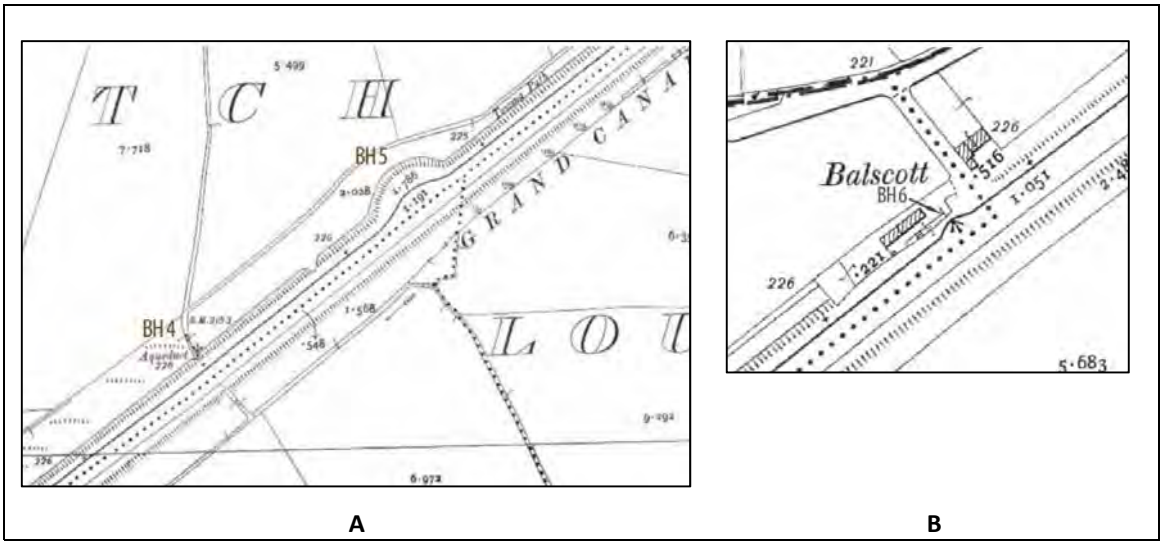

Figure 12 Revised edition 25-inch OS map, 1906-9, showing (A) BH 4 & BH 5 (B) BH 6

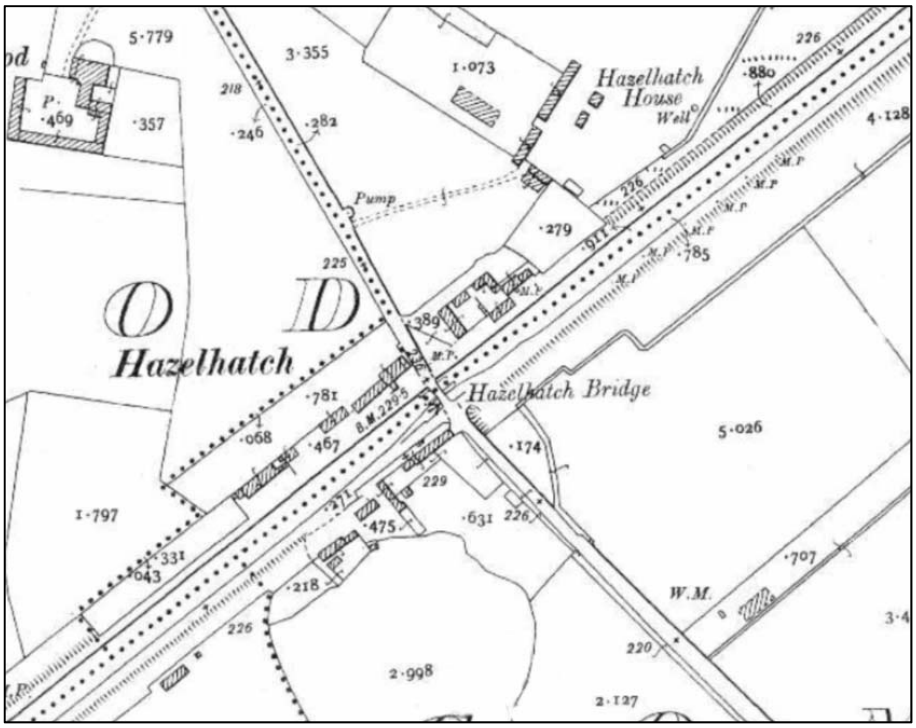

Figure 13 Revised edition 25-inch OS map, 1906-9, showing Hazelhatch Bridge

Many of the houses / cottages along the canal are no longer depicted, though new buildings have been added at Hazelhatch and at the farm yard at Gollierstown (Figures 13 & 14). Structure BH 2 is indicated as being disused or in ruin by this time, as is the house at Stacumny, BH 3.

At the 12th Lock, the farmstead to the southwest is named The Grange (BH 1, Figure 15). The Flour Mill has been extended, almost doubling in length. The quarries along the canal are now marked as disused. There are no significant changes by the time of the revised six-inch edition OS map of 1935-38.

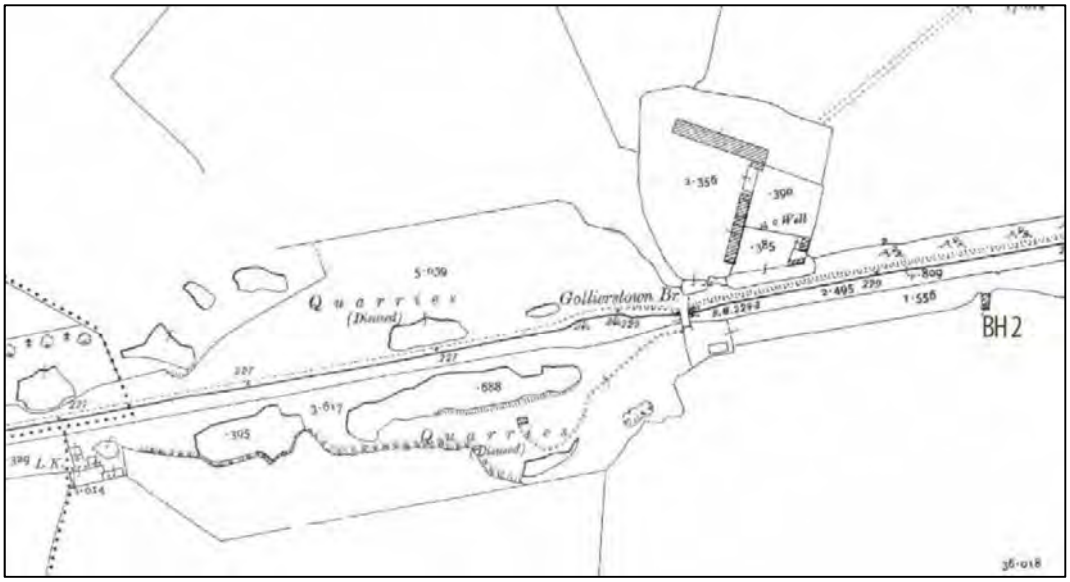

Figure 14 Revised edition 25-inch OS map, 1906-9, showing Gollierstown Bridge

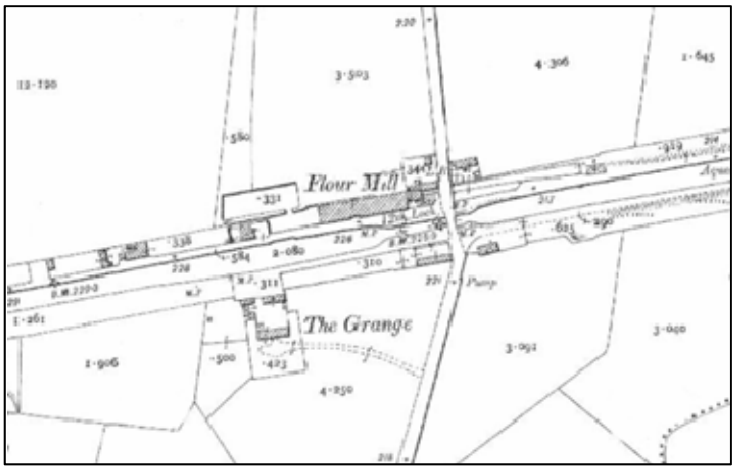

Figure 15 Revised edition 25-inch OS map, 1906-9, showing 12th Lock

6. FIELD INSPECTION

6.1. Introduction

The field inspection was carried out on 24th May 2018 on a dry day, with a mixture of bright and overcast conditions. The survey area is described below from east to west, beginning with the 12th Lock and terminating at Hazelhatch Bridge. Significant locations along the canal are marked on Figure 16, along with the undesignated sites built and cultural heritage sites identified during this assessment.

6.2. 12th Lock & Environs

In addition to the 12th Lock and Canal Bridge, both of which are protected structures (RPS 125 & 127), there is a collection of interesting industrial structures located on the north-western side of the canal which provide an historic setting for the canal (Plate 1). None of the buildings are currently in use. They include a seven-bay two storey over basement former mill building, constructed c.1860 (RPS 118) and a much larger detached three-storey over basement former mill dating to c.1860 (NIAH 11204055).

The bridge itself (known as Leck Bridge) was originally constructed c. 1770 (Plates 2 & 3). The earliest section comprises a segmental headed arch with painted dressed voussoir stones set into smooth rendered west elevation. It was widened (doubled) and refurbished in 1932.

The 12th Lock is a single-stage lock, built c. 1770, with coursed limestone walls and limestone coping (Plates 1 & 2). The gates are constructed of replacement timber and iron at the eastern and western ends of the lock and they are flanked with coursed limestone inner walls. There is painted timber mooring posts at intervals between the lock gates.

Plate 1 View of former mill buildings at the 12th Lock, facing northwest

Plate 2 12th Lock and bridge, facing east

Plate 3 Lock Keeper's Cottage on north side of canal

Plate 4 Original arch, west side of Leck Bridge, c. 1770

Beyond the industrial buildings to the west is the former Lock Keeper's Cottage, built c. 1765 (RPS 119, Plate 4). The detached three-bay two-storey gable-fronted classical-style house is now derelict. This attractive former lock-keeper's house was built to a standard design and retains much of its original architectural impact and style, though it has suffered badly from neglect. The plain string courses and classical detail contrast with the roughcast walls to a very pleasing effect. Possibly designed by Thomas Omer, it is a fine addition to the varied group surrounding the 12th lock.

The farmstead to the west of the 12th Lock Bridge (BH 1), which is depicted on the first edition OS map (1843) is still in use, but its setting is almost obscured by trees and is dominated by modern farm buildings

and equipment. This side of the canal has also suffered from fly-tipping along the former towpath. The path has been re-surfaced with gravel and terminates c. 485 m west of the bridge (as it does on the historic OS mapping).

The northern towpath runs uninterrupted alongside the canal. While the surface is tarmac at the 12th Lock, it reverts to a partly grass-covered track beyond the industrial buildings, gravelled in places. Traces of the original cobbled surface could occasionally be seen, as could the cut-stone edging along the canal bank (Plates 5 & 6).

Plate 5 Traces of cobbled surface visible in towpath along north side of canal

Plate 6 Cut-stone edging to canal bank

6.3. Gollierstown Bridge & Environs

Shortly after the canal leaves the 12th Lock, the surroundings become noticeably more rural. There is a sense of enclosure for much of the way, with high earthen banks and mature, dense vegetation. The presence of a bio-reserve at the site of the disused quarries in Gollierstown adds to the character of the canal (Plate 8), as does the attractive stone structure of Gollierstown Bridge (Plates 7 & 10).

The towpath continues alongside the canal running beneath the single-arched stone bridge, Gollierstown Bridge (Plate 10), with a second raised pathway running alongside it. This second path rises to access the bridge, before sloping back down to eventually re-join the towpath. The embankment along the south side of the raised path was originally faced with coursed stones. This has come away in places (or otherwise removed) and a section of the embankment has been exposed, revealing the rubble-stone construction of the raised pathway (Plate 13). There are deep rope grooves are cut into the east and west corners of the north bridge pier adjacent to the walkway / towpath, which provide a rare tangible link to the canal's working past (Plate 14).

The bridge structure has suffered from neglect (Plates 11 & 12), with render having come away in places from the wing- and parapet-walls. The flat coping stones on the wing- and parapet-walls have been replaced in some areas, with a rounded finish at a lower level than the original stones. There is evidence of anti-social

activity, with an unsightly metal fence with barbed wire blocking access on the north side and graffiti on the north pier. The deck of the bridge is badly eroded.

Plate 7 View west / southwest along the canal towards Gollierstown Bridge

Plate 8 Bio-reserve at disused quarries, facing east / northeast

Plate 9 View of Gollierstown Bridge, towpath and raised pathway, facing west / southwest

Plate 10 West face of Gollierstown Bridge

Plate 11 Gollierstown Bridge, facing south

Plate 12 Existing deck of Gollierstown Bridge

Plate 13 Embankment of raised path on west side of Gollierstown Bridge

Plate 14 Rope grooves on the north pier of Gollierstown Bridge, west corner (left) & east corner (right)

The ruined remains of a single-storey cottage depicted on the first edition OS map (BH 1) survive on the south bank of the canal, to the southeast of Gollierstown Bridge (Plate 11).

Plate 15 Ruined remains of stone cottage (BH 2), on north bank of canal

6.4. Hazelhatch Bridge & Environs

Hazelhatch Bridge and the varied structures clustered around it form an attractive and picturesque group, adding much to the scenic quality along this stretch of the canal. It is a vibrant area, with numerous canal boats moored on either side of the bridge, and provides a direct contrast to the serenity at Gollierstown Bridge.

The single-arch stone bridge has retained its original narrow form and is in good condition (Plates 16-21). It is a focal feature and adds much to the historic character of this location. This is a result of the overall appearance of the structure in its setting and of the smaller historical details, such as the rope-cut grooves and a benchmark on the south pier. The large pipe attached to the west face over the arch is an unattractive modern intrusion on the bridge structure. Some of the granite kerbstones along the canal are missing on the southeast side of the bridge, while others have been replaced beneath the bridge.

The canal boats that line the banks on the northeast side of the bridge partly obscure views of the bridge the farther along the towpath one travels and the bridge is best experienced in its more immediate setting (Plate 22).

The surrounding buildings enhance this historic character, including the range of buildings incorporating the Hatch Bar and stables on the southwest side of the bridge (this complex is screened from the towpath with access via a large gate; according to signage, the buildings house an artist's workshop, gallery and café, though it was not open on the day of inspection).

McEvoy's, on the northeast side of the bridge, in particular is integral to the ambience here (Plates 23-26). It is an attractive building that retains its original form and sense of place. It is a public house that was originally built to serve the canal in the mid-18th century and which still operates as a canal-side pub now. The stone boundary walls around the perimeter and the yards to the rear contribute to the sense of history, as do the 18th century outbuildings and canal company warehouse that still stand in the yard.

Plate 16 Hazelhatch Bridge, viewed from northeast

Plate 17 Hazelhatch Bridge, viewed from southwest

Plate 18 Hazelhatch Bridge, northeast wing wall

Plate 19 Hazelhatch Bridge, southeast wing wall

Plate 20 Hazelhatch Bridge, from northeast, showing replacement kerbstones along towpath

Plate 21 Hazelhatch Bridge, facing south

Plate 22 View southwest towards Hazelhatch Bridge

Plate 23 McEvoy's Pub, facing northeast

Plate 24 View towards towpath from McEvoy's side yard

Plate 25 Derelict canal company warehouse to rear of McEvoy's, prior to vegetation overgrowth (NIAH image)

Plate 26 Derelict canal company warehouse to rear of McEvoy's

The 'aqueduct' marked on the 25-inch 1906-9 OS map to the northeast of Hazelhatch Bridge (BH 4) survives as a cut-stone-lined channel at the base of the steep canal embankment. The channel carries a stream beneath the canal, through a single-arch culvert. The cut-stone faced arch is segmental, with a benchmark inscribed on the keystone. The voussoirs have not been neatly finished to follow the curve of the arch. Although this is a well-built structure it was not designed to be seen (nor could it be seen from the towpath / canal level) and did not require careful attention to detail. Large stone blocks are set above the arch to support the embankment rising to the level of the towpath above, now heavily overgrown and obscured by vegetation.

Plate 27 Culvert BH 4, north side of canal

A short distance northeast, the towpath broadens out to encompass the curve of the feature marked on Rocque's map, 'The Quay' (BH 5). The path itself continues parallel to the canal, following its slight curve, bypassing what appears to be an infilled section of 'The Quay'.

Plate 28 'The Quay' (BH 5), facing southwest

Plate 29 Overflow weir (BH 6), facing southwest

Further northeast, just before the townland boundary between Hazelhatch and Balscott, the towpath curves away from the canal around an overflow weir (BH 6). Broad stone steps rise from the main channel to the canal bank, where a gentle slope takes the excess water away from the canal through two small arches. The arches are surmounted by a low parapet wall and ashlar masonry line the walls along each side of the weir. On the far side of the townland boundary, a small single-storey cottage in a derelict state is all that is now visible of the early 19th century Balscott farm complex (BH 7). It is set well back from the canal, with a large unfinished modern house abutting its south side.

Plate 30 Derelict farm cottage (BH 7)

6.5. Ruined House (BH 3) at Stacumny Cottage

The remains of a two-storey house stand in Stacumny Cottage townland (BH 3), at the county boundary, where the canal bends to run eastwards towards Gollierstown and 12th Lock. The derelict canal-side house although not positioned at or near a lock, displays many of the features common to Omer's design for Lock Houses (Plates 31-34): the surviving gable walls suggest a pitched roof; blind recessed arches are visible on at least three facades; square-headed window openings; and a string course separating the two floors. Overall, the building is remarkably similar in size and style to the Lock-Keeper's Cottage at 12th Lock.

The northwest elevation is almost entirely obscured by overgrowth (as is the southwest façade) and appears to be in particularly poor condition, with stone collapse having created a vertical opening that halves this face of the building. This is, according to Delaney (1995), one of Omer's surviving lock-houses (albeit without an associated lock), at which there was formerly a store yard.

There is a local tradition that this ruined house was once a hotel, as recorded by Delaney in the early 1970s (Delaney 1995) and as narrated by canal-boat owners encountered at Hazelhatch during the course of this field survey. There is no official record for a hotel at this location and the size of the building would make it unlikely. The story probably arose because rooms in the house were rented in the 1780s during the season for drinking water at the nearby Lucan Spa (Delaney 1995). The building is undoubtedly associated with the canal, probably later 18th century in date, and had fallen out of use some time prior to the start of the 20th century. It is not known who it was built for, though it may be that the occupant was supervised or managed the store yard.

Plate 31 House at Stacumny (BH 3), southwest elevation

Plate 32 House at Stacumny (BH 3), southeast elevation

Plate 33 House at Stacumny (BH 3), facing west

Plate 34 House at Stacumny (BH 3), facing south

6.6. Towpath

In an era when all canal boats were pulled by horses, the towpath was an important component of the canal. The towpaths were constructed with a rubble foundation, and very often was formed from the upcast spoil from the excavation of the canal bed. A camber was commonly formed at the water's edge, with additional reinforcements provided on sections leading to locks, which were built with masonry (Rynne

2006). Evidence of cut-stone kerbing was identified in places along the canal from 12th Lock to Gollierstown, as noted above.

The towpath runs uninterrupted along the north bank from Hazelhatch as far as the 12th Lock. For most of its length, as noted previously, it is grassed over, with wild verges evidence for rough cobbling visible in places (Plate 35). The idyllic canal vistas and the sense of history enjoyed along this length of the waterway owes much to the existing towpath surface, which does not jar with the bucolic and often rural nature of the surroundings. The role that the surface plays in the charm of the canal walk is apparent when contrasted with the previously upgraded surface along the southern towpath from Hazelhatch to Aylmer Bridge (now a broad swathe of fine dark grit). A similar effect can be seen along the stretch of canal continuing east from 12th Lock, which has a tarmacadam, black-top surface that serves to strip the canal of some of its appeal.

Plate 35 View along towpath to Hazelhatch Bridge, showing remnants of cobbled surface

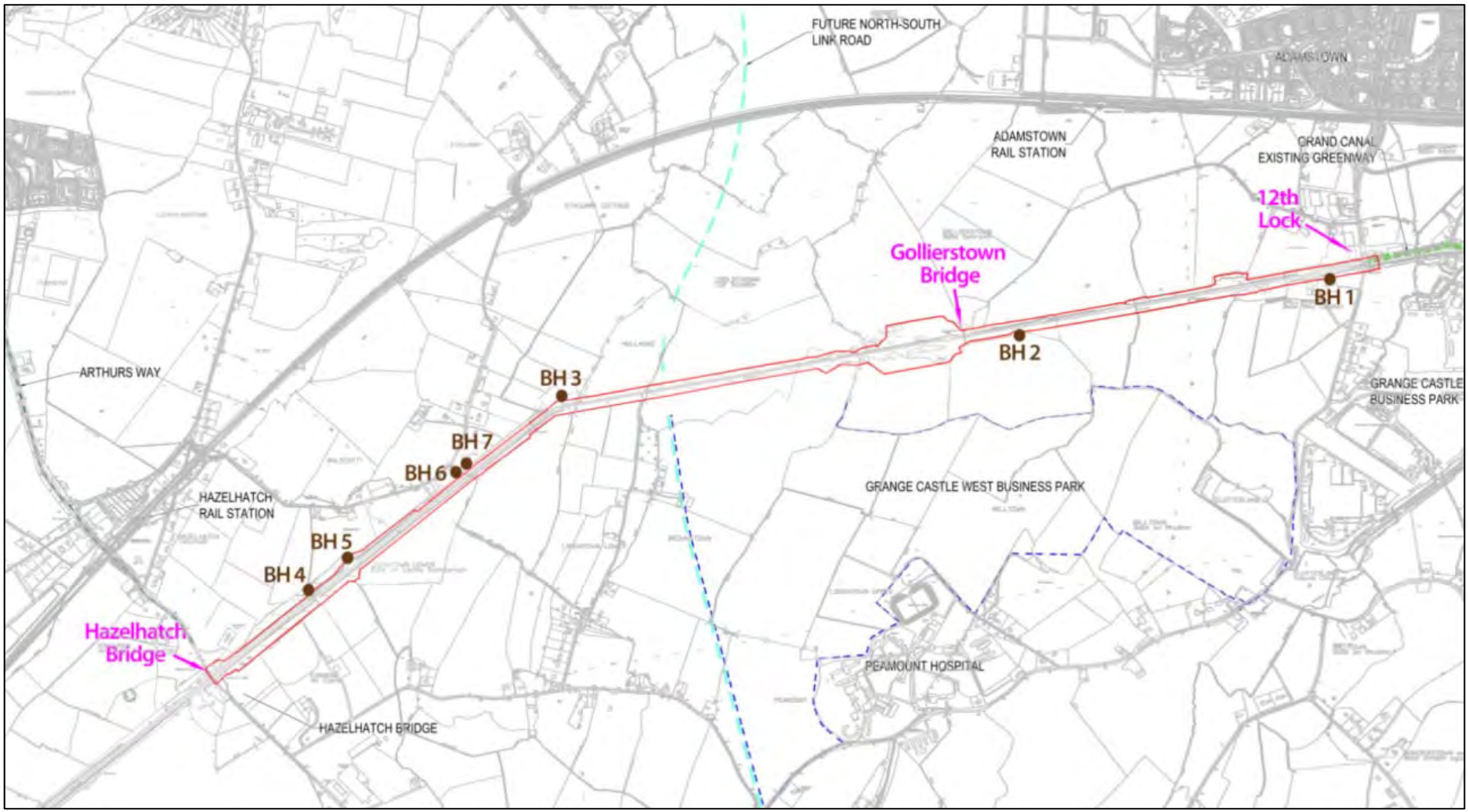

Figure 16 Location of built and cultural heritage sites, with proposed greenway extenstion in red

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

The Grand Canal plays a significant role in the cultural heritage of this area. It is an important feature of the historic landscape and a prominent reminder of our industrial past.

7.1.1. Archaeological Constraints

Given the level of disturbance required to construct the canal in the 18th century, any earlier archaeological deposits would not survive intact within its bounds. While the canal itself and its associated infrastructure are a feature of our industrial archaeological heritage, they will not be negatively impacted by the proposed Greenway Extension.

7.1.2. Architectural Heritage Constraints

There are a number of protected structures and NIAH sites located along the Grand Canal, including the structures focused around the 12th Lock and Hazelhatch Bridge, as well as Gollierstown Bridge (detailed in Table 1, section 4.2). With the exception of the bridges and the lock itself, all of the structures are set back from the canal, at the side of the tow path. No works are proposed at 12th Lock (Leck) Bridge.

The assessment also identified seven undesignated sites of built and industrial heritage interest, all of which are depicted on the first edition OS map (BH 1 to BH 7, Figure 17). None of these sites will be negatively affected by the proposed Greenway Extension.

Gollierstown Bridge

Gollierstown Bridge is a protected structure (RPS No. 131). The setting of this canal bridge is idyllic, with a remote location in a lush natural environment. The vistas along the canal to and from the bridge are significant and it is important that they remain undisturbed by any modern intrusions (e.g. a new bridge structure to carry services across the canal). For this reason, the proposed services crossing will utilise an engineering solution (e.g. directional drilling), thus avoiding a negative impact on the setting of the protected structure.

There will be no proposed works to the existing bridge structure. Ramp access is to be provided, however, on all approaches to the existing bridge.

Hazelhatch Bridge

Hazelhatch Bridge is a protected structure (RPS No. 168). The 18th century canal bridge forms the focal point of the historic setting at Hazelhatch, which is enhanced by the varied group of 18th and 19th century buildings that cluster around it (Figure 17). The majority of these buildings are also protected structures, including McEvoy's Pub, with its stables and rear courtyard (RPS No. 164), the boundary walls of which line the canal towpath. The derelict canal company warehouse and attached outbuilding which stand in the rear yard of McEvoy's are listed in the National Inventory of Architectural Heritage (NIAH Ref. 11207015, Regional Rating) and front onto the canal (the canal front is overgrown, obscuring the buildings).

Figure 17 Location of architectural heritage constraints in Hazelhatch

While there are some distant views along the canal of the bridge, the canal boats that line the banks on the northeast side of the bridge partly obscure views of it the farther along the towpath one travels and the bridge is best experienced in its more immediate setting. This should be borne in mind for any future development proposed in proximity to the bridge.

The works proposed in the current planning application will not adversely affect Hazelhatch Bridge or the surrounding protected structures.

7.2. Recommendations

7.2.1. Gollierstown Bridge

In order to avoid negative impacts on the setting of the protected structure, the proposed services crossing will utilise an engineering solution (e.g. directional drilling).

With regard to provision of ramp access on all approaches to the existing bridge, an appropriate design should be agreed in consultation with the conservation officer of South Dublin County Council to avoid any potential indirect impacts to the protected structure.

7.2.2. General

Proposals to upgrade the towpath surface should consider, if possible, the use of sympathetic materials that are in keeping with the existing environment.

It is also important that the history of the canal and the areas through which it travels is accessible to the public. Informative signage, such as that currently used for Arthur's Way, would be a welcome initiative to the Greenway.

Recommendations made in this report are subject to approval of the heritage and conservation officers in South Dublin County Council.

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Online Resources:

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www.heritagemaps.ie

www.tcd.ie/downsurvey

APPENDIX 1 EXTRACTS FROM RELEVANT LEGISLATION

National Monuments Legislation 1930-2004.

All archaeological sites have the full protection of the national monuments legislation (Principal Act 1930; Amendments 1954, 1987, 1994 and 2004).

In the 1987 Amendment of Section 2 of the Principal Act (1930), the definition of a national monument is specified as:

any artificial or partly artificial building, structure or erection or group of such buildings, structures or erections,

any artificial cave, stone or natural product, whether forming part of the ground, that has been artificially carved, sculptured or worked upon or which (where it does not form part of the place where it is) appears to have been purposely put or arranged in position,

any, or any part of any, prehistoric or ancient

(i) tomb, grave or burial deposit, or

(ii) ritual, industrial or habitation site,

and

any place comprising the remains or traces of any such building, structure or erection, any cave, stone or natural product or any such tomb, grave, burial deposit or ritual, industrial or habitation site...

Under Section 14 of the Principal Act (1930):

It shall be unlawful...

to demolish or remove wholly or in part or to disfigure, deface, alter, or in any manner injure or interfere with any such national monument without or otherwise than in accordance with the consent hereinafter mentioned (a licence issued by the Office of Public Works National Monuments Branch),

or

to excavate, dig, plough or otherwise disturb the ground within, around, or in the proximity to any such national monument without or otherwise than in accordance...

Under Amendment to Section 23 of the Principal Act (1930),

A person who finds an archaeological object shall, within four days after the finding, make a report of it to a member of the Garda Síochána...or the Director of the National Museum...

The latter is of relevance to any finds made during a watching brief.

In the 1994 Amendment of Section 12 of the Principal Act (1930), all of the sites and 'places' recorded by the Sites and Monuments Record of the Office of Public Works are provided with a new status in law. This

new status provides a level of protection to the listed sites that is equivalent to that accorded to 'registered' sites [Section 8(1), National Monuments Amendment Act 1954] as follows:

The Commissioners shall establish and maintain a record of monuments and places where they believe there are monuments and the record shall be comprised of a list of monuments and such places and a map or maps showing each monument and such place in respect of each county in the State.

The Commissioners shall cause to be exhibited in a prescribed manner in each county the list and map or maps of the county drawn up and publish in a prescribed manner information about when and where the lists and maps may be consulted.

- In addition, when the owner or occupier (not being the Commissioners) of a monument or place which has been recorded, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Commissioners and shall not, except in the case of urgent necessity and with the consent of the Commissioners, commence the work for a period of two months after having given the notice.

The National Monuments Amendment Act 2004

The National Monuments Amendment Act enacted in 2004 provides clarification in relation to the division of responsibilities between the Minister of Environment, Heritage and Local Government, Finance and Arts, Sports and Tourism together with the Commissioners of Public Works. The Minister of Environment, Heritage and Local Government will issue directions relating to archaeological works and will be advised by the National Monuments Section and the National Museum of Ireland. The Act gives discretion to the Minister of Environment, Heritage and Local Government to grant consent or issue directions in relation to road developments (Section 49 and 51) approved by An Bord Pleanála and/or in relation to the discovery of National Monuments

14A. (1) The consent of the Minister under section 14 of this Act and any further consent or licence under any other provision of the National Monuments Acts 1930 to 2004 shall not be required where the works involved are connected with an approved road development.

(2) Any works of an archaeological nature that are carried out in respect of an approved road development shall be carried out in accordance with the directions of the Minister, which directions shall be issued following consultation by the minister with the Director of the National Museum of Ireland.

Subsection 14A (4) Where a national monument has been discovered to which subsection (3) of this section relates, then

(a) the road authority carrying out the road development shall report the discovery to the Minister
(b) subject to subsection (7) of this section, and pending any directions by the minister under paragraph (d) of this subsection, no works which would interfere with the monument shall be carried out, except works urgently required to secure its preservation carried out in accordance with such measures as may be specified by the Minister

The Minister will consult with the Director of the National Museum of Ireland for a period not longer than 14 days before issuing further directions in relation to the national monument.

The Minister will not be restricted to archaeological considerations alone, but will also consider the wider public interest.

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

This Act provides for the establishment of a national inventory of architectural heritage and historic monuments.

Section 1 of the act defines "architectural heritage" as:

(a) all structures and buildings together with their settings and attendant grounds, fixtures and fittings,

(b) groups of such structures and buildings, and,

(c) sites

which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

Section 2 of the Act states that the Minister (for Arts, Heritage, Gaeltacht and the Islands) shall establish the NIAH, determining its form and content, defining the categories of architectural heritage, and specifying to which category each entry belongs. The information contained within the inventory will be made available to planning authorities, having regard to the security and privacy of both property and persons involved.

Section 3 of the Act states that the minister may appoint officers, who may in turn request access to premises listed in the inventory from the occupiers of these buildings. The officer is required to inform the occupier of the building why entry is necessary, and in the event of a refusal, can apply for a warrant to enter the premises.

Section 4 of the Act states that obstruction of an officer or a refusal to comply with requirements of entry will result in the owner or occupier being guilty of an offence.

Section 5 of the Act states that sanitary authorities who carry out works on a monument covered by this Act will as far as possible preserve the monument with the proviso that its condition is not a danger to any person or property, and that the sanitation authority will inform the Minister that the works have been carried out.

The provisions in the Act are in addition to and not a substitution for provisions of the National Monument Act (1930–94), and the protection of monuments in the National Monuments Act is extended to the monuments covered by the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act (1999).

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Appendix D – Strategic Flood Risk Assessment

Clifton Scannell Emerson Associates

Hazelhatch Bridge to 12th Lock - Grand Canal Greenway

Strategic Flood Risk Assessment

Comhairle Contae Átha Cliath Theas
South Dublin County Council

Client: South Dublin County Council

Date: 07th December 2018

Job Number: 18_065

CONSULTING ENGINEERS

Civil Engineering | Structural Engineering | Transport Engineering | Environmental Engineering | Project Management | Health and Safety

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Document Control Sheet

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1st	FINAL	07th Dec 2018	DRL	RG

Table of Contents

1 Introduction

1.1 Background

On behalf of South Dublin County Council (SDCC), Clifton Scannell Emerson Associates (CSEA) were tasked with the undertaking of a Strategic Flood Risk Assessment (SFRA) study for the existing Grand Canal lands, northern towpath predominately, located between the existing Hazelhatch Bridge and the existing 12th Lock which is under the ownership and operation of Waterways Ireland.

The SFRA is carried out in full compliance with the requirements of "The Planning System & Flood Management Guidelines" published by the Department of Environment in November 2009.

1.2 Site Location

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway development is located within the existing townlands of Ballymakaily, Gollierstown, Coolscuddan, Brownstown, Mullauns, Loughtown Lower, Stacammy Cottage, Balscott and Hazelhatch respectively. For further details regarding the existing townland boundaries that the proposed scheme traverses through, please see **Figure 1** below. The proposed scheme is located along the entire extents of the existing northern tow path attributed to the Grand Canal and traverses in and east to west direction for approximately 4.6km in total length.

From the most eastern commencement location of the proposed scheme, access to the northern towpath is gained from the R120 Regional Road located adjacent to the existing 12th Lock. Access from the most western point of the scheme is gained from the existing Hazelhatch public house premises which is located adjacent to the existing Hazelhatch Road/Bridge. Internal site access to both the northern and southern towpaths attributed to the Grand Canal is additionally provided by the existing Gollierstown Bridge. Access at this location of the proposed scheme is predominately utilised by local landowners/farmers. Furthermore, a small portion, approximately 0.48km, of the proposed scheme traverses through County Kildare lands with the remaining footprint located within County Dublin lands.

For further information regarding the location of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme, please refer to **Appendix A** of this report.

Figure 1 - Existing Townland Boundaries (GSI Website)

1.3 Scheme Description

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme is primarily located along the northern tow path of the existing Grand Canal.

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme will include the following features:

- 4.6km of shared walking and cycling Greenway along the existing northern Grand Canal towpath.
- Path widths will vary from 2.5m to 3.5m in width. Widths will be dictated by existing on site features.
- Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust or Asphalt Tarmac depending on local conditions for pedestrian and cyclists use.
- Provision of access controls such as pedestrian and cycle friendly gates along the route.
- Underground utilities and services including: Power ducting, telecom ducting, Public Lighting ducting & CCTV ducting.
- All associated ancillary works and integrated landscape plans.

2 The Planning System and Flood Risk Management Guidelines

2.1 Introduction

In 2009 the Department of Environment, Heritage and Local Government in conjunction with the Office of Public Works published The Planning System and Flood Risk Management: Guidelines for Planning Authorities. The purpose of the Guidelines is to ensure that flood risk is considered by all levels of government when preparing development plans and planning guidelines. They should also be used by developers when addressing flood risk in development proposals. The Guidelines should be implemented in conjunction with the relevant flooding and water quality EU Directives including the Water Framework Directive (River Basin Management Plans (RBMPs)) and the Floods Directive (Catchment Flood Risk Assessment and Management Studies (CFRAMS)).

The core objectives of the Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding.
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off.
- Ensure effective management of residual risks for development permitted in floodplains.
- Avoid unnecessary restriction of national, regional or local economic and social growth.
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

The Guidelines recommend that Flood Risk Assessments (FRA) be carried out to identify the risk of flooding to land, property and people. FRAs should be carried out at different scales by government organisations, local authorities and for proposed developments appropriate to the level of information required to implement the core objectives of the Guidelines. The FRA scales are:

- **Regional Flood Risk Appraisal (RFRA)** - a broad overview of flood risk issues across a region to influence spatial allocations for growth in housing and employment as well as to identify where flood risk management measures may be required at a regional level to support the proposed growth. Currently being undertaken by the OPW through the CFRAMs process.
- **Strategic Flood Risk Assessment (SFRA)** - an assessment of all types of flood risk informing land use planning decisions. This will enable the Planning Authority to allocate appropriate sites for development, whilst identifying opportunities for reducing flood risk. This SFRA will revisit and develop the flood risk identification undertaken in the RFRA, and give consideration to a range of potential sources of flooding. An initial flood risk assessment, based on the identification of Flood Zones, will also be carried out for those areas, which will be zoned for development. Where the initial flood risk assessment highlights the potential for a significant level of flood risk, or there is conflict with the proposed vulnerability of development, then a site specific FRA will be recommended, which will necessitate a detailed flood risk assessment.
- **Site Specific Flood Risk Assessment (FRA)** - site or project specific flood risk assessment to consider all types of flood risk associated with the site and propose appropriate site management and mitigation measures to reduce flood risk to and from.

2.2 Flood Risk Assessment Approach

The Guidelines recommend that Flood Risk Assessments (FRA) be carried out to identify the risk of flooding to land, property and people. FRAs should use the Source-Pathway-Receptor (S-P-R) Model to identify the sources of flooding, the flow paths of the floodwaters and the people and assets impacted by the flooding. **Figure 2** shows the SPR model that should be adopted in FRAs.

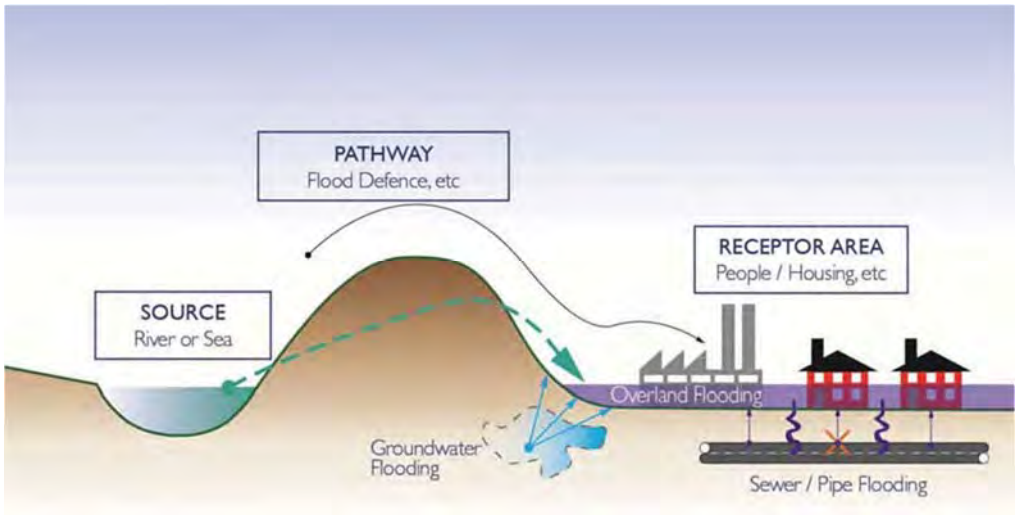


Figure 2 - Flood Risk Assessment Source - Pathway - Receptor Model (SFRA-SDCC Dev. Plan 2016 - 2022)

FRAs should be carried out using the following staged approach;

- **Stage 1 Flood Risk Identification** - to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels.

- **Stage 2 Initial Flood Risk Assessment** - to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped.

- **Stage 3 Detailed Flood Risk Assessment** - to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

This report addresses the requirements for both stages 1 and 2 respectively.

2.3 Types of Flooding

There are two main sources of flooding, inland and coastal. Inland flooding is caused by prolonged and/or intense rainfall. This results in fluvial, pluvial or ground water flooding acting independently or in combination. Coastal flooding is not a concern for SDCC as it is a landlocked county, however a combination of high flow in rivers and a high tide may prevent the river from discharging into the sea thus increasing water levels inland causing rivers to overtop their banks.

- Fluvial flooding occurs when a river overtops its banks due to a blockage in the channel or the channel capacity is exceeded.
- Pluvial flooding occurs when overland flow cannot infiltrate into the ground, when drainage systems exceed their capacity or are blocked and when the water cannot discharge due to a high water level in the receiving watercourse.
- Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it.

2.4 Flood Risks

Guidelines state flood risk is a combination of the likelihood of flooding and the potential consequences arising. Flood risk is expressed as:

Flood risk = Likelihood of flooding x Consequences of flooding

The Guidelines define the likelihood of flooding as the percentage probability of a flood of a given magnitude as occurring or being exceeded in any given year. A 1% probability indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year. **Table 1.0** shows flood event probabilities used in flood risk management.

Annual Exceedance Probability (%)	Return Period (Years)
50	2
10	10
1	100
0.1	1000

Table 1.0 - Flood Event Probabilities

The consequences of flooding depend on the hazards associated with the flooding (e.g. depth of water, speed of flow, rate of onset, duration, wave action effects, water quality), and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the population, the type of development, presence and reliability of mitigation measures etc.).

2.5 Flood Zones

The Guidelines recommend identifying flood zones which show the extent of flooding for a range flood event probabilities. The Guidelines identify three levels of flood zones:

- **Flood Zone A** - where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).

- **Flood Zone B** - where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
- **Flood Zone C** - where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

The flood zones are generated without the inclusion of climate change factors. The flood zones only account for inland and coastal flooding. They should not be used to suggest that any areas are free from flood risk as they do not account for potential flooding from pluvial and groundwater flooding. Similarly, flood defences should be ignored in determining flood zones as defended areas still carry a residual risk of flooding from overtopping, failure of the defences and deterioration due to lack of maintenance.

2.6 Climate Change

Climate Change is expected to increase flood risk. It could lead to more frequent flooding and increase the depth and extent of flooding. Due to the uncertainty surrounding the potential effects of climate change a precautionary approach is recommended in the Guidelines:

- Recognise that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopt a cautious approach to zoning land in these potential transitional areas.
- Ensure that the levels of structures designed to protect against flooding, such as flood defences, land-raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect.
- Ensure that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.

2.7 Sequential Approach

The Guidelines recommend using a sequential approach to planning to ensure the core objectives are implemented. Development should be avoided in areas at risk of flooding, where this is not possible, a land use that is less vulnerable to flooding should be considered. If the proposed land use cannot be avoided or substituted a Justification Test must be applied and appropriate sustainable flood risk management proposals should be incorporated into the development proposal. **Figure 3** shows the sequential approach principles in flood risk management. **Table 2.0 and Table 3.0** outline recommendations from the Guidelines for the types of development that would be appropriate to each flood zone and those that would be required to meet the Justification Test.

Figure 3 - Sequential Approach Principles in Flood Risk Management

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water compatible development	Appropriate	Appropriate	Appropriate

Table 2.0 - Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

The Justification Test is used to assess the appropriateness of developments in flood risk areas. The test is comprised of two processes. The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding. The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Vulnerability Class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	• Garda, ambulance and fire stations and command centres required to be operational during flooding; • Hospitals; • Emergency access and egress points; • Schools; • Dwelling houses, student halls of residence and hostels; • Residential institutions such as residential care homes, children's homes and social services homes; • Caravans and mobile home parks; • Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and • Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	• Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; • Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; • Land and buildings used for agriculture and forestry • Waste treatment (except landfill and hazardous waste); • Mineral working and processing; and • Local transport infrastructure.
Water-compatible development	• Flood control infrastructure; • Docks, marinas and wharves; • Navigation facilities; • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; • Water-based recreation and tourism (excluding sleeping accommodation); • Lifeguard and coastguard stations; • Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and • Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merit	

Table 3.0 - Classification of vulnerability of different types of development

3 Flood Risk Identification

3.1 Flood Risk Identification

The purpose of the Stage 1 – Flood Risk Identification is to identify whether there may be any flooding or surface water management issues related to the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway development site that may warrant further investigation at the appropriate lower level plan or planning application levels. If there is a potential flood risk issue then, in accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities (DOEHLG 2009)', the flood risk assessment procedure should move to 'Stage 2 – Initial flood risk assessment'. If no potential flood risk is identified during Stage 1 then the overall flood risk assessment can be concluded. The following information and data was collated as part of the screening assessment for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (northern towpath only).

As mentioned in section 1.1 the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway development site is located along the northern tow path of the Grand Canal within the townlands of Ballymakaily, Gollierstown, Coolscuddan, Brownstown, Mullauns, Loughtown Lower, Stacammy Cottage, Balscott and Hazelhatch respectively. The site is bounded to the south by the Grand Canal itself and to the north it is bounded by existing farmlands. The proposed lands are currently under the ownership and operation of Waterways Ireland and is predominately used for leisure purposes.

The general topography of the existing northern tow path is predominately flat but does rise on both approach ramps that provide access to the existing Gollierstown Bridge that ultimately affords access to the southern Grand Canal tow path and the existing farmlands lands located north and south of the proposed scheme.

3.2 Hydrology of the Surrounding Area

Contained within the existing Milltown lands attributed to the proposed scheme is an existing spring located just north east of the existing Peamount reservoir site. Groundwater surging up through this spring has been identified as the commencement of the Lucan (Tobermaclugg) stream. This stream then continues in a northerly direction towards and under the existing Grand Canal (Chainage 3+750) and the existing Cork to Dublin Railway line.

Located to the west is the existing Shinkeen River, to the North is the existing Conneyburrow stream and to the extreme east is the existing Griffeen River, none of which are deemed to pose a direct threat with regards to fluvial flooding.

For further details with regards to the location of each of the aforementioned streams/rivers, please see **Figure 4** below which has been extracted from Environmental Protection Agency (EPA) Map Viewer website.

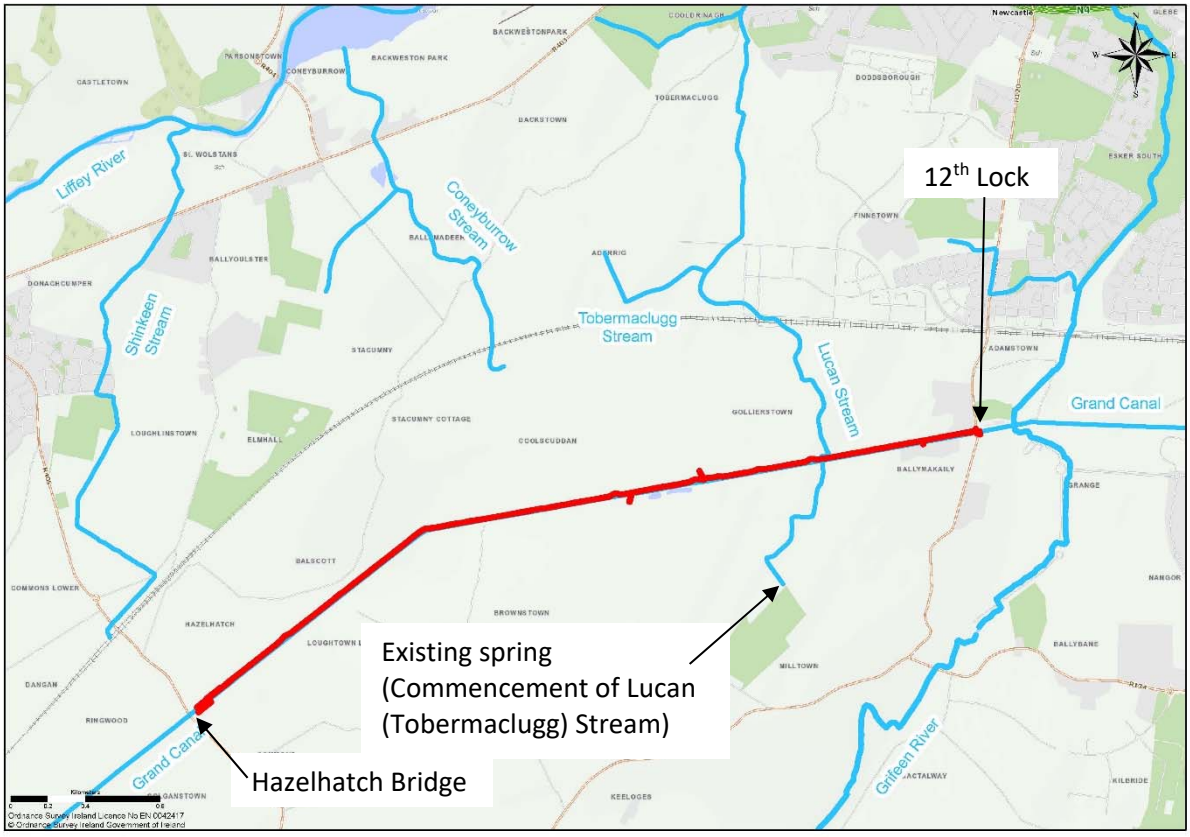


Figure 4 - Existing watercourses that fall within close proximity of the proposed lands (EPA Map Viewer)

3.3 OPW Flood Maps

The examination of recorded flood events as detailed on OPW's www.floodmaps.ie interactive mapping website displays one prominent recorded flood event which occurred to the west of the Griffeen catchment. The Griffeen catchment ultimately drains to the Liffey via a series of watercourses and small streams flowing northwards through Kildare in the Newcastle/Hazelhatch area which, in November 2000, a flooding event occurred. A flooding response squad was ultimately engaged in the

cleaning of river and culvert screens to facilitate flows, the filling and distribution of sandbags to protect vulnerable areas and the freeing of blockages throughout the system that were caused by debris attributed to this November 2000 flood event.

With regards to the 2005 Peamount Road flood event and the R134/R120 Junction Flood event, this was deemed to be insignificant as it is not considered to be in close proximity of the proposed Grand Canal northern tow path site. For further details, please see **Figure 5** displayed below. Furthermore, please find South Dublin County Report on Flooding 5th & 6th Nov 2000 located in **Appendix B** of this report.

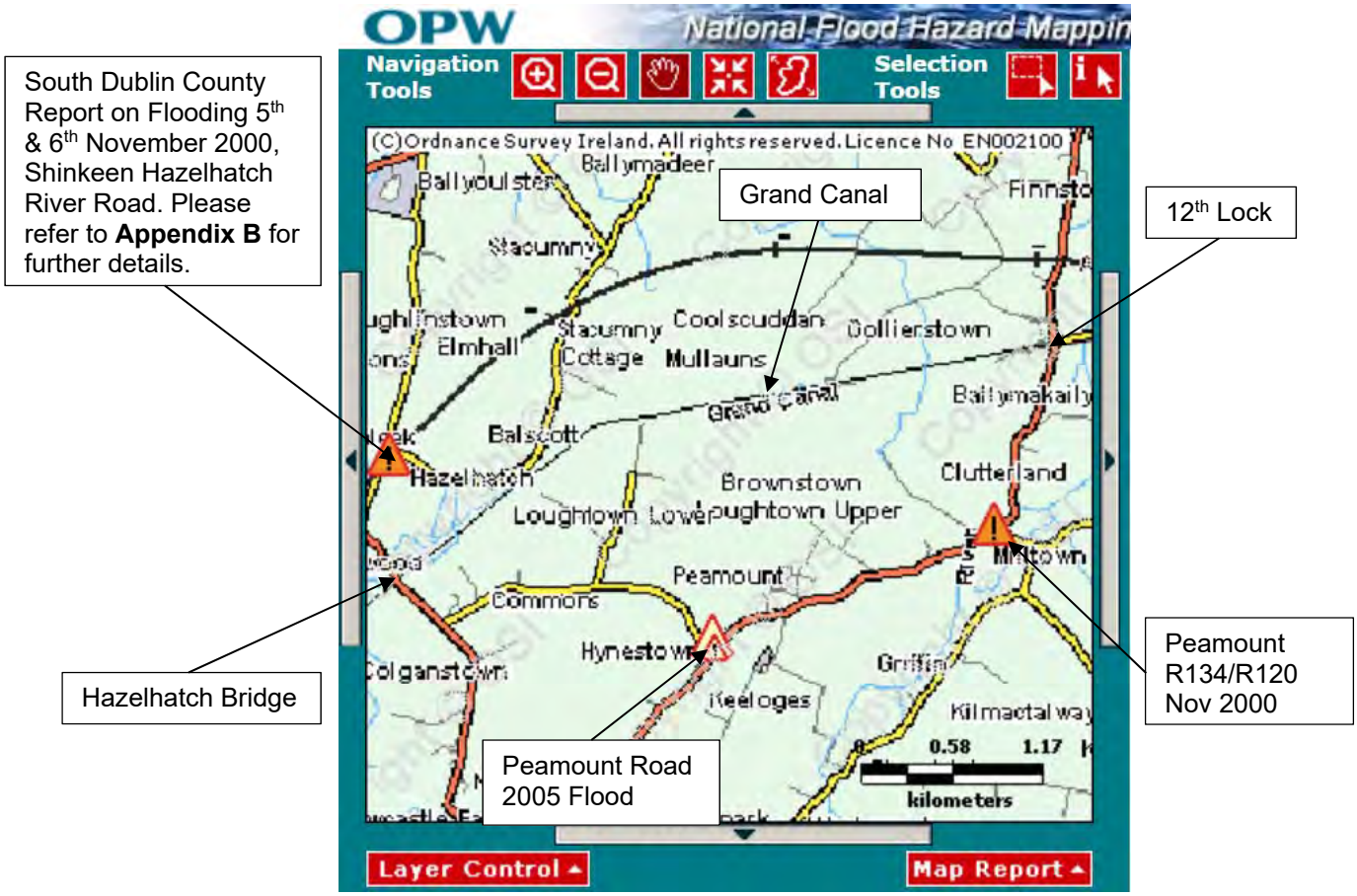


Figure 5 - National Flood Hazard Mapping (OPW)

3.4 Geology, Water and Hydrology

Geological and Hydrological Information obtained from the Geological Survey of Ireland (GSI) are attached in **Appendix C** of this report.

The GSI Bedrock 100K Solid Geology for the proposed lands is found to be Lucan Formation (Dark Limestone & Shale - Formation ranges from 300m to 800m in Thickness).

The National Draft Bedrock Aquifer identified within the proposed lands footprint has been described as a 'Locally Important Aquifer - Bedrock which is moderately productive only in local zones.

The geological society of Ireland (GSI) maintain a database of ground investigation works undertaken and keep records of borehole and trial pit data. It was found that no boreholes or trial pit testing have been undertaken to date within the proposed lands.

As deemed necessary, a full Ground Investigation contract should be procured in the future to establish existing ground conditions attributed to the proposed lands.

3.5 Hydrometric Gauging Stations

CSEA have reviewed the hydrometric information available from the OPW/EPA in proximity to the proposed lands site. It has been determined that there was no data available that would have been of any major benefit to this study.

3.6 OSI Historical Mapping

The 6" (1837 – 1842) and the 25" (1888 – 1913) historical maps have been examined (See Figures 5 and 6). Historical mapping is often a very useful source of information for assessing the flood history of an area. There is no indication of historical flooding of the proposed Grand Canal Greenway site upon review of both (**Figures 6** & **7** below) OSI Historical Maps.

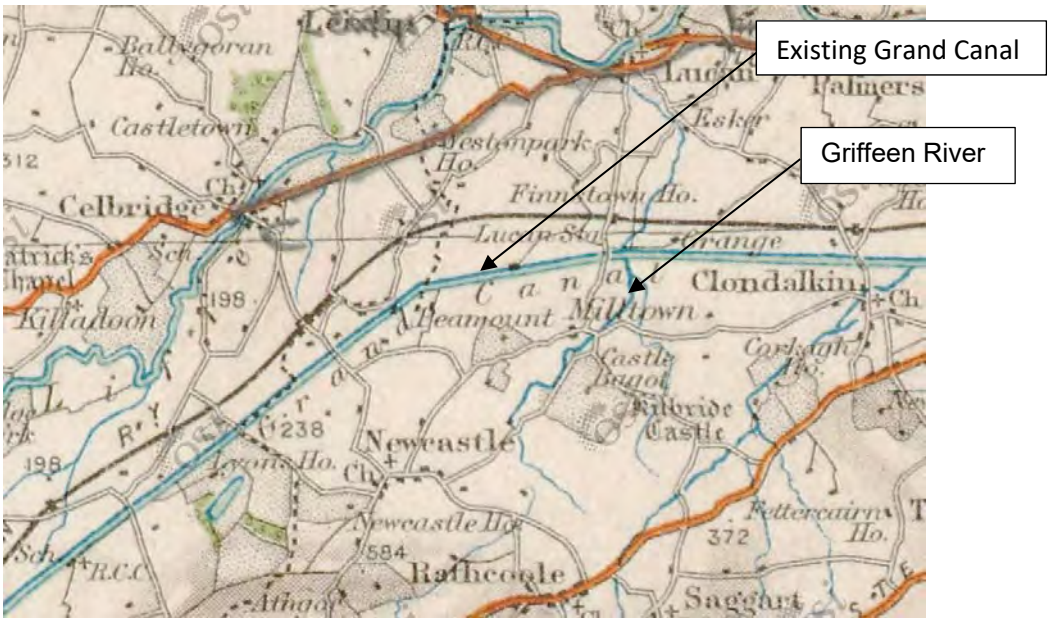


Figure 6 - 25" Historical Mapping (Myplan.ie)

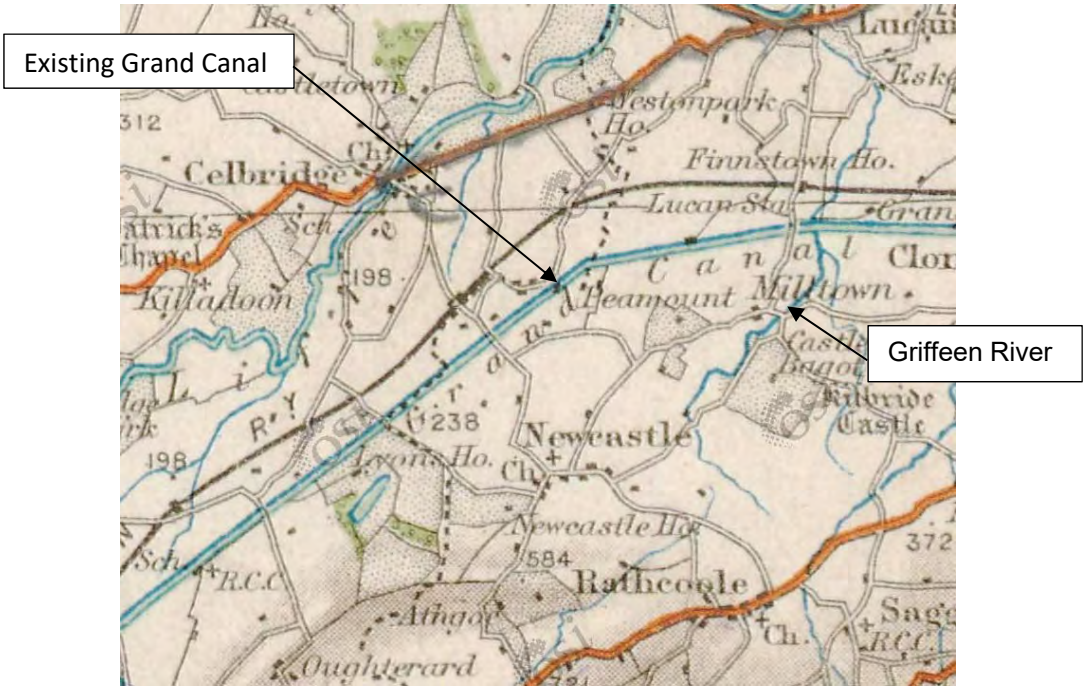


Figure 7 - 6" Historical Mapping (Myplan.ie)

3.7 Walkover Survey

On the 15th May 2018 Clifton Scannell Emerson Associates visited the proposed lands to establish any potential sources of flooding, likely routes of flood waters and the sites key features. The following items was established on site:

- The site (Hazelhatch Bridge to 12th Lock) is predominately flat with the exception of the approach and departure ramps at Gollierstown Bridge.
- The northern and southern towpaths located within the Hazelhatch Bridge to 12th Lock Grand Canal footprint sit generously higher with respect to their outermost grass verges which house several species of vegetation, trees and plants.
- Several quarry ponds were observed at the existing Biodiversity Areas located directly west and adjacent to Gollierstown Bridge
- Dry weather conditions experienced during site walkover.
- CSEA site representatives observed no potential flood risks to the proposed Hazelhatch to 12th Lock Grand Canal Greenway taking account of both the existing northern and southern towpath (where accessible) during the walkover survey.

3.8 Initial Estimates of Flood Zone and Flood Risk

3.8.1 Indicative Flood Zone Maps

It has been determined that the Lucan (Tobermaclugg) stream is located in close proximity of the scheme which is essentially conveyed through an existing aqueduct that traverses under the proposed Hazelhatch to 12th Lock Grand Canal Greenway (northern towpath only) footprint at chainage 3+750m. An extract of the fluvial flood extent maps from the 'Lucan to Chapelizod' Area is shown in **Figure 8**, the full map can be reviewed in **Appendix D** of this report. Upon inspection of the fluvial 'Lucan to Chapelizod' flood extent map, it is suggested that the Tobermaclugg stream is not susceptible to flooding for the 10% (1 in 10), 1% (1 in 100) or 0.1% (1 in 1000) fluvial AEP events.

With regards to the node ID labels displayed below, the following two and most notable (nodes 09TOWN00392 & 09TOWN00442 represents the closest available water level data attributed to the proposed scheme) information has been yielded from said fluvial 'Lucan to Chapelizod' flood extent map which is tabulated below as follows;

Node Label	Water Level (10% AEP)	Flow (m3/s) 10% AEP	Water Level (1% AEP)	Flow (m3/s) 1% AEP	Water Level (0.1% AEP)	Flow (m3/s) 0.1% AEP
09TOWN00392	64.19	N/A	66.87	N/A	67.00	N/A
09TOWN00442	66.76	N/A	66.87	0.02	67.00	N/A

With regards to the existing topography (at crossing location) attributed to the proposed Grand Canal Greenway Northern towpath site, it has been determined that in the event that a 1 in 100 or 1 in 1000 year event was to occur, that the existing Tobermaclugg stream channel (including aqueduct - Chainage 3+750), as displayed in **Figure 8** below, would be capable of conveying and containing raised water levels yielded from either storm event materialising presently and/or into the future.

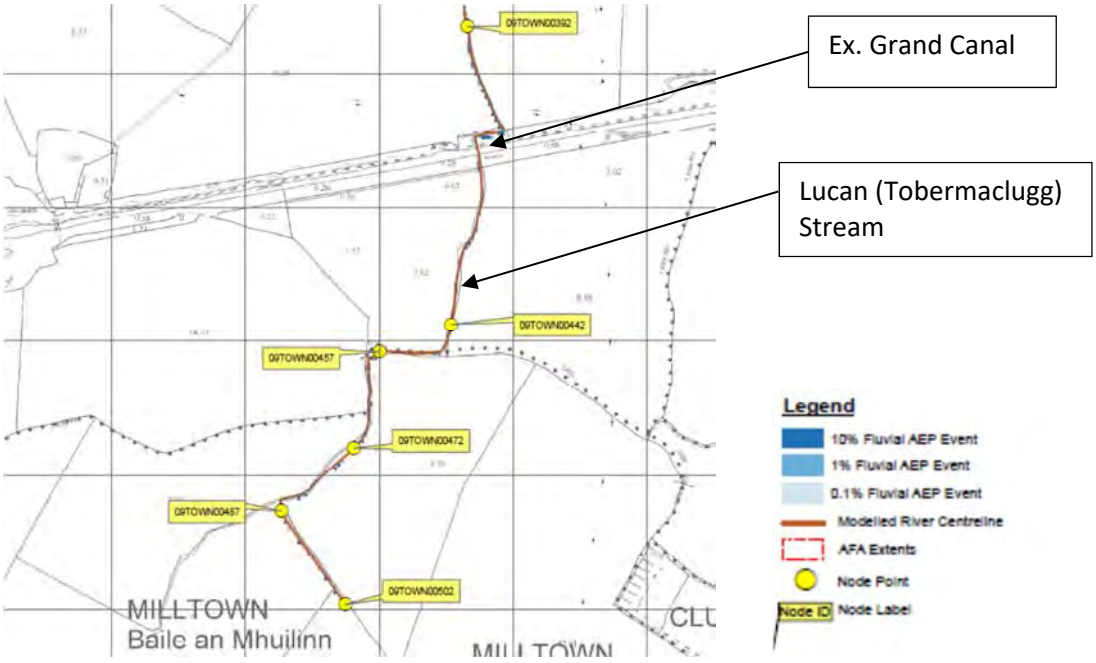


Figure 8 Extract from 'Lucan to Chapelizod' CFRAM maps of portion of Grand Canal Greenway (northern towpath only) site

Upon inspection of the fluvial 'Hazelhatch' flood extent map (see **Appendix D** for further information), and with regards to the node ID labels displayed below, the following and most notable (node 09BALS00109J represents the closest available water level data attributed to the proposed scheme - Chainage 0+495m) information has been yielded from said fluvial 'Hazelhatch flood extent map which is tabulated below as follows;

Node Label	Water Level (10% AEP)	Flow (m3/s) 10% AEP	Water Level (1% AEP)	Flow (m3/s) 1% AEP	Water Level (0.1% AEP)	Flow (m3/s) 0.1% AEP
09BALS00109J	62.38	N/A	62.78	N/A	63.22	N/A

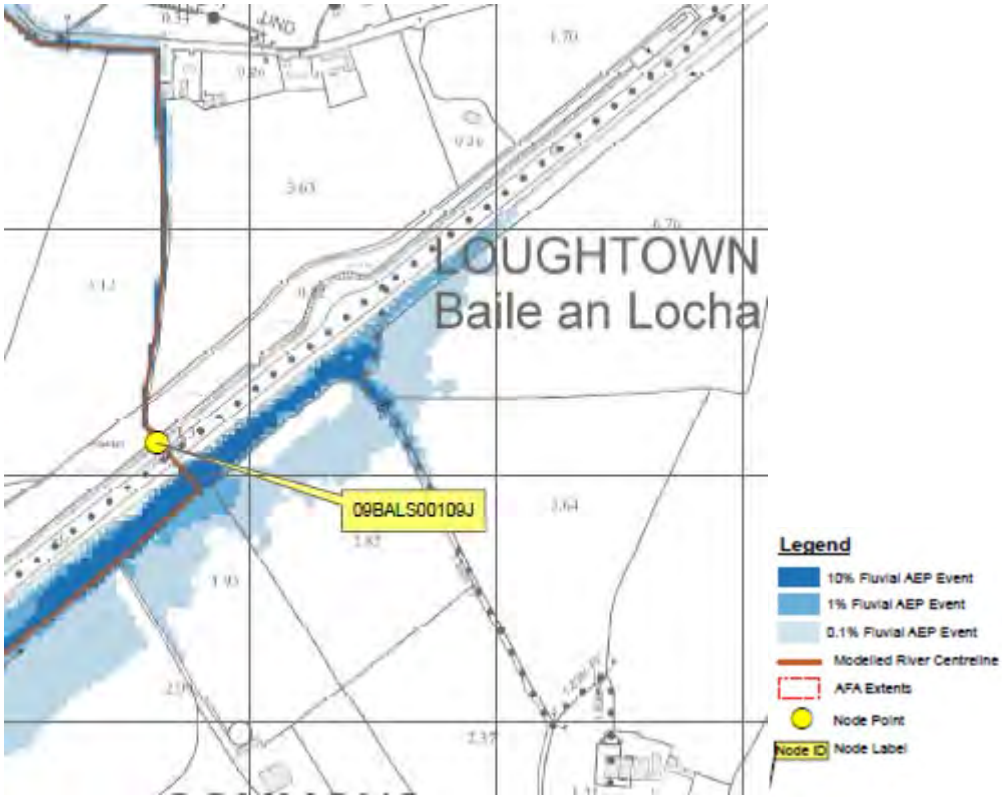


Figure 9 Extract from 'Hazelhatch' CFRAM maps of portion of Grand Canal Greenway (northern towpath only) site

With regards to the existing topography (crossing location at chainage 0+495m) attributed to the proposed Grand Canal Greenway Northern towpath site, it has been determined that in the event that a 1 in 100 or 1 in 1000 year event was to occur, that the existing stream (assumed tributary of the Shinkeen Stream) channel (including aqueduct), as displayed in **Figure 9** above, would be capable of conveying and containing raised water levels yielded from either storm event materialising presently and/or into the future. As displayed in **Figure 9** above, the potential for a 10% and 1% Fluvial AEP event predominately focuses on the southern extents of the existing Grand Canal and will have no adverse effect on the Northern towpath which is proposed to receive the proposed scheme.

Further inspections were undertaken based around RPS's Fluvial Flood Zone Mapping that was incorporated within SDCC's Strategic Flood Risk Assessment adopted within South Dublin's County

Development Plan 2016-2022. Information yielded from the above referenced RPS flood zone mapping ultimately places the existing Tobermaclugg stream and the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme outside flood Zones A & B. For further details, please refer to **Appendix E** with regards to RPS Fluvial Flood Zone mapping drawing.

An initial assessment of the flood risk for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway scheme and catchment area is made with reference to existing published information provided by the Office of Public Works (OPW). This data is comprised of (I) Preliminary flood risk assessment mapping (PFRA) and (ii) records of historical flood events in the environs and the periphery elements of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme

The PFRA mapping (See **Appendix F**) is based on broad scale simple analysis and cannot be deemed accurate for any specific location. A review of Map 237 for the site environs shows that there is little or no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subjected to flooding for the 1% annual exceedance potential (AEP) event (1 in 100 year return period).

When assessing and reviewing the OPW CFRAM (Catchment Flood Risk Management Assessment and Management) Fluvial Flood Extent Maps (see **Appendix D**) for Baldonnel, Lucan to Chapelizod and Hazelhatch maps for the 0.1% AEP event (1 in 1000), 1% AEP Event (1 in 100) and 10% AEP event (1 in 10), it was apparent that there is no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subject to flooding.

When assessing and reviewing the OPW CFRAM Fluvial AEP Flood Depth Maps (see **Appendix G**) for Baldonnel, Lucan to Chapelizod and Hazelhatch maps for the 0.1% AEP event (1 in 1000), 1% AEP Event (1 in 100) and 10% AEP event (1 in 10), again it has been assessed that there is no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subject to flooding.

Upon review of the OPW 'Fluvial Risk to the Environment' (see **Appendix H)** for Baldonnel, Lucan to Chapelizod and Hazelhatch maps, it has been assessed that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint contains no risk to it surrounding environs.

It has also been established that no tidal/coastal flood maps were generated for the site study area under consideration and therefore no further information was available to be assessed and included in this report.

3.8.2 Flood Zone

In this Strategic Flood Risk Assessment the precautionary principals advocated in The Planning System and Flood Risk Management Guidelines was followed. There is no further evidence to suggest that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint has flooded in the past. Furthermore, the indicative Lucan to Chapelizod, Hazelhatch and Baldonnell PFRA and CFRAM maps and the SFRA for South Dublin County Development Plan 2016 to 2022 places the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint outside both Flood Zone A (i.e. an area likely to suffer flooding in a 1 in 100 year fluvial event) and Flood Zone B (i.e. an area likely to suffer flooding in a 1 in 1000 year fluvial event).

Therefore CSEA have concluded that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint is located outside both Flood Zone A (i.e. an area likely to suffer flooding in a 1 in 100 year fluvial event) and Flood Zone B (i.e. an area likely to suffer flooding in a 1 in 1000 year fluvial event).

4 Initial Flood Risk Assessment

4.1 Source of Flooding

When carrying out a Strategic Flood Risk Assessment one should consider all the potential flood risks and sources of flood water at the site. In general the relevant flood sources are:

i. **Fluvial:**
Fluvial Flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain. A flood risk in the vicinity of proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme from fluvial sources does exist.

ii. **Pluvial:**
Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall. Flood risk from pluvial sources is not thought to be significant at this site due to the topography of the site and the existing drainage characteristics of the subsoil.

iii. **Coastal:**
Coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land. It is not thought that there is a significant risk of coastal flooding with respect to the location of the proposed site.

4.2 Flood Zone

With reference to Section 3.8.2 of this report, it has been determined that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint is located outside Flood Zones A & B. On this basis, CSEA have taken no further action with regards to justification test attributed to the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme.

4.3 Vulnerability

Table 3.1 of the Planning System and Flood Risk Management Guidelines for Planning Authorities gives a detailed classification of vulnerability of different types of development.

This Strategic Flood Risk Assessment has been prepared based on the land use of proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme to be classified as 'Amenity Open Space, outdoor sports and recreation' i.e. 'Water Compatible development' Zone C category. Based on Table 3.2 identified within The Planning System and Flood Risk Management Guidelines, a justification test is therefore not required to be undertaken for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme site.

4.4 Potential Impact on Flooding Elsewhere

Upon assessing the PFRA maps, OPW CFRAM maps, the Strategic Flood Risk Assessment for SDCC Development Plan 2016 to 2022 and OPW Interactive flood maps for the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint, it is CSEA's opinion that there is little or no evidence to suggest that there is any risk of flooding for both a 1 in 100 and a 1 in 1000 fluvial event.

Furthermore and due to the fact that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint falls outside flood zones A and B respectively, it is

CSEA's opinion that any potential flooding to lands outside the footprint of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme will not be adversely affected if and when the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme is constructed and brought into full service.

Through detailed design, the introduction of sustainable drainage systems, flood risk management and proper planning procedures, any potential flood risks to lands/properties located outside the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint will ultimately be avoided.

4.5 Flood Risk Management

Flood risk management under the EU Floods Directive aims to minimise the risks arising from flooding to people, property and the environment. Minimising risk can be achieved through structural measures that block, restrict or divert the pathways of floodwaters, such as river defences or non-structural measures that are often aimed at reducing the vulnerability of people and communities such as flood warning, effective flood emergency response, or resilience measures for communities or individual properties.

With regards to the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme, it is not anticipated that any of the above referenced measures will need to be introduced to minimise flood risks to any of the existing lands or properties that currently fall within the catchment area of the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint.

5 Conclusion

The proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint has been assessed for a flood risk using all available sources of information as summarised in the following paragraphs.

Inspections were undertaken based around RPS's Fluvial Flood Zone Mapping that was incorporated within SDCC's Strategic Flood Risk Assessment adopted within South Dublin's County Development Plan 2016 -2022. Information yielded from the above referenced RPS flood zone mapping ultimately places the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint outside flood Zones A & B.

The PFRA mapping shows that there is little or no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subjected to flooding for the 1% annual exceedance potential (AEP) event (1 in 100 year return period).

When assessing and reviewing the OPW CFRAM (Catchment Flood Risk Management Assessment and Management) Fluvial Flood Extent Maps for Baldonnel, Lucan to Chapelizod and Hazelhatch maps for the 0.1% AEP event (1 in 1000), 1% AEP Event (1 in 100) and 10% AEP event (1 in 10), it was noted that there is no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subject to flooding.

When assessing and reviewing the OPW CFRAM Fluvial AEP Flood Depth Maps for Baldonnel, Lucan to Chapelizod and Hazelhatch maps for the 0.1% AEP event (1 in 1000), 1% AEP Event (1 in 100) and 10% AEP event (1 in 10), again it has been assessed that there is no risk that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint would be subject to flooding.

There is no further evidence to suggest that the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint have flooded in the past. Furthermore, the indicative Lucan to Chapelizod, Hazelhatch and Baldonnell PFRA & CFRAM maps and the SFRA for South Dublin County Development Plan 2016 to 2022 places the proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme footprint outside both Flood Zone A (i.e. an area likely to suffer flooding in a 1 in 100 year fluvial event) and Flood Zone B (i.e. an area likely to suffer flooding in a 1 in 1000 year fluvial event).

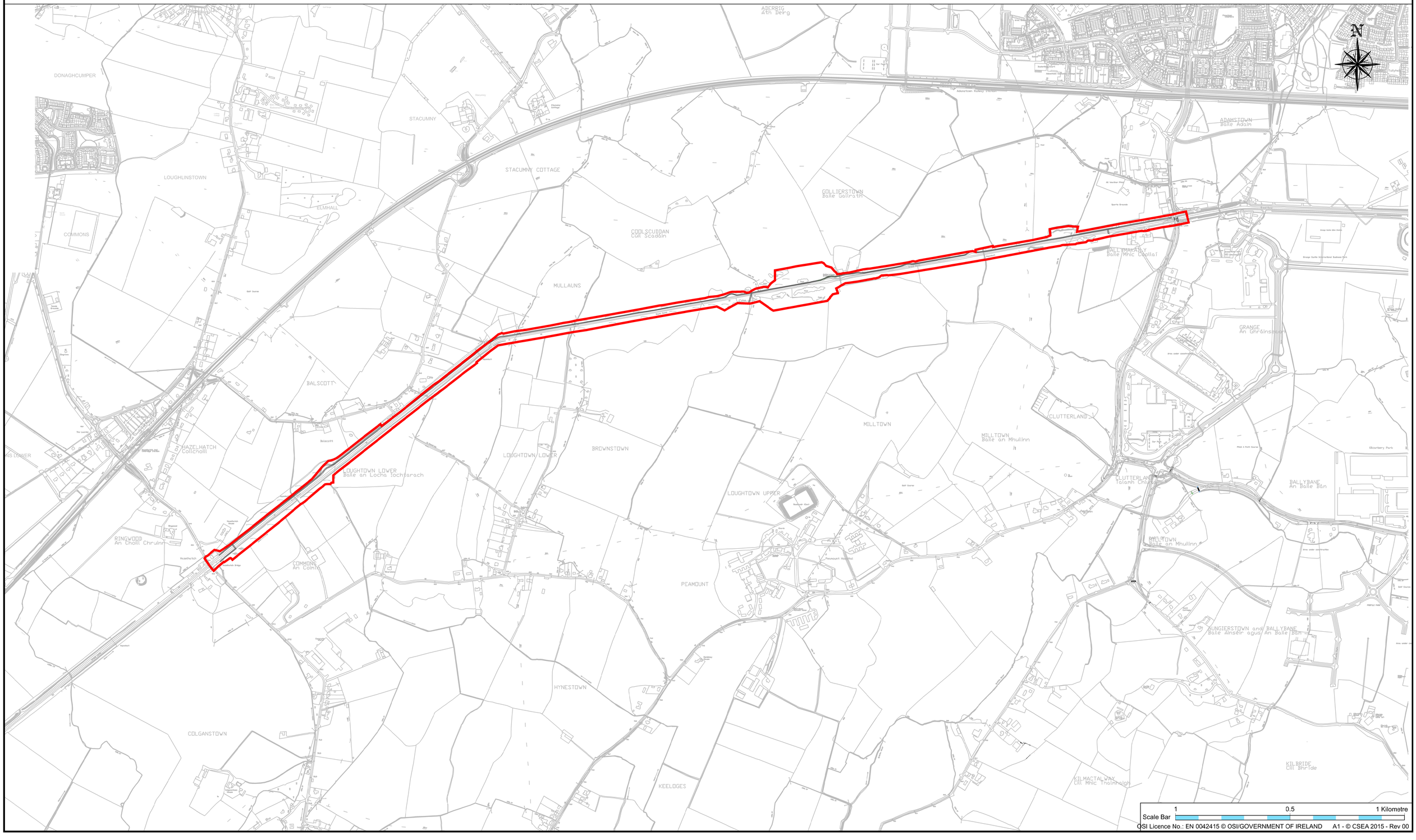
This Strategic Flood Risk Assessment has been prepared based on the land use of proposed Hazelhatch Bridge to 12th Lock Grand Canal Greenway (Northern towpath) scheme to be classified as 'Amenity Open Space, outdoor sports and recreation' i.e. 'Water Compatible development' Zone C category.

Appendix A - Site Location Map

Comhairle Contae
Átha Cliath Theas
South Dublin County Council

GRAND CANAL GREENWAY
HAZELHATCH BRIDGE TO 12th LOCK BRIDGE

Clifton Scannell Emerson Associates



Appendix B - SDCC Flooding Report

SOUTH DUBLIN COUNTY COUNCIL
COMHAIRLE CHONTAE ATHA CLIATH THEAS

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Lar an Bhaile, Tamhlacht
Baile Atha Cliath 24

Telefon: 01-4149000
Facs: 01-4149101

ENVIRONMENTAL SERVICES DEPARTMENT
P.O. Box 4122
Town Centre, Tallagh
Dublin 24

Telephone: 01-4149000
Fax: 01-4149101

South Dublin County Report on Flooding 5th & 6th November, 2000

Rainfall

- Rainfall varied across the County from the 76mm recorded at Baldonnell to 137mm recorded at Boharnabreena for the period 9.00a.m. Sunday to 9.00a.m. Monday.

Geography of South Dublin

- South Dublin County Council Administrative Area is divided into 3 main catchment areas, drained respectively by the Griffeen, Camac and Dodder Rivers.

- The most serious flooding events occurred in the Griffeen Catchment area. Drainage works carried out post '93, Camac Phase 1, effectively served to protect the Camac Catchment from serious flooding and thus protected urban areas downstream of Corkagh Park, in particular Clondalkin.

  Some flooding occurred in the Dodder Catchment at Dodder Park Road and Lower Dodder Road, also the Tallagh Stream, a tributary of the Dodder.

  To the west of the Griffeen Catchment some flooding occurred in areas that ultimately drain to the Liffey via a series of watercourses and small streams flowing northwards through Kildare in the Newcastle/Hazelhatch area.

Details of flooding

- Serious flooding occurred in the Griffeen Catchment particularly in 2 areas.

  To the north at its confluence with the Liffey, the Griffeen river caused considerable flooding in the old village of Lucan.

  The second area affected by serious flooding was in the Griffeen Valley just to the north of the Dublin Cork Railway line in the new housing areas of Old Forge and Grange Manor estates.

Chronology & Response

- South Dublin County Council received its first emergency call at 12.30p.m. on 5.11.00.

  Consequent on this call and following inspections by Supervisory personnel, Drainage Department work crews were mobilised at 2.00p.m. on the 5.11.00. Work crews from the Council's Roads, Cleansing and Housing sections subsequently joined in the emergency works. These squads remained on duty from 2.00p.m. 5.11.00 to 3.00a.m. on 6.11.00 and from 8.00a.m. on 6.11.00 to 1.00a.m. on 7.11.00 to deal with the various problems arising.

  On Sunday evening and Sunday night, squads were engaged in the cleaning or river and culvert screens to facilitate flows, filling, distribution of sandbags to protect vulnerable areas and freeing blockages throughout the system caused by debris.

During this period excavations were carried out to lower the bank of the Camac at Corkagh Park to allow the pitches to serve as attenuation ponds.

- Early on Monday morning (6.11.00) at approximately 4.00a.m., the Griffeen broke its banks at the northern extremity of Griffeen Valley Park (north of the N4) and flooded Lucan Village.

  Between 4.00a.m. and 7.00a.m. on Monday the Griffeen also flooded the estates of Old Forge and Grange Manor in the South Lucan Area.
  This flooding persisted throughout Monday and the Griffeen was only returned to its channel at approximately 8.00p.m. on Monday night.

Emergency Plan

- The extent of the storm and the flooding caused local emergency plans to be put into operation. There were considered adequate to deal with the situation which developed. It was not considered necessary to declare a major emergency in South Dublin due to the very specific and confined areas affected.

Road Closures
The only national route closed was the national secondary road N81 at Jobstown (11.00p.m. 5.11.00 – 4.00p.m. 6.11.00).

Regional and Local Roads closed included:

Adamstown Road at Lucan Village (4.00a.m. 6.11.2000 – 9.11.2000)
Lucan Ballowen Road (9.00a.m. – 4.00p.m. 6.11.2000)
New Link Road at Grange Manor (8.00a.m. – 8.00p.m. 6.11.2000)
Adamstown Road Flooded but passable.
Alymer Road (4.00a.m. – 8.00p.m. 6.11.2000)
Lucan Peamount (Polly Hops) (4.00a.m. – 8.00p.m. 6.11.2000)
College Lane (8.00a.m. – 8.00p.m. 6.11.00 – passable)
Hatch road flooded – passable
Belgard Road flooded – passable
Fortunestown Lane (8.00a.m. – 8.00p.m.)
Barnhill Road (Weirview Cottages) 4.00a.m. 6.11.2000 – 9.11.2000

Properties Flooded

Residential
12 houses at Avonmore Park (Nos. 7 – 18)
4 No. houses, Kiltipper Road, Tallaght (individually named)
25 No. houses, Old Forge Estate, Lucan
18 No. houses, Grange Manor Park/Drive, Lucan
House beside 'Griffeen Valley Nursing Home', Arthur Griffith Park, Lucan
House to rear of 'Courtneys Pub', Lucan Village
2 No. Bungalows Newcastle Village
2 No. Bungalows beside Newcastle Treatment Works
2 No. Houses, Knocklyon Avenue, Firhouse
3 No. Houses, Edmonstown Road (individually named)
15 No. Houses, Woodview Cottages, Rathfarnham
1 house beside Chemserve on Edmonstown Road

'Homeville' opposite Mount Carmel Park, Firhouse3 Houses at Hazelhatch

Total number of residential properties known to be flooded: 90.

Commercial
'Virtus Ltd' Haydens Lane, Lucan

All the following in Lucan Village:
Centra Supermarket
Village Oriental Food Stores
Spice Inn Chinese Fast
Creative Flowers
Irish Permanent
O'Neills Pub
Kennys Pub
Courtneys Pub
Bank of Ireland
Pat Toolan Bookmaker
Carrolls Butchers

Also:
Jobstown Inn, Jobstown, Tallaght
'Johns Takeaway' Walkinstown Roundabout
'Motorworld' Robinhood Industrial Estate and adjoining premises
Chemserve on Edmondstown Road
'Eurometals' Mill Road, Saggart

Total number of commercial known to be flooded: 17.

The above are the premises which have come to the attention of this South Dublin County Council to date.

Evacuations

- No large-scale evacuations were required. However in a number of limited cases South Dublin County Council personnel helped to evacuate houses, a particular example being an expectant mother in the Old Forge estate.
- These evacuations were from Private Residential houses.
- No alternative accommodation was either requested or provided.
- We do not consider that anyone is still evacuated due to the flooding.

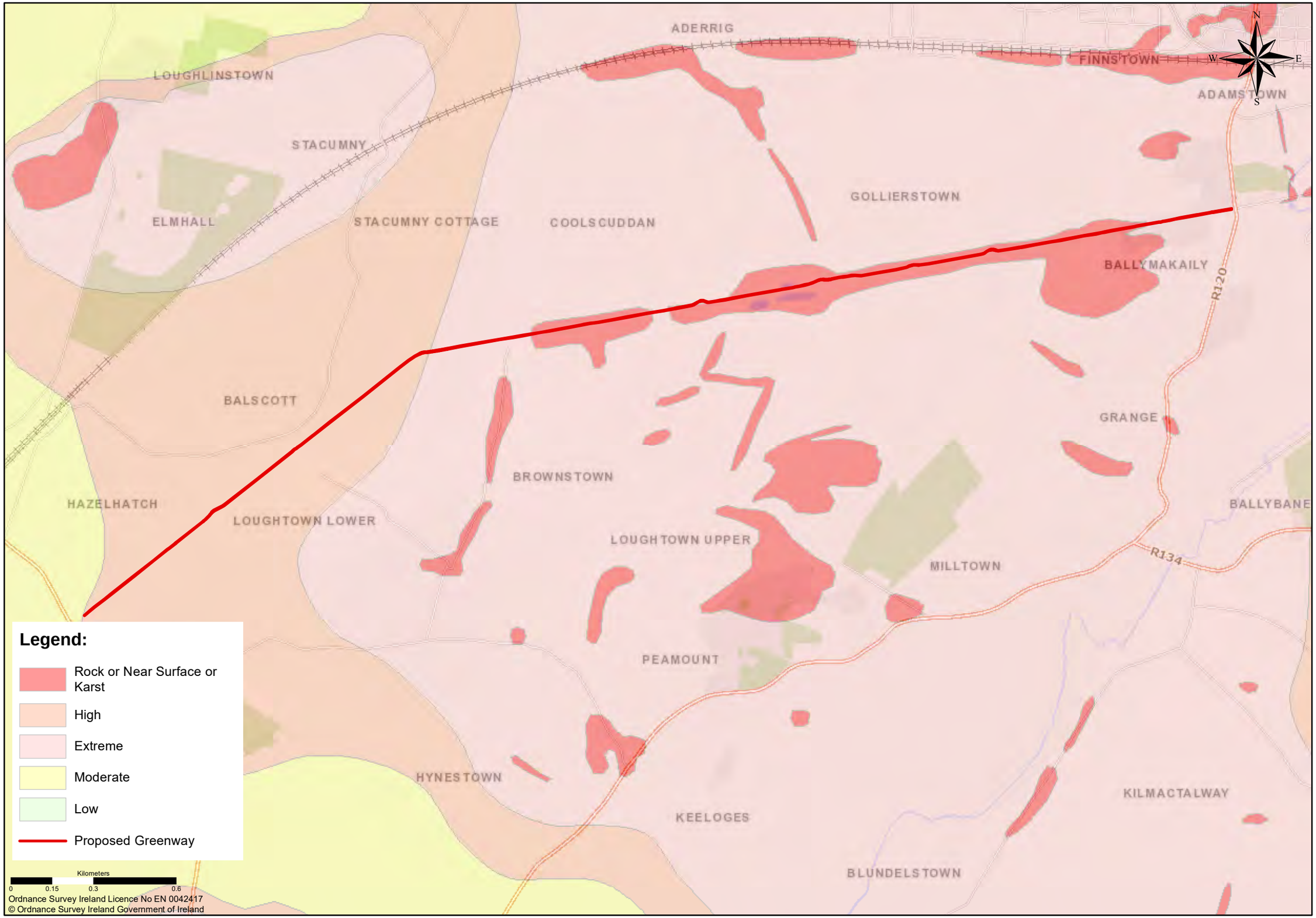
General

- No water treatment works were affected due to the flooding.
- Certain sewerage systems were affected by the flooding:

(a) The treatment Plant at Newcastle was submerged, preventing its operations for 24 hours.

(b) The Lucan Low Level Pumping Station on the Adamstown Road was flooded. As a result the pump motors were burnt out and need to be replaced. Alternative pumping arrangements will be in place by 10.11.00.

Appendix C - Geological & Hydrological Maps



Appendix D - CFRAM Fluvial Flood Extent Mapping

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09GRIF00557I	66.15	N/A	66.45	N/A	67.41	N/A
09GRIF00500E	64.09	N/A	64.33	N/A	65.03	N/A
09GRIF00442	62.56	N/A	62.76	N/A	63.42	N/A
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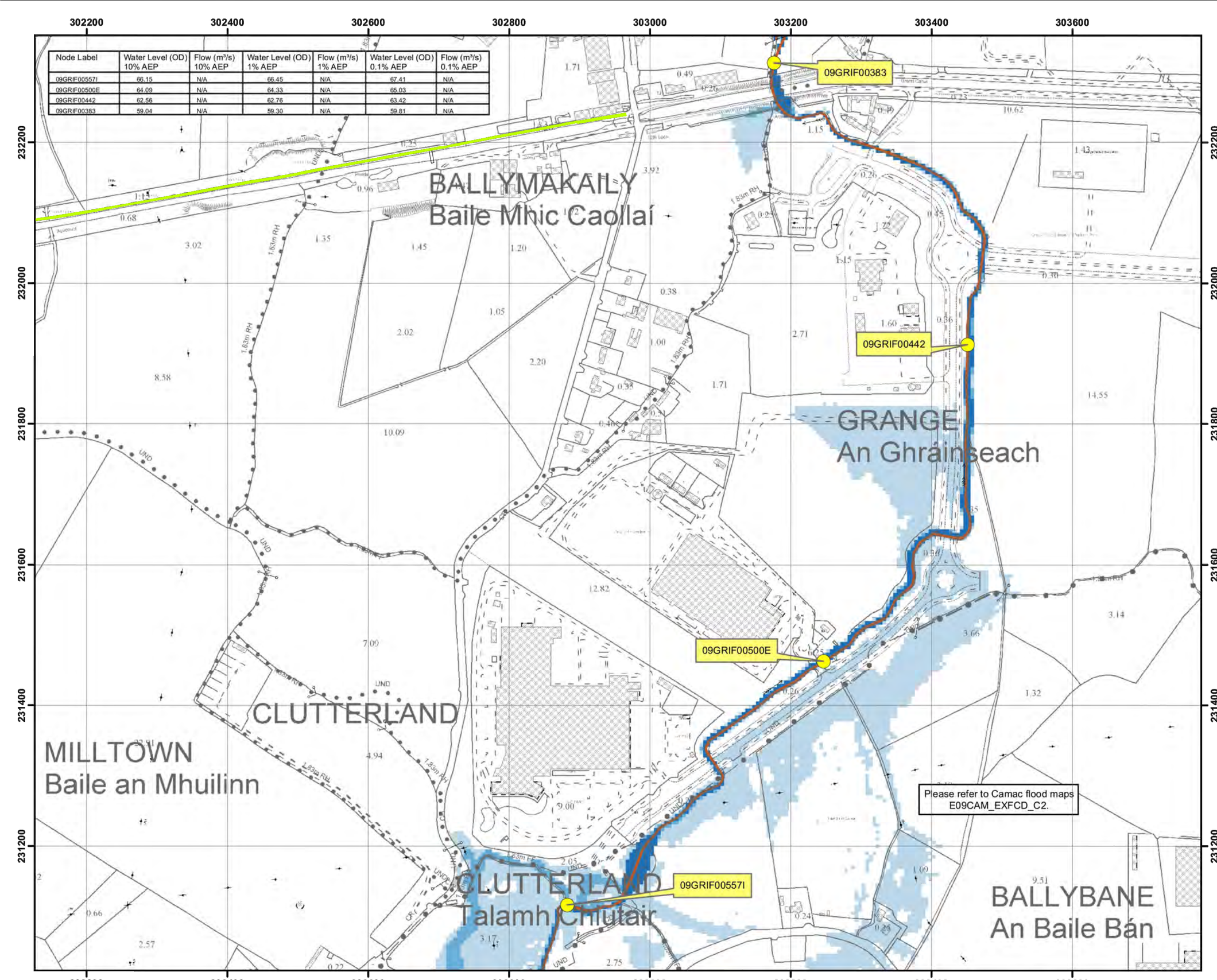

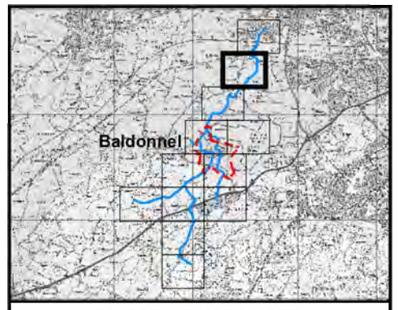

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label
- Proposed Greenway

0 50 100 200 300 400 500 Metres

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY

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Map:
Baldonnel Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : C.C.	Date : 21 July 2016
Checked By : D.I.	Date : 21 July 2016
Approved By : G.G.	Date : 21 July 2016
Drawing No. :	E09BAL_EXFCD_F0_10
Map Series :	Page 10 of 12
Drawing Scale :	1:5,000 @ A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
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09TOWN00487	71.53	N/A	71.61	N/A	71.69	N/A
09TOWN00472	69.85	N/A	69.95	N/A	70.06	N/A
09TOWN00457	68.40	N/A	68.48	N/A	68.58	N/A
09TOWN00442	66.76	N/A	66.87	N/A	67.00	N/A
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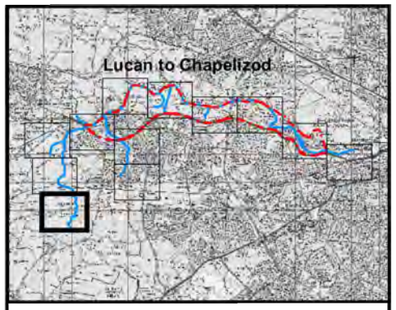

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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label
- Proposed Greenway

GOLLIERSTOWN
Baile Gallrath

MILLTOWN
Baile an Mhuilinn

09TOWN00392
09TOWN00442
09TOWN00457
09TOWN00472
09TOWN00487
09TOWN00502

301000 301200 301400 301600 301800 302000 302200 302400

232600 232400 232200 232000 231800 231600 231400

0 50 100 200 300 400 500 Metres

FINAL

REV:	NOTE:	DATE:

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Map:	Lucan to Chapelizod Fluvial Flood Extents
Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : C.C.	Date : 27 July 2016
Checked By : S.P.	Date : 27 July 2016
Approved By : G.G.	Date : 27 July 2016
Drawing No. :	E09LUC_EXFCD_F0_01
Map Series :	Page 1 of 12
Drawing Scale :	1:5,000 @ A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09BALS00109J	62.38	N/A	62.78	N/A	63.22	N/A

299000 299200 299400 299600 299800 300000 300200 300400 300600

232000 231800 231600 231400 231200 231000 230800

BALSCOTT

LOUGHTOWN LOWER
Baile an Locha Íochtarach

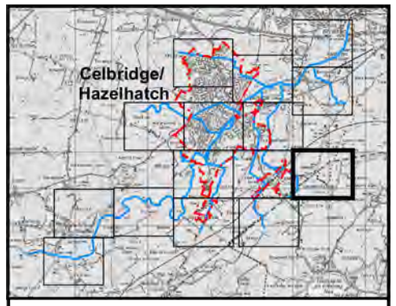
Na Mulláin

LOUGHTOWN LOWER
Baile an Locha Íochtarach

BROWNSTO
Baile an Bhr

09BALS00109J

0 50 100 200 300 400 500 Metres



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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:
01	Model update on Crippaun watercourse	15/05/2017

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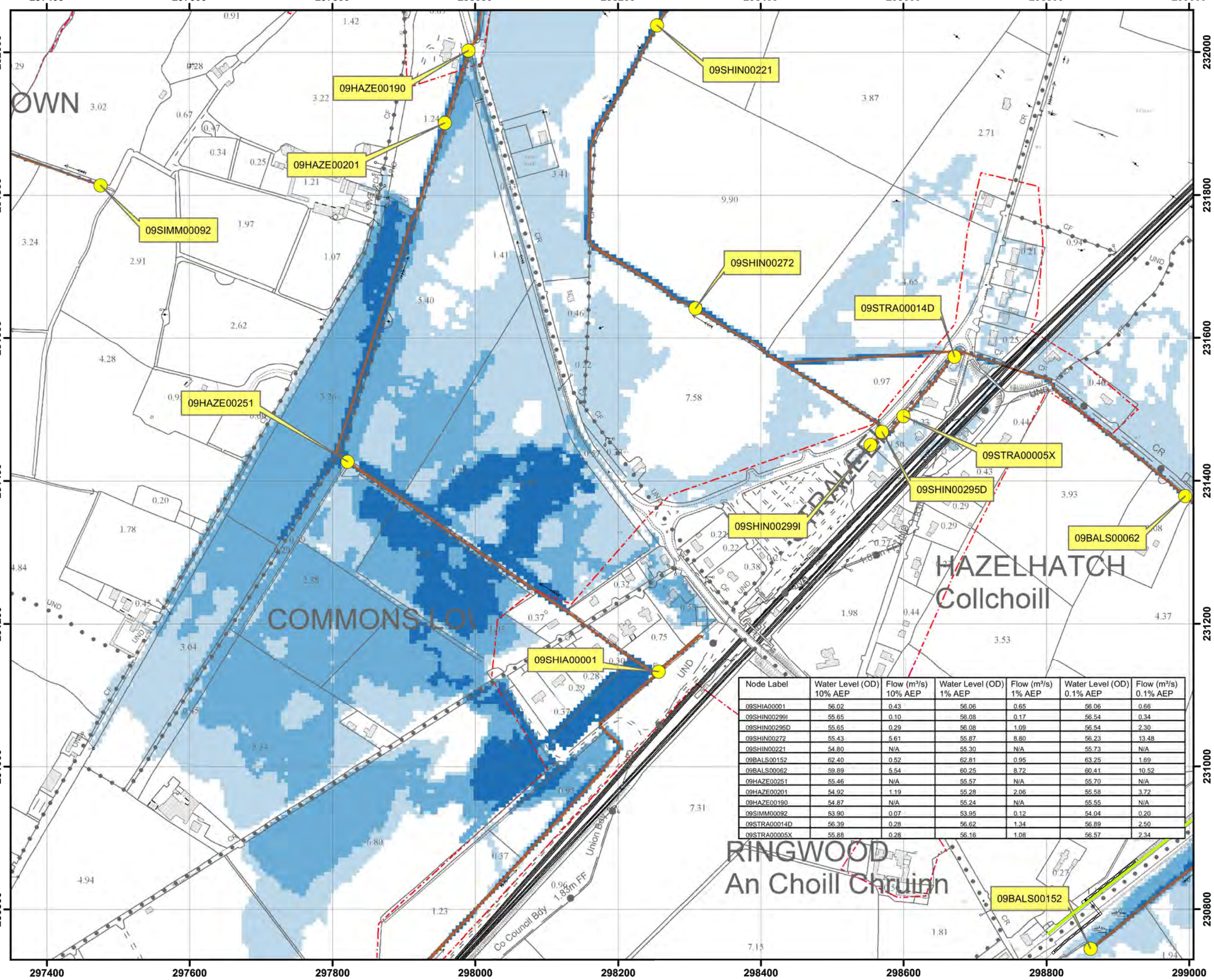
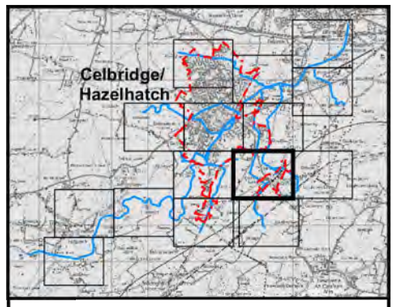
Map:
Hazelhatch Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : F.M.C.	Date : 19 May 2017
Checked By : S.P.	Date : 19 May 2017
Approved By : G.G.	Date : 19 May 2017
Drawing No. :	E09CEL_EXFCD_F1_13
Map Series :	Page 13 of 15
Drawing Scale : 1:5,000	@A3





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- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
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- Node ID Node Label
- Proposed Greenway

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09SHIA00001	56.02	0.43	56.06	0.65	56.06	0.66
09SHIN00299I	55.65	0.10	56.08	0.17	56.54	0.34
09SHIN00295D	55.65	0.29	56.08	1.09	56.54	2.30
09SHIN00272	55.43	5.61	55.87	8.80	56.23	13.48
09SHIN00221	54.80	N/A	55.30	N/A	55.73	N/A
09BALS00152	62.40	0.52	62.81	0.95	63.25	1.69
09BALS00062	59.89	5.54	60.25	8.72	60.41	10.52
09HAZE00251	55.46	N/A	55.57	N/A	55.70	N/A
09HAZE00201	54.92	1.19	55.28	2.06	55.58	3.72
09HAZE00190	54.87	N/A	55.24	N/A	55.55	N/A
09SIMM00092	53.90	0.07	53.95	0.12	54.04	0.20
09STRA00014D	56.39	0.28	56.62	1.34	56.89	2.50
09STRA00005X	55.88	0.28	56.16	1.08	56.57	2.34

FINAL

REV:	NOTE:	DATE:
01	Model update on Crippaun watercourse	15/05/2017

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Map:
Hazelhatch Fluvial Flood Extents

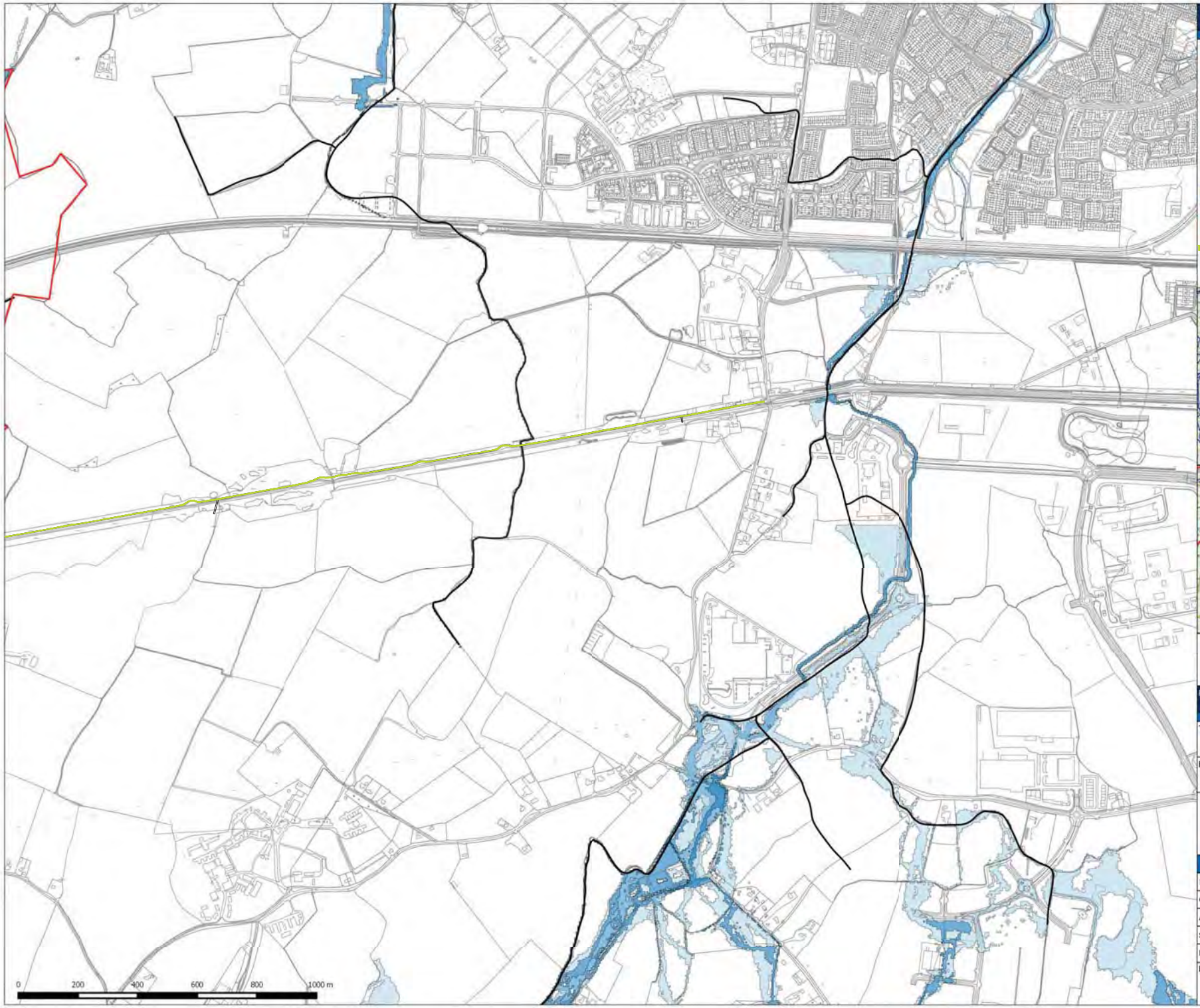
Map Type:	EXTENT	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	F.M.C.	Date : 19 May 2017
Checked By :	S.P.	Date : 19 May 2017
Approved By :	G.G.	Date : 19 May 2017

Drawing No. :
E09CEL_EXFCD_F1_14

Map Series : Page 14 of 15

Drawing Scale : 1:5,000 @A3

Appendix E - RPS SFRA Flood Zone Mapping



Legend

- Flood Zone A - 1% AEP Flood Extent (1 in 100 chance in any given year)
- Flood Zone B - 1% AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- Watercourse Centreline
- Indicative Flood Extents
- County Boundary
- Proposed Greenway

DRAFT

Comhairle Contae Átha Cliath Theas
South Dublin County Council

Project: Strategic Flood Risk Assessment

Title: Fluvial Flood Zone Mapping

Figure: MDW657_0004

RPS Consulting Engineers
West Pier Business Campus
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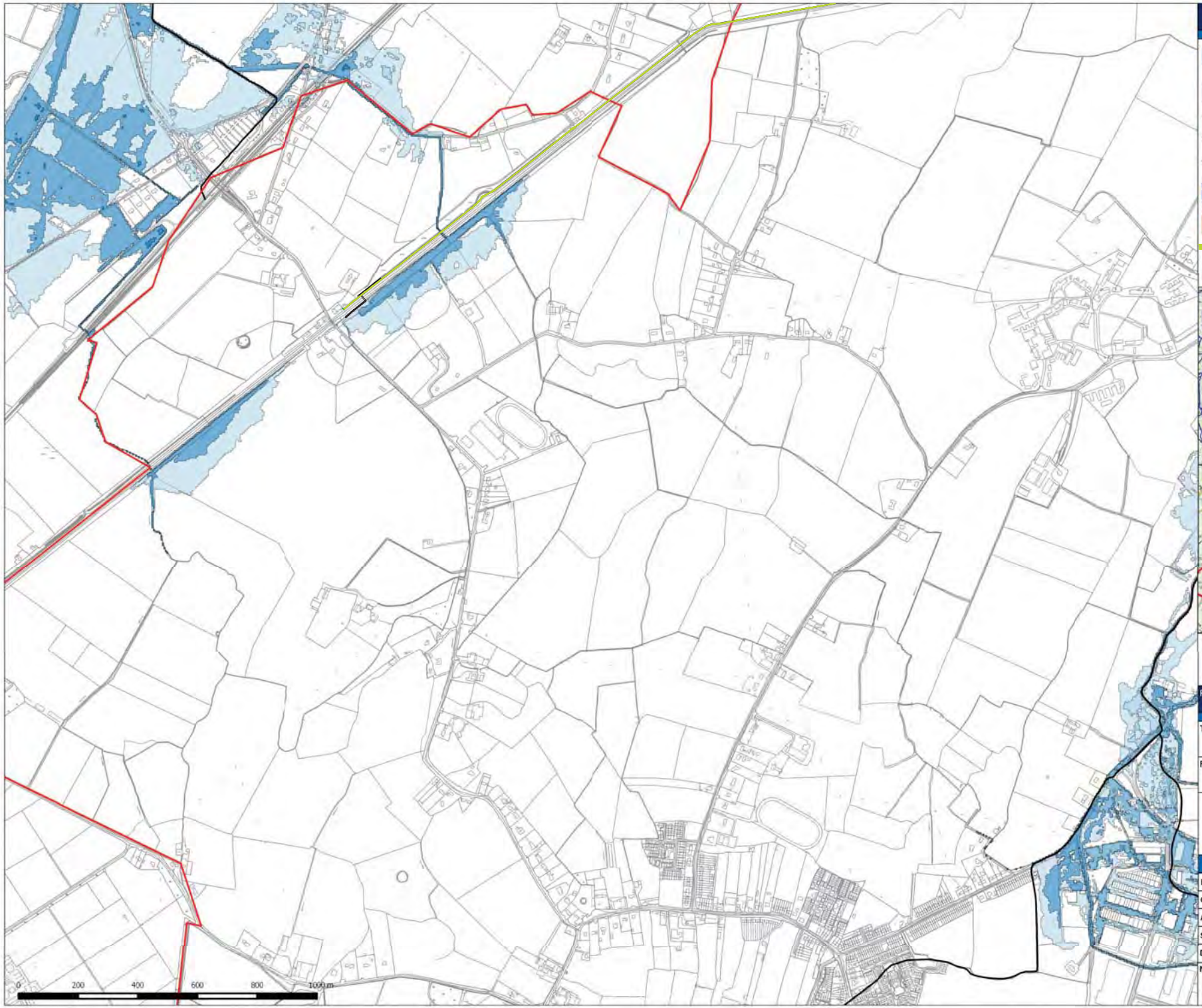
Fax: +353 1 462 0814

Issue Details

Drawn:	BT	Project No.	MDW0657
Checked:	JH	File Ref	MDW0657QG0010F02
Approved:	JH		
Scale:	1:6000 @ A1	Drawing No.	Projection
Date:	14/01/2016	4 of 26	IG

Notes
1. The viewer of this map should refer to the SFRA Report and Disclaimer



Legend

- Flood Zone A - 1% AEP Flood Extent (1 in 100 chance in any given year)
- Flood Zone B - 1% AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- Watercourse Centreline
- Indicative Flood Extents
- County Boundary
- Proposed Greenway

DRAFT

Comhairle Contae Átha Cliath Theas
South Dublin County Council

Project: Strategic Flood Risk Assessment

Title: Fluvial Flood Zone Mapping

Figure: MDW657_0007

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RPS Consulting Engineers
West Pier Business Campus
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Tel: +353 1 488 2900
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Issue Details

Drawn:	BT	Project No.	MDW0657
Checked:	JH	File Ref	MDW0657QG0010F02
Approved:	JH		
Scale:	1:6000 @ A1	Drawing No.	Projection
Date:	14/01/2016	7 of 26	IG

Notes
1. The viewer of this map should refer to the SFRA Report and Disclaimer

Appendix F - OPW PFRA Mapping

No Fluvial Data Available For Area

MAYNOOTH

LEIXLIP

No Fluvial Data Available For Area

LUCAN TO CHAPELIZOD

FINNSTOWN

ADAMSTOWN

ESKER SOUTH

CELBRIDGE

HAZELHATCH

STRAFFAN

No Fluvial Data Available For Area

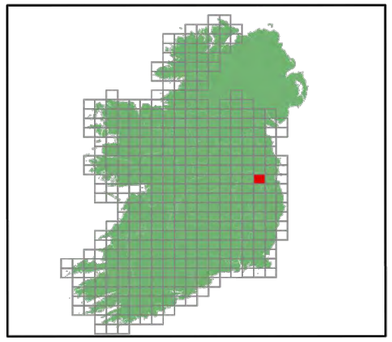
RATHCOOLE, SAGGART & BALD

TURNINGS

No Fluvial Data Available For Area

0.5 0.25 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 Kilometers

Location Plan :



Legend:

Flood Extents

- Fluvial - Indicative 1% AEP (100-yr) Event
- Fluvial - Extreme Event
- Coastal - Indicative 0.5% AEP (200-yr) Event
- Coastal - Extreme Event
- Pluvial - Indicative 1% AEP (100-yr) Event
- Pluvial - Extreme Event
- Groundwater Flood Extents
- Lakes / Turloughs

PFRA Outcomes

- Probable Area for Further Assesment
- Possible Area for Further Assesment

Important User Note:

The flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location. Information on the purpose, development and limitations of these maps is available in the relevant reports (see www.cfram.ie). Users should seek professional advice if they intend to rely on the maps in any way.

If you believe that the maps are inaccurate in some way please forward full details by contacting the OPW (refer to PFRA Information leaflets or 'Have Your Say' on www.cfram.ie).

Office of Public Works
Jonathon Swift Street
Trim
Co Meath
Ireland

Project :
PRELIMINARY FLOOD RISK ASSESMENT (PFRA)

Map :
PFRA Indicative extents and outcomes
- Draft for Consultation

Figure By : PJW Date : July2011

Checked By : MA Date : July 2011

Figure No. : 2019 / MAP / 237 / A

Revision 0

Drawing Scale : 1:50,000 Plot Scale : 1:1 @ A3

Appendix G - CFRAM Fluvial Flood Depth Maps

302200 302400 302600 302800 303000 303200 303400 303600

232200 232000 231800 231600 231400 231200

BALLYMAKAILY
Baile Mhic Caollaí

GRANGE
An Ghráinseach

CLUTTERLAND

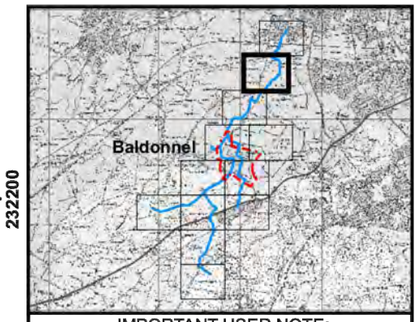
MILLTOWN
Baile an Mhuilinn

CLUTTERLAND
Talamh Chluthair

BALLYBANE
An Baile Bán

Please refer to Camac flood maps
E09CAM_DPFCD001_C1.

0 50 100 200 300 400 500 Metres



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

Modelled River Centreline

AFA Extents

Proposed Greenway

FINAL

REV:	NOTE:	DATE:

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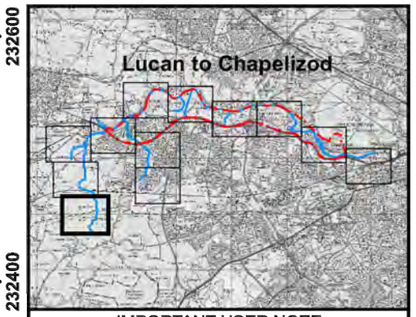
Map:
Baldonnel Fluvial Flood Depths

Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : C.C.	Date : 29 July 2016
Checked By : D.I.	Date : 29 July 2016
Approved By : S.P.	Date : 29 July 2016
Drawing No. :	
E09BAL_DPFCD001_F0_10	
Map Series :	Page 10 of 12
Drawing Scale : 1:5,000	@ A3



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

Modelled River Centreline
AFA Extents
Proposed Greenway

FINAL

REV:	NOTE:	DATE:

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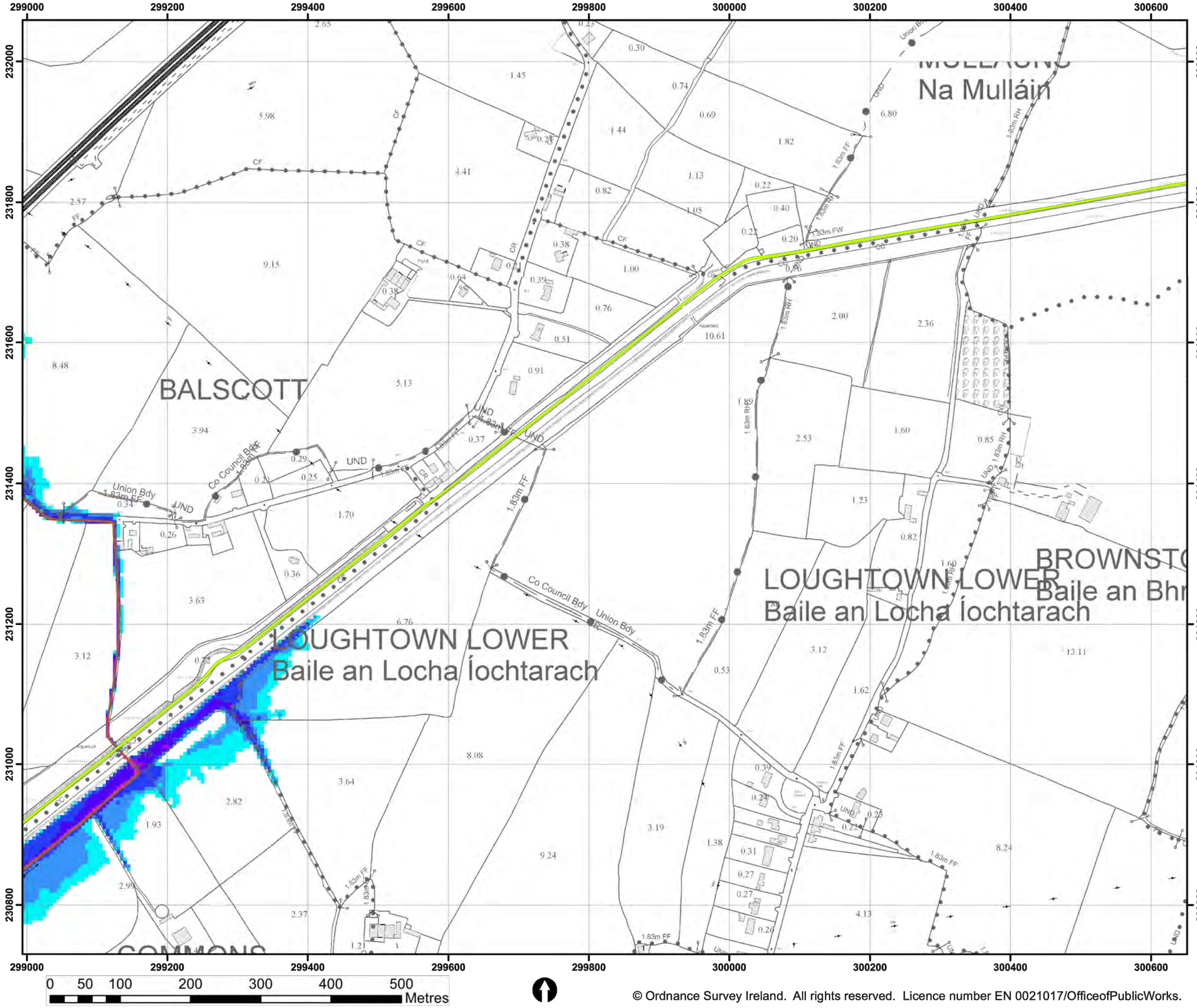
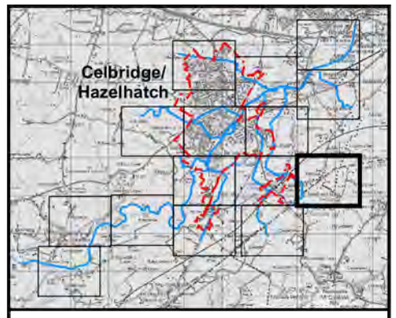
Map:
Lucan to Chapelizod Fluvial Flood Depths

Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	C.McG. Date : 28 July 2016
Checked By :	S.P. Date : 28 July 2016
Approved By :	G.G. Date : 28 July 2016
Drawing No. :	E09LUC_DPFCD001_F0_01
Map Series :	Page 1 of 12
Drawing Scale :	1:5,000 @ A3





IMPORTANT USER NOTE:
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Legend

0.1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

- Modelled River Centreline
- AFA Extents
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:
01	Model update on Crippaun watercourse	15/05/2017

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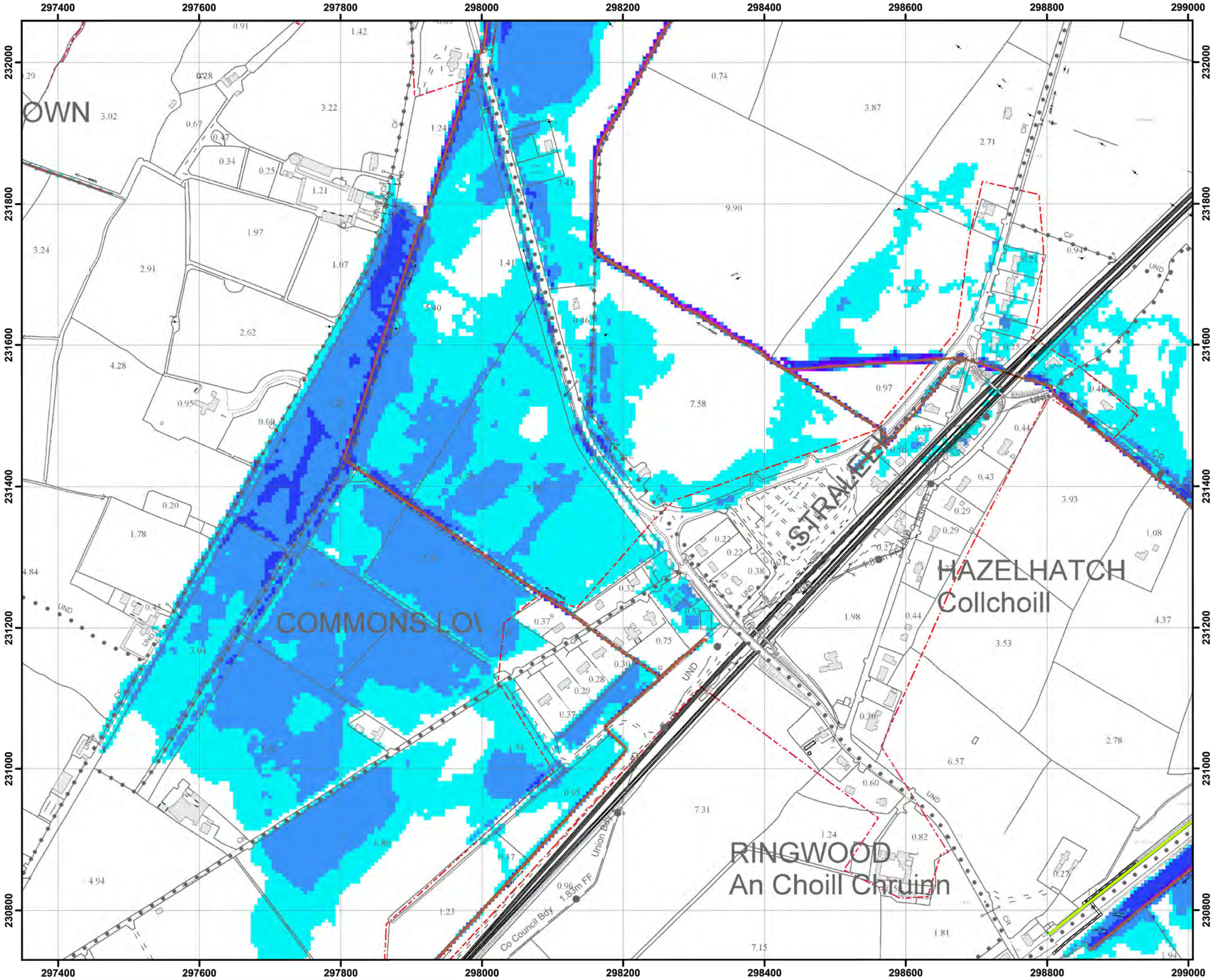
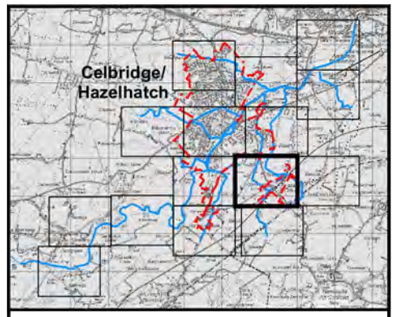
Map:
Hazelhatch Fluvial Flood Depths

Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**C.C.** **Date : 19 May 2017**
Checked By :	**S.P.** **Date : 19 May 2017**
Approved By :	**G.G.** **Date : 19 May 2017**
Drawing No. :	**E09CEL_DPFCD001_F1_13**
Map Series :	**Page 13 of 15**
Drawing Scale :	**1:5,000 @ A3**





IMPORTANT USER NOTE:
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Legend

0.1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:
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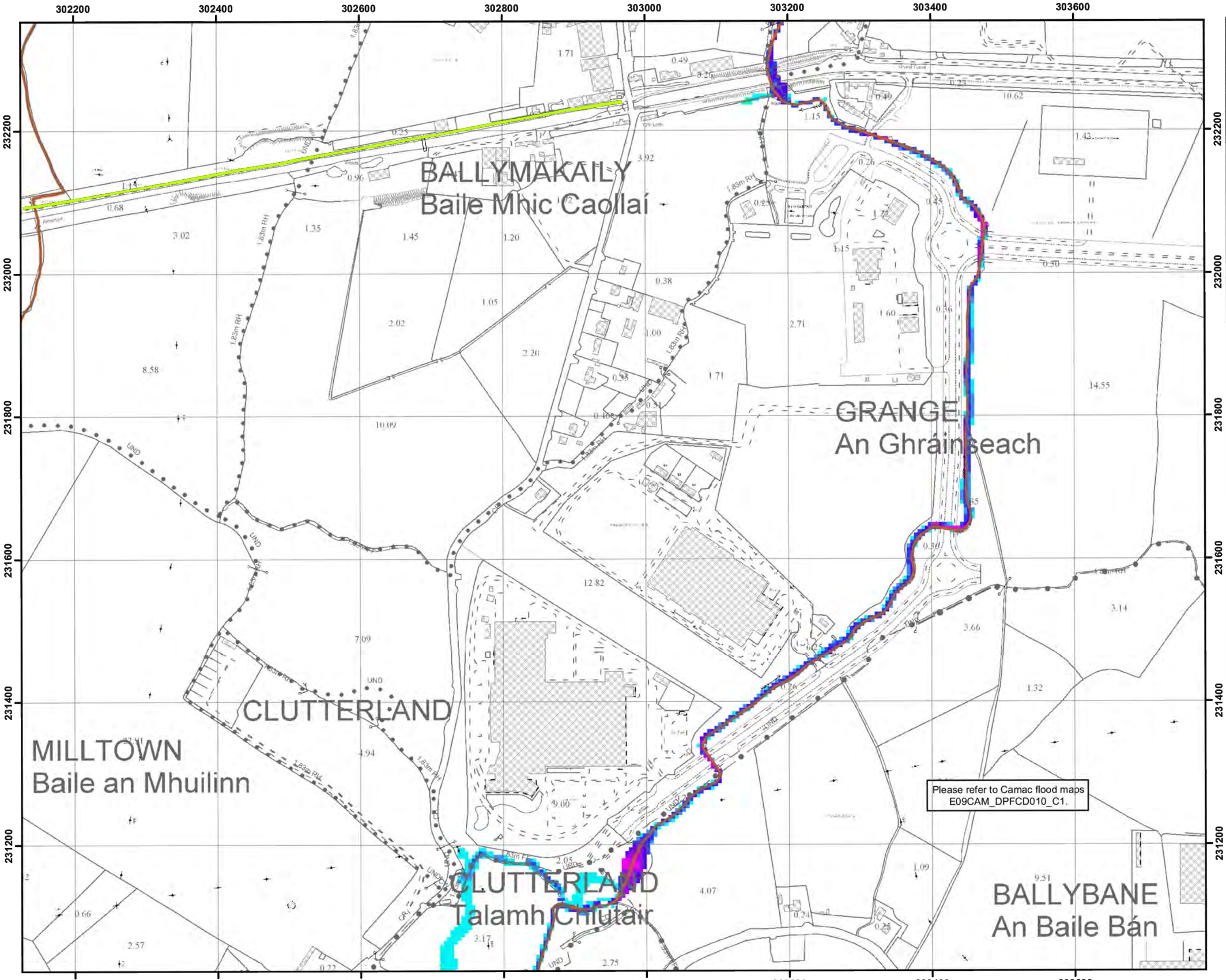
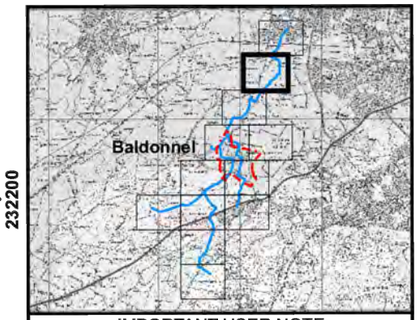
Map:	Hazelhatch Fluvial Flood Depths
Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	C.C. Date : 19 May 2017
Checked By :	S.P. Date : 19 May 2017
Approved By :	G.G. Date : 19 May 2017
Drawing No. :	E09CEL_DPFCD001_F1_14
Map Series :	Page 14 of 15
Drawing Scale :	1:5,000 @ A3





Legend

1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:

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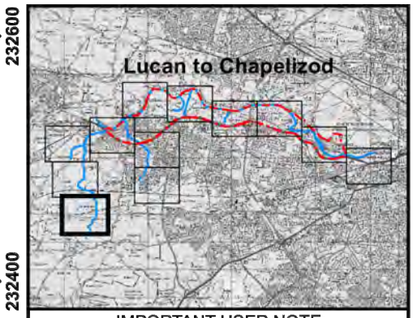
Map:	**Baldonnel Fluvial Flood Depths**
Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**C.C.** **Date : 29 July 2016**
Checked By :	**D.I.** **Date : 29 July 2016**
Approved By :	**S.P.** **Date : 29 July 2016**
Drawing No. :	**E09BAL_DPFCD010_F0_10**
Map Series :	**Page 10 of 12**
Drawing Scale :	**1:5,000 @ A3**



IMPORTANT USER NOTE:
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Legend

1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

- Modelled River Centreline
- AFA Extents
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:

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Map:
Lucan to Chapelizod Fluvial Flood Depths

Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**C.McG. Date : 28 July 2016**
Checked By :	**S.P. Date : 28 July 2016**
Approved By :	**G.G. Date : 28 July 2016**
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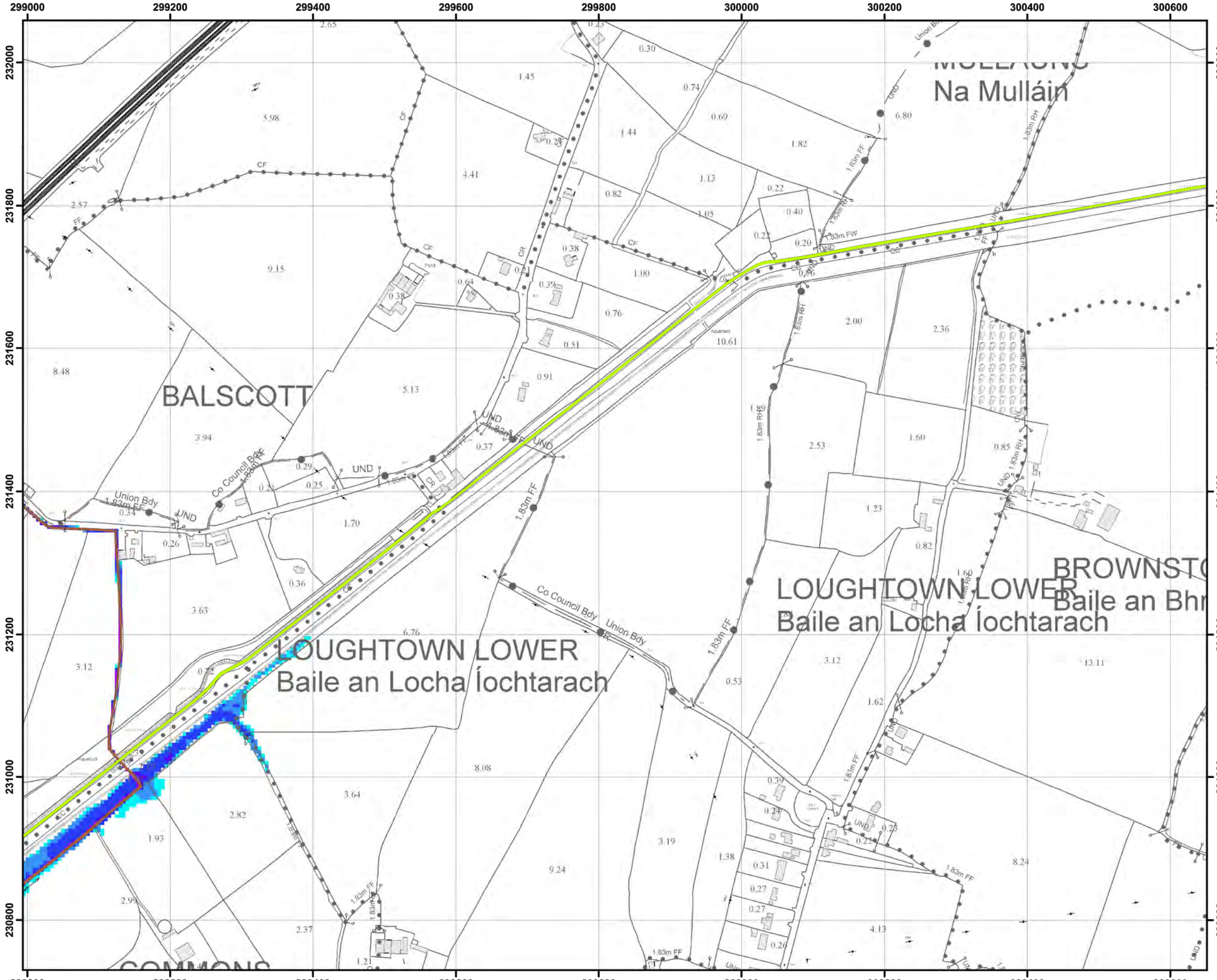

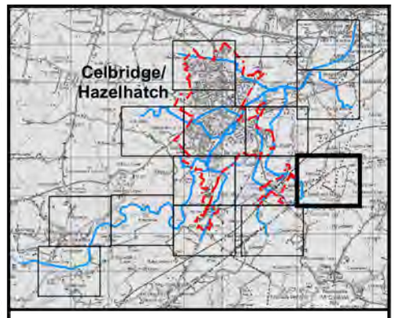

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

- Modelled River Centreline
- AFA Extents
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:
01	Model update on Crippaun watercourse	15/05/2017

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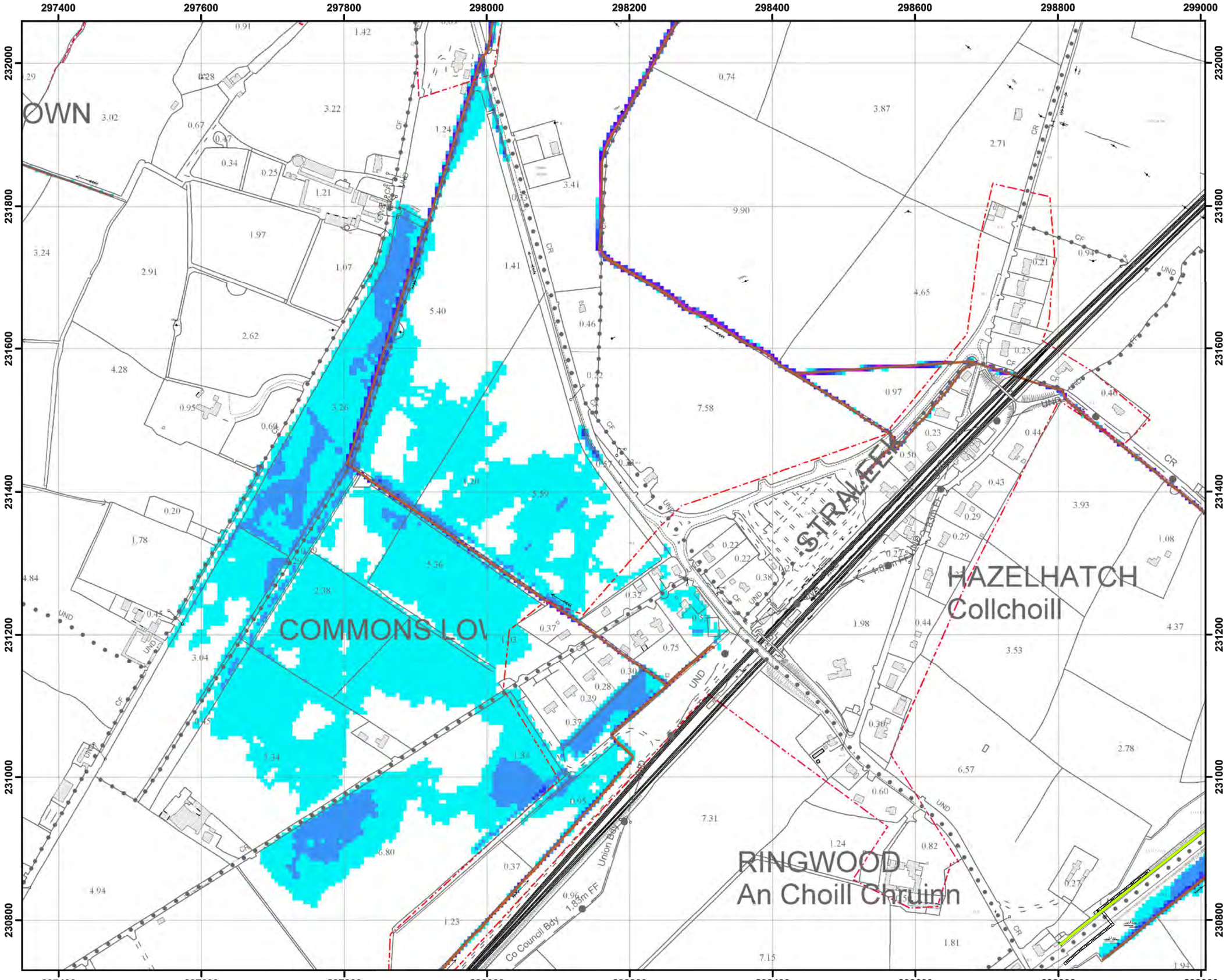
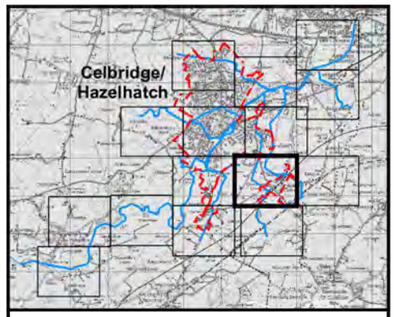
E Ireland@rpsgroup.com

Map:
Hazelhatch Fluvial Flood Depths

Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**C.C.** **Date : 19 May 2017**
Checked By :	**S.P.** **Date : 19 May 2017**
Approved By :	**G.G.** **Date : 19 May 2017**
Drawing No. :	**E09CEL_DPFCD010_F1_13**
Map Series :	**Page 13 of 15**
Drawing Scale :	**1:5,000 @ A3**





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:
01	Model update on Crippaun watercourse	15/05/2017

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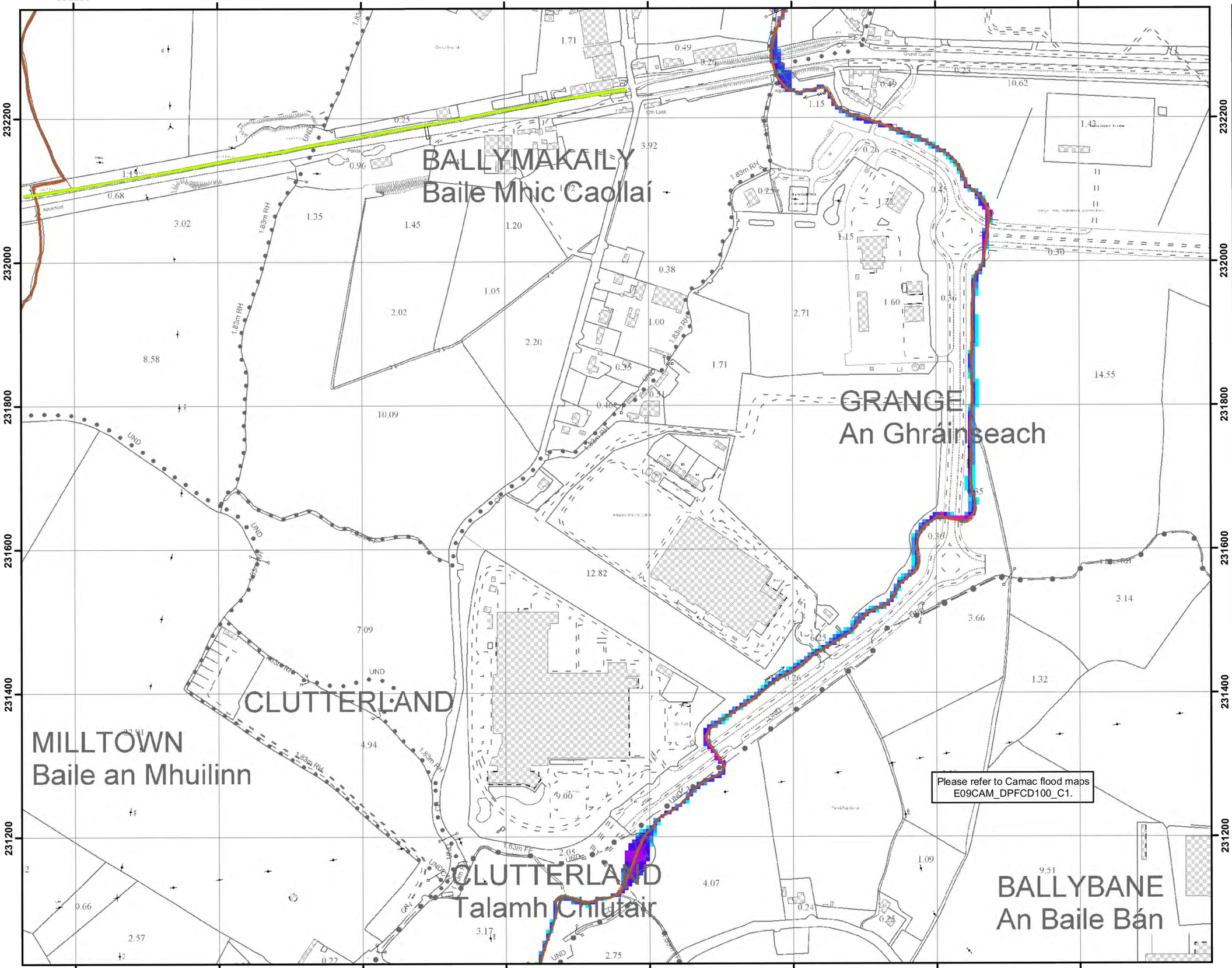
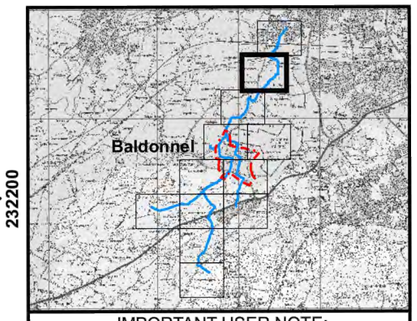
E ireland@rpsgroup.com

Map:	Hazelhatch Fluvial Flood Depths
Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	C.C. Date : 19 May 2017
Checked By :	S.P. Date : 19 May 2017
Approved By :	G.G. Date : 19 May 2017
Drawing No. :	E09CEL_DPFCD010_F1_14
Map Series :	Page 14 of 15
Drawing Scale :	1:5,000 @ A3





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

10% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

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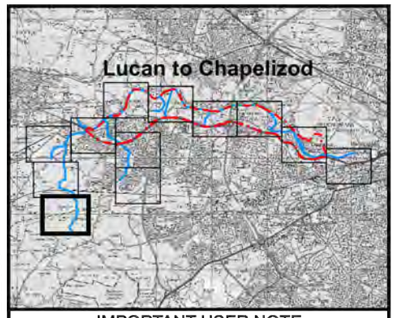
E ireland@rpsgroup.com

Map:	Baldonnel Fluvial Flood Depths
Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : C.C.	Date : 29 July 2016
Checked By : D.I.	Date : 29 July 2016
Approved By : S.P.	Date : 29 July 2016
Drawing No. :	E09BAL_DPFCD100_F0_10
Map Series :	Page 10 of 12
Drawing Scale : 1:5,000	@ A3



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

10% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

Modelled River Centreline
AFA Extents
Proposed Greenway

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY

OPW

RPS

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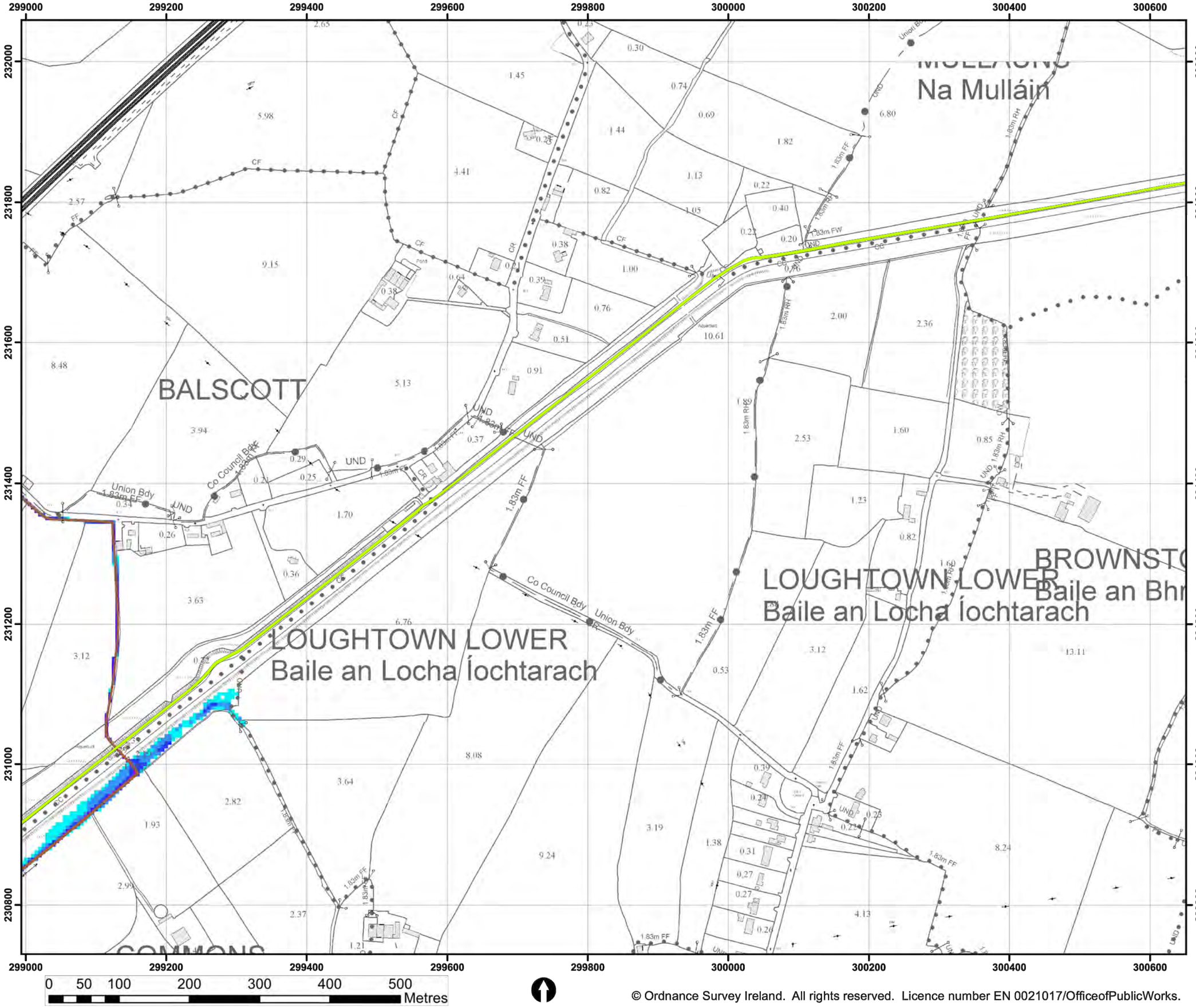
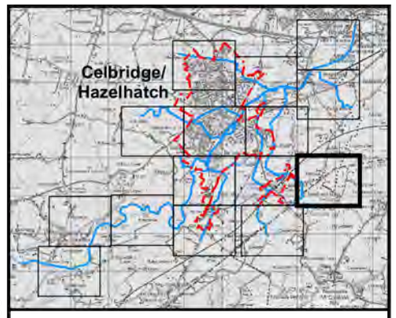
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:	**Lucan to Chapelizod Fluvial Flood Depths**
Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**C.McG. Date : 28 July 2016**
Checked By :	**S.P. Date : 28 July 2016**
Approved By :	**G.G. Date : 28 July 2016**
Drawing No. :	**E09LUC_DPFCD100_F0_01**
Map Series :	**Page 1 of 12**
Drawing Scale :	**1:5,000 @A3**





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Legend

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- 0 - 0.25m
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- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

- Modelled River Centreline
- AFA Extents
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01	Model update on Crippaun watercourse	15/05/2017

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Map:
Hazelhatch Fluvial Flood Depths

Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**C.C. Date : 19 May 2017**
Checked By :	**S.P. Date : 19 May 2017**
Approved By :	**G.G. Date : 19 May 2017**
Drawing No. :	**E09CEL_DPFCD100_F1_13**
Map Series :	**Page 13 of 15**
Drawing Scale :	**1:5,000 @ A3**

297400 297600 297800 298000 298200 298400 298600 298800 299000

232000 231800 231600 231400 231200 231000 230800

HAZELHATCH
Collchoill

COMMONS LO\

RINGWOOD
An Choill Chruinn

STRALEEN

Union B&L

Co Council Bdy

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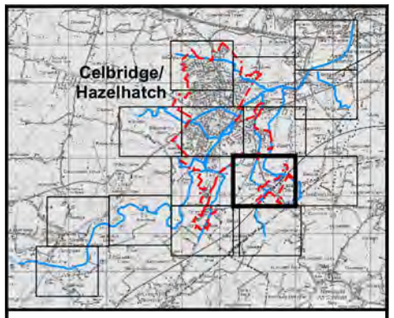

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Legend

10% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

Modelled River Centreline

AFA Extents

Proposed Greenway

FINAL

REV:	NOTE:	DATE:
01	Model update on Crippaun watercourse	15/05/2017

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Map:
Hazelhatch Fluvial Flood Depths

Map Type:	**DEPTH**	
Source:	**FLUVIAL**	
Map Area:	**HPW**	
Scenario:	**CURRENT**	
Drawn By :	**C.C.**	**Date : 19 May 2017**
Checked By :	**S.P.**	**Date : 19 May 2017**
Approved By :	**G.G.**	**Date : 19 May 2017**

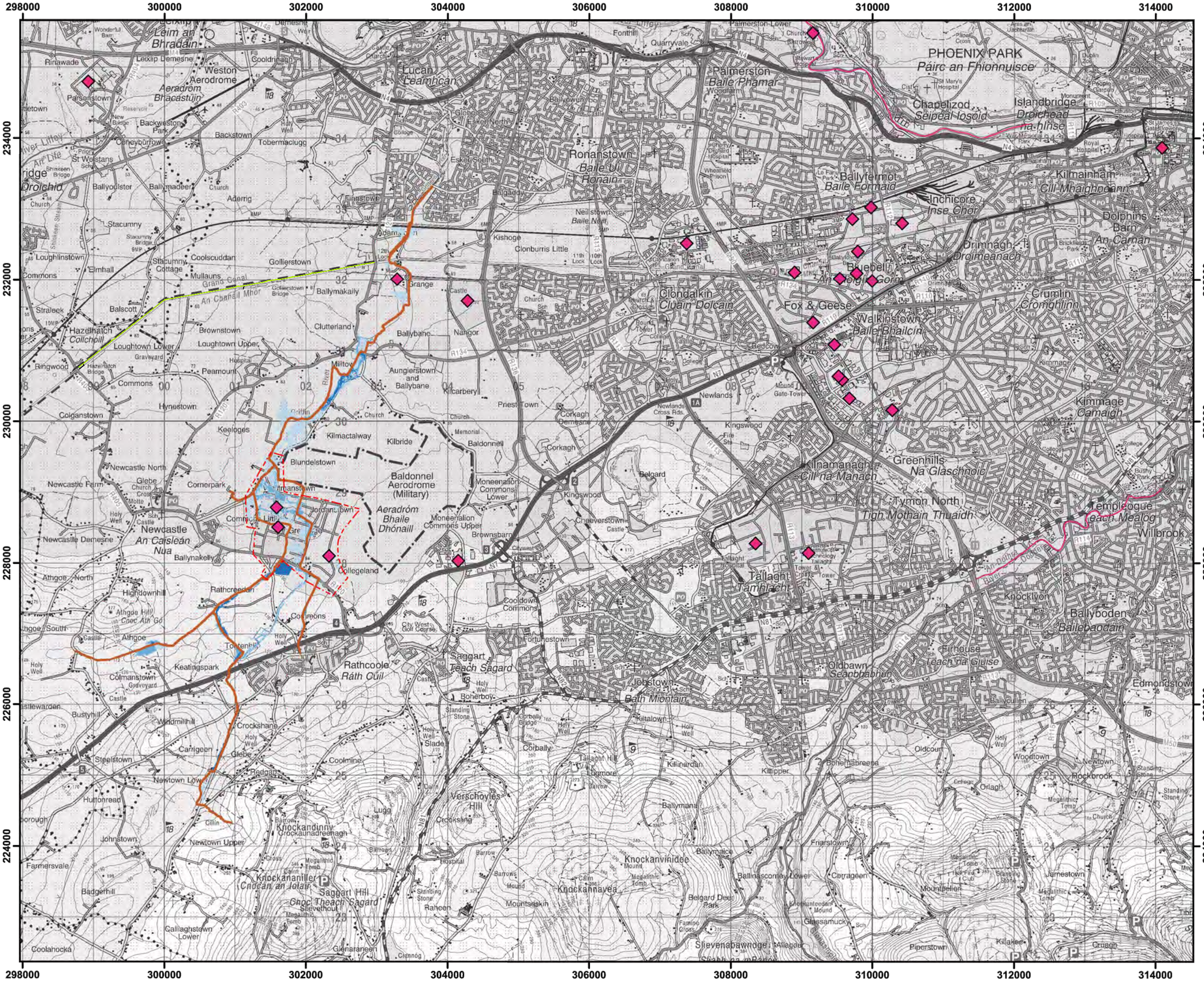
Drawing No. :
E09CEL_DPFCD100_F1_14

Map Series : Page 14 of 15

Drawing Scale : 1:5,000 @A3

0 50 100 200 300 400 500 Metres

Appendix H - OPW General Risk to Environment Maps



IMPORTANT USER NOTE:
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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- IED Sites
- Designated for Drinking Water Abstraction
- Designated for Drinking Water Abstraction
- Recreational Waters
- SAC Water Dependent
- SAC Water Dependent
- SAC Water Dependent
- SPA Water Dependent
- Modelled River Centreline
- AFA Extent
- Proposed Greenway

FINAL

REV:	NOTE:	DATE:

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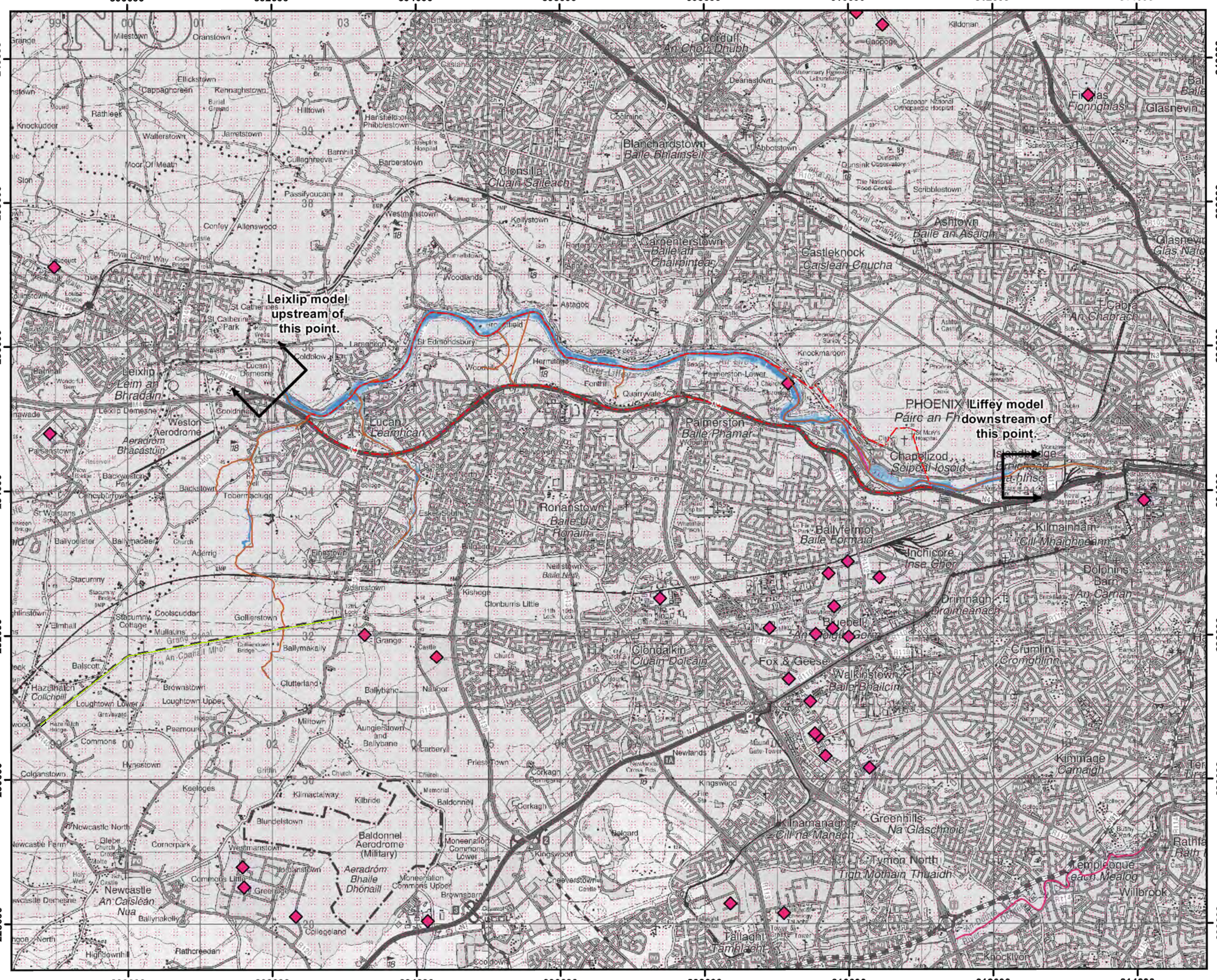
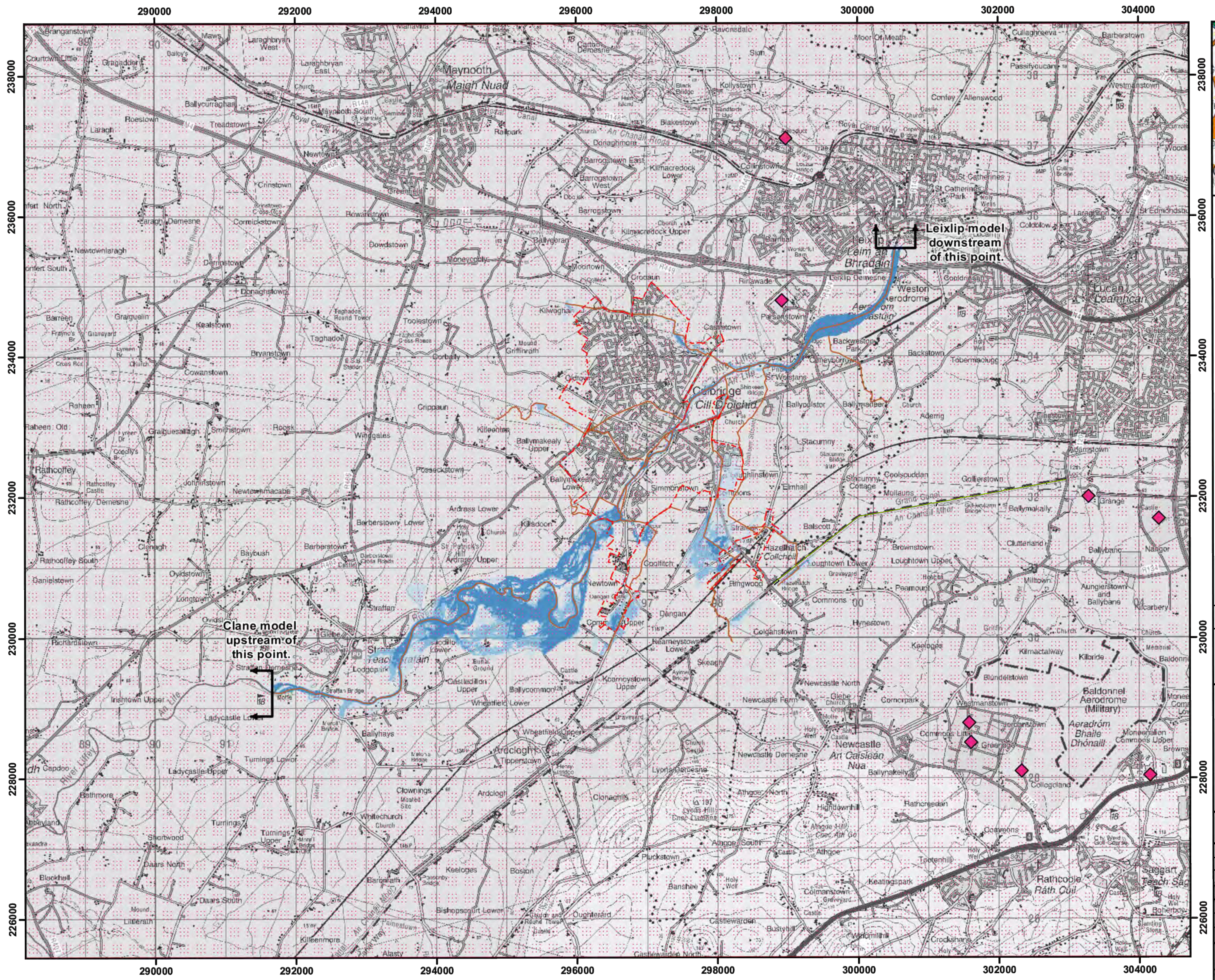
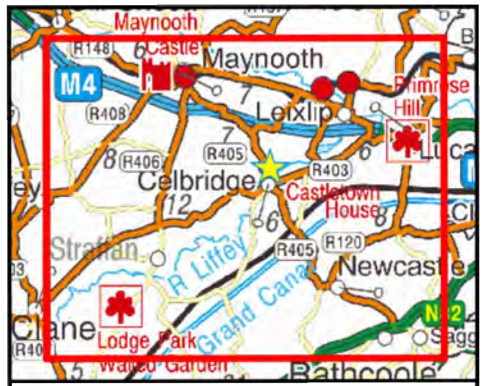
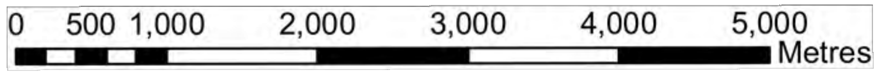
Map:	Baldonnell Risk to Environment Map
Map Type:	GENERAL RISK - ENVIRONMENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	F.M.C. Date : 26 July 2016
Checked By :	D.I. Date : 26 July 2016
Approved By :	S.P. Date : 26 July 2016
Drawing No. :	E09BAL_RVFCD_F0_01
Map Series :	Page 1 of 1
Drawing Scale :	1:50,000 @ A3









IMPORTANT USER NOTE:
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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- IED Sites
- Designated for Drinking Water Abstraction
- Designated for Drinking Water Abstraction
- Recreational Waters
- SAC Water Dependent
- SAC Water Dependent
- SAC Water Dependent
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Map:
Celbridge/Hazelhatch Risk to Environment Map

Map Type: GENERAL RISK - ENVIRONMENT
Source: FLUVIAL
Map Area: HPW
Scenario: CURRENT
Drawn By : C.C. **Date :** 19 May 2017
Checked By : S.P. **Date :** 19 May 2017
Approved By : G.G. **Date :** 19 May 2017
Drawing No. :
E09CEL_RVFCD_F0_01
Map Series : Page 1 of 1
Drawing Scale : 1:50,000 @ A3

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Appendix E – Environmental Impact Assessment

Environmental Impact Assessment Screening Report for Proposed Greenway, Grand Canal, South Dublin

EIA Screening Report prepared for South Dublin County Council

Environmental Impact Assessment Screening Report for Proposed Greenway, Grand Canal, South Dublin

EIA Screening Report prepared for South Dublin County Council

Contents

1.1 Introduction

South Dublin County Council (SDCC) has appointed Doherty Environmental Ltd to prepare an Environmental Impact Assessment (EIA) screening report for the proposed Grand Canal Greenway, hereafter referred to as the proposed development. The proposed development relates to the provision of a Greenway Walking and Cycling route along the northern towpath of the Grand Canal, from the 12th lock to the County Kildare boundary at Hazelhatch.

This EIA screening report contains necessary information to enable the competent authority, in this case SDCC, to undertake an EIA screening assessment and determine whether an EIA is required to support the proposed development. The findings of the EIA screening assessment are presented in this report and will inform the determination by SDCC in advance of the Part 8 planning consent process.

1.2 Legislative Background

EIA requirements derive from EU Directive 85/337/EEC (as amended by Directive 97/11/EC, Directive 2014/52/EU and S.I. 454 of 2011; S.I. 464 of 2011; S.I. 456 of 2011 and S.I. No 296 of 2018) on the assessment of the effects of certain public and private projects on the environment. The purpose of this Environmental Impact Assessment Screening Report is to determine whether this proposed development will require full Environmental Impact Assessment.

The Directive outlines in Article 4 (1) 21 Annex 1 projects that require mandatory EIA. Article 4 (2) outlines Annex 2 projects that require consideration for EIA further to a case by case examination or through thresholds and criteria established by Member States. Projects requiring mandatory EIA are listed in Schedule 5 of the Planning and Development Regulations 2001, as amended. Where developments are under the relevant EIA threshold, planning authorities are required under Article 103 of the 2001 Regulations, as amended, to request an EIS where it considers the proposed development is likely to have a significant effect on the environment. In these cases the significant effects of the project are assessed relative to the criteria contained in Schedule 7a of the regulations, principally:

- The projects characteristics
- Sensitivity of the project location, and
- Characterisation of potential impacts.

In addition, where the development would be located on or in an area, site etc. set out in Article 103(2), the planning authority shall decide whether the development would or would not be likely to have significant effects on the environment for such site, area or land etc. the implication being that if it decides that it would be likely to have significant effects on the environment, it can invoke its powers to request an EIS.

Article 103(2) sites comprise the following:

a) A European Site;

b) An area the subject of a notice under section 16(2) (b) of the Wildlife (Amendment) Act, 2000;

c) An areas designated as a Natural Heritage Area under section 18 of the Wildlife (Amendment) Act, 2000;
d) Land established or recognised as a nature reserve within the meaning of section 15 or 16 of the Wildlife Act, 1976, as amended by sections 26 and 27 of the Wildlife (Amendment) Act, 2000; or
e) Land designated as a refuge for flora or as a refuge for fauna under section 17 of the Wildlife Act, 1976, as amended by section 28 of the Wildlife (Amendment) Act, 2000.

The proposed Greenway is located along the Grand Canal which is designated as a proposed Natural Heritage Area (site code: 002104).

The proposed development also falls under the EIA requirements of the Roads Act 1993 as amended by the Planning and Development Acts (2000, as amended) and the Roads Act (2007) as well as regulations made under the Roads Acts, The European Communities (Environmental Impact Assessment) (Amendment) Regulations 1989-2001, and EC Directives 85/337/EC and 97/11/EC referenced above. A road within the 1993 Act is defined to include:

> *(a) any street, lane, footpath, square, court, alley or passage,*
> *(b) any bridge, viaduct, underpass, subway, tunnel, overpass, overbridge flyover, carriageway whether single or multiple, pavement or footway,*
> *(c) any weighbridge or other facility for the weighting or inspection of vehicles, toll plaza or other facility for the collection of tolls, services area, emergency, telephone, first aid post, culvert, arch, gulley, railing, fence, wall, barrier, guardrail, margin, kerb, lay-by, hard shoulder, island, pedestrian refuge, median, central reserve.*

Furthermore Cycleway is referred to in Section 68 of the 1993 Act as follows:

> *(1) In this section "cycleway" means a public road or proposed pubic road reserved for the exclusive use of pedal cyclists or pedal cyclists and pedestrians.*
> *(2) (a) A road authority may construct (or otherwise provide) and maintain a cycleway.*
> *(b) Where a road authority constructs or otherwise provides a cycleway it shall by order declare either – (i) the cycleway is for the exclusive use of pedal cyclists, or*
> *(ii) that the cycleway is for the exclusive use of pedal cyclists and pedestrians.*
> *(c) any person who uses a cycleway in contravention of an order under paragraph*
> *(b) shall be guilty of an offence.*

1.3 Screening

According to European Commission Guidance (2017[1]);

> "Screening has to implement the Directive's overall aim, i.e. to determine if a Project listed in Annex II is likely to have significant effects on the environment and, therefore, be made subject to a requirement for Development Consent and an assessment, with regards to its effects on the environment. At the same time, Screening should ensure that an EIA is carried out only for those Projects for which it is thought that a significant impact on the

[1] Environmental Impact Assessment of Projects Guidance on Screening (Directive 2011/92/EU as amended by 2014/52/EU). European Commission 2017. Page 23.

environment is possible, thereby ensuring a more efficient use of both public and private resources. Hence, Screening has to strike the right balance between the above two objectives."

As previously stated, this may be considered a sub-threshold EIA development, as EIA is not mandatory for walking and cycling routes such as this Greenway. The key issue for the competent/consent authority in the context of the possible need for EIA of sub-threshold is whether or not such development is likely to have significant effects on the environment. Consideration of significant effect should not be determined by reference to size only. The nature and location of a project must also be taken into account. This EIA Screening Report is therefore being undertaken to determine in light of the criteria listed in Schedule 7A of the Planning and Development Regulations, 2001 as amended, whether or not this proposed development will require full EIA.

According to the most recent publication, '*Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment*', DHPLG, (2018) the following is stated;

'*For all sub-threshold developments listed in Schedule 5 Part 2, where no EIAR is submitted or EIA determination requested, a screening determination is required to be undertaken by the competent authority unless, on preliminary examination it can be concluded that there is no real likelihood of significant effects on the environment. This is initiated by the competent authority following the receipt of a planning application or appeal*

A preliminary examination is undertaken, based on professional expertise and experience, and having regard to the 'Source – Pathway – Target' model, where appropriate. The examination should have regard to the criteria set out in Schedule 7 to the 2001 Regulations.

Where, based on a preliminary examination of the information submitted with the application and any other supplementary information received, the competent authority concludes that, having considered the nature, size and location of the proposed development, there is no real likelihood of significant effects on the environment, this should be recorded with reasons for this conclusion stated, and no EIA required or formal determination made. The recording of the competent authority's view should be brief and concise, but adequate to inform the public. In many cases this considered view will be included in the planner's/inspector's report on the planning application and this may be cross-referenced in the competent authority's decision. Normally, this will be published at the time of the decision of the competent authority.'

1.3.1 Recent changes to the EIA Screening Process

The EIA Directive (2014/52/EU) has brought a number of changes to the EIA process with a strengthening of the Screening process as follows:

Article 4 (4) of this Directive introduces a new Annex IIA to be used in the case of a request for a screening determination for Annex II projects. This is information to be provided by the developer on the projects listed in Annex II (see below):

1.3.2 Annex IIA: Information to be provided by the developer on the projects listed in Annex II.

1. A description of the project, including in particular:

(a) a description of the physical characteristics of the whole project and, where relevant, of demolition works (*Section 2 of this report*);

(b) a description of the location of the project, with particular regard to the environmental sensitivity of geographical areas likely to be affected (*Section 3 of this report*)

2. A description of the aspects of the environment likely to be significantly affected by the project (*Section 3 of this report*)

3. A description of any likely significant effects, to the extent of the information available on such effects, of the project on the environment resulting from:

(a) the expected residues and emissions and the production of waste, where relevant;

(b) the use of natural resources, in particular soil, land, water and biodiversity (*Section 4 of this report*).

4. The criteria of Annex III shall be taken into account, where relevant, when compiling the information in accordance with points 1 to 3 (*Section 4 of this report*).

Article 4(4) specifies that the developer may provide a description of any features of the project and/or mitigation measures to avoid or prevent what might otherwise have been significant effects on the environment. It should be noted that this does NOT include compensation measures (Mitigation measures are provided in Section 2.2.).

1.3.3 Article 4(5) Determination of Screening

Article 4(5): The Competent Authority shall make its determination, on the basis of information provided by the developer in accordance with paragraph 4 taking into account, where relevant, the results of preliminary verifications or assessments of the effects on the environment carried out pursuant to Union legislation other than this Directive.

The determination shall be made available to the public and:

(a) where it is decided that an environmental impact assessment is required, state the main reasons for requiring such assessment with reference to the relevant criteria listed in Annex III; or

(b) where it is decided that an environmental impact assessment is not required, state the main reasons for not requiring such assessment with reference to the relevant criteria listed in Annex III,

and, where proposed by the developer, state any features of the project and/or measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment

1.4 Approach to this EIA Screening

This EIA Screening report has been prepared and informed by the following guidance and guidelines:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, August 2018, Department of Housing, Planning and Local Government
- Environmental Impact Assessment of Projects Guidance on Screening (Directive 2011/92/EU as amended by 2014/52/EU). European Commission 2017.
- Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development, 2003, Department of Environment, Heritage and Local Government;
- Guidance on the Information to be contained in Environmental Impact Statements Environmental Protection Agency 2002, and
- Environmental Impact Assessment (Agriculture) Regulations, 2011 Guide for Farmers, Department of Agriculture, Food and the Marine

A desktop study of environmental receptors within the project area was undertaken in addition to a site walkover in July 2018. A review was also undertaken of relevant projects within the project area. The screening for Appropriate Assessment that was prepared as part of the current application was reviewed also.

2 Description of the Proposed Development

2.1. Description of Proposed Development

2.1.1 Description of Proposed Route

The proposed development is a Greenway and will involve the resurfacing of the northern towpath of the Grand Canal from the 12th Lock near Clondalkin to Hazelhatch.

2.1.2 Features of the proposed development

The proposed Grand Canal Greenway – Hazelhatch to 12th Lock will include the following features:

- 4.6km of shared walking and cycling Greenway along the existing northern Grand Canal towpath.
- Path widths will vary from 2.5m to 3.5m in width. Widths will be dictated by existing on site features.
- Improvements to the existing towpath along the Grand Canal through the provision of a suitable surface i.e. Quarry Dust or Asphalt Tarmac depending on local conditions for pedestrian and cyclists use.
- Provision of access controls such as pedestrian and cycle friendly gates along the route.
- Underground utilities and services including: Power ducting, telecom ducting, Public Lighting ducting & CCTV ducting.
- The provision of a temporary construction compound to be situated in the townland of Brownstown to the south of the Grand Canal
- Provision of a temporary bridge crossing, in the form of a bailey bridge, to facilitate movements between the temporary construction compound to the south of the canal at Brownstown to the proposed greenway.
- All associated ancillary works and integrated landscape plans for the reinstatement of temporary construction footprint.

The detailed approach to the works to the Greenway is presented in the following section but primarily comprise the following:

- Upgrading of towpath trails with a new trail surfaces proposed;.
- Traffic safety measures to facilitate safe pedestrian and cycling crossing
- Safety Railings at section of verge where there are steep or near vertical falls to the north; and
- Fencing/gates to facilitate safety and permit access to residences/fields.

There is no lighting or tree removal proposed as part of this application.

2.1.2 Habitats to be lost to the footprint of the development

There will be no loss of high value semi-natural habitats as a result of the proposed development. The footprint of the proposed greenway will overlay the extent of the existing towpath and will be confined with the existing banks either side of the towpath. As such the only habitat that will be lost to the footprint of the proposed greenway will be the Towpath Mosaic, which is of low value along the stretch of the canal between the 12th Lock and Hazelhatch.

2.2 Methodology for Greenway Construction.

2.2.1 General Methodology:

As outlined in the introduction, the proposal is to locate the cycleway and footway on the existing towpath of the Grand Canal between the 12th Lock and Hazelhatch.

The proposal entails the upgrading of the existing towpath, the length of which is also a National Way-marked Trail along the Grand Canal.

- *Approximate volume of material to be removed from site = 7,250m^3, this includes path construction and ducting installation.*
- *the works will be carried out with 2 crews each using an 8 ton excavator and 2 no. 6 ton dumpers*
- *there would be 12-15 operatives on the ground during the works*
- *The works will generally be carried out between 07:30 and 17:30 however this may extend during summer months*
- *It is estimated that approximately 12 to 15 operatives will be required during the construction phase of the project. The daily working hours will be between 07:30 and 17:30. The duration of the construction phase is estimated to last for no more than 8-months.*
- *Silt run off shall be captured using a toe board buried 50mm into the ground and fixed between the fencing posts at locations where the edge berm does not exist*
- *Please see attached a typical noise and vibration specification which we would normally include in works specification*
- *The control of duct shall carried out by watering the towpath with a bowser or the like during construction and restricting vehicle speeds along the towpath*
- *Gate locations are indicated in the overall drawing, these are only at either end of the works and Gollierstown Bridge. No located any signs yet, however these should be outlined in the detailed design stage.*

2.2.2 Surface Water Management

Surface water runoff during the construction phase will be contained, will either drain to ground or will drain in a northerly direction, away from the canal. Water will be prevented from draining to the canal through the retention of the existing bank on the canal side of the towpath and where this is absent the provision of a barrier at such locations that will prevent the migration of surface water to the canal.

Any dewatering of excavations during the construction phase will pump surface water to an onsite settlement tank. The water will then be discharged from the settlement tank over land to the north of the canal.

2.2.3 Noise and Vibration

Noise and vibration emissions will be generated during the construction phase. In order to minimise any potential for noise and vibration and potential nuisance to residents along the canal and other ecological receptors such as otters or badgers mitigation measures will be implemented. These measures will adhere to the best practice guidelines outlined in BS5228: Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise (2009 + A1 2014). These standard guidelines offer detailed guidelines on the control of noise and vibration from construction activities.

The following mitigation measures will be implemented during the construction phase of the proposed development to ensure noise and vibration limit values are complied with:

- The hours during which site activities are likely to create high levels of noise will be limited to a set time period;
- A site representative will be appointed to take responsibility of all matters relating to noise and vibration;
- Noise monitoring will be undertaken during the construction phase, particularly during critical periods and at sensitive locations;
- All site access roads will be kept even to mitigate the potential for noise and vibration from lorries.
- Plant with low inherent potential for generating noise and/ or vibration will be selected for construction;
- Where required noise barriers will be erected around items such as generators or high duty compressors;
- Noisy plant will be sited as far away from sensitive properties as permitted by site constraints.
- With the implementation of the measures it is predicted that the nuisance impact of noise generated during the construction phase will be of a short-term, slight, negative nature.

2.2.4 Surface Types

A tailored surface finish shall be employed to ensure a durable and fit for purpose trail in accordance with National Trails Office Guidance. This surface will not only improve accessibility, but provide a more robust surface that will be able to withstand any potential increase footfall or traffic that may arise subsequent to the upgrade of the trail. The proposed surface type to be used on the proposed greenway will be an unbound surface of compacted quarry stone and dust. As specified in the name of this surface it is a compacted surface and as such it is highlighted that the

"dust" element of the surface not in fact prone to suspension in surface water or air but is in fact compacted into the surface of the trail.

The existing sections of asphalt occurring either end of the proposed greenway at the 12th Lock and Hazelhatch will be retained and upgraded. Otherwise a compacted quarry stone and dust surface will be used.

Trail Surface Construction Materials

Materials for construction of the trail will be imported and stockpiled at the construction compound, located in the townland of Brownstown to the south of the canal (see Figure 2.1 for location). The materials to be employed shall principally consist of:

- Geotextile ground reinforcing cloth
- Granular sub-base material (NRA clause 804)
- 6mm crushed limestone dust
- Dense Bitumen Macadam to NRA Specification for Road Works (Series 900) (to be used at either of the proposed greenway only)
- Hot rolled asphalt (to be used at either end of the proposed greenway only)
- Topsoil / grass seed

2.2.5 Construction methodology

The first item of works to be completed on the ground prior to the commencement of the construction works will be the setting out of the construction footprint along the proposed greenway. Along the northern canal bank the construction footprint will be limited to the width of the existing towpath from its south boundary adjacent to the bankside verge to its northern boundary which is represented variously by a grassy verge, treelines, and low to high vertical banks. Once marked out on the ground the construction corridor temporary fencing will be installed. Once fencing is in place all construction plant, machinery and personnel will be restricted from encroaching into areas along the canal beyond the temporary construction fenceline.

Once the fenceline is in place the section of the canal will be closed to the public for the duration of the construction phase, which is estimated to last for approximately 8-months.

Construction materials will be transported from stockpiled areas at the construction compound along the haul road to the northern canal bank in 6-tonne dumper trucks for construction of the trail and cable ducts. A total of 2 no. dumper trucks will be required throughout the duration of the construction phase.

Excavations, using one 8-tonne excavator, will be required for the provision of a cable trench that will facilitate the installation of the cabling and ducts.

Excavation of the existing surface will be kept to a minimum. The maximum depth of the cable trench will be 1.25m. Excavated material will be used for the reinstatement of the trench with

additional surplus material being disposed of offsite. It is estimated that approximately 7,250m^3 of surplus spoil for offsite disposal will be generated during the project.

Works will be undertaken on a section by section basis with only one section being commenced and completed at any one time. The sections will be kept to a minimum to reduce the potential for disturbance to adjacent ecological receptors.

2.2.6 CONSTRUCTION METHODOLOGY FOR SURFACE TYPES

Detailed construction methodologies for the proposed trail surface type is shown in Figure 1 and outlined in Table 1 below.

Figure 1: Proposed Compacted Stone and Dust

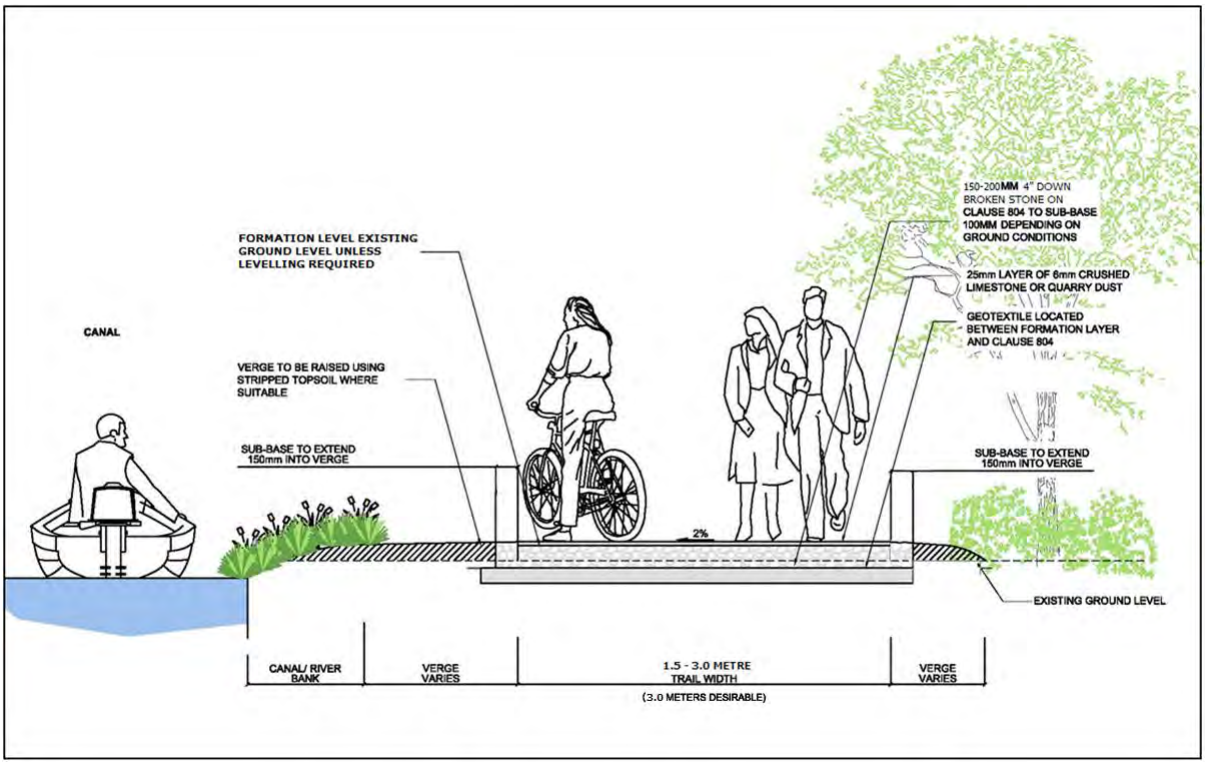


Table 1 Type A Compacted Stone and Dust

Type A: Compacted Stone and Dust	
LOCATIONS	MATERIAL SPECIFICATION
Along the entire stretch of the proposed greenway with the exception of either end at the 12th Lock and Hazelhatch.	Geotextile Polybrane 240 Membrane or alternative equivalent product grade

	Sub -Base layer 4” Down Broken Stone, then Granular sub-base, in accordance with Clause 804 of Tii Specification. Surface layer 0/6mm crushed limestone or quarry dust

CONSTRUCTION SEQUENCE (Refer Figure 1 above)

(a) Formation Tray Excavation where unavoidable (Desirable Width of 3.5mm. Note width will vary from a maximum 3.5m wide and reduce to suit existing restricted access widths for example at lock houses and lock gates) (b) Overlay to Existing Path (Desirable Path Width of 3.0m. Note width will vary from a maximum 3.0m wide and reduce to suit existing restricted access widths for example at lock houses and lock gates)

Grade out irregularities to form 3.5m wide formation tray (width of formation tray to be approximately 300mm wider than the path width) to maximum depth of 100mm below ground level. (Actual depth will depend on depth of sub-base being used, which will depend on ground conditions. Where possible new construction will overlay existing). Formation tray should be rectangular in section with vertical sides and level base.

Any Stripped vegetation and excavated topsoil to be stacked neatly either side of formation tray to be used for reinstatement of path shoulders.

There would be no excavation requirements in regard to the overlay of the existing surface other than to address isolated issues with soft spots.

Geotextile Installation

Lay and secure geotextile sheet in formation tray or on top of the existing ground. Overlap joining sheets by 1.0m.

If required in soft ground - Lay and secure geogrid on top of geotextile sheet. Overlap joining sheets by 1.0m.

Sub-Base Layer

Using either a drag box or suitable excavator lay the required depth of 4” down Broken Stone upon the geotextile sheet to falls and levels, to form 1:50 (2%) camber or 1:40 (2.5%) cross-fall in maximum layer depths of 150mm – 200mm. Then 100mm Clause 804 granular sub-base. Depths of Sub-base will depend on existing ground conditions

Compact sub-base layer using a pedestrian roller taking care not to apply undue pressures to the canal bank until satisfactory compaction is achieved.

Once sub-base layer is compacted, check levels of the surface at regular intervals along the compacted sub-base layer for consistent even surface regularity. Any part of the sub-base layer deviating from the required level must be raked off or topped up with additional Clause 804 granular sub-base and re-compacted to the correct levels.

Surface Layer

Using either a drag box or suitable excavator lay 25mm depth of 6mm limestone dust to falls and levels, to form 1.5m to 2.5m wide path surface with 1:50 (2%) camber or 1:40 (2.5%) crossfall along the centre line of compacted sub-base layer.

Compact surface layer using a roller until satisfactory compaction is achieved.

Once rolling is finished, check levels of the surface at regular intervals along the compacted surface layer for consistent even surface regularity. Any part of the surface layer deviating from the required level must be raked off or topped up with additional 6mm limestone dust and re- compacted to the correct levels.

Landscaping

Using available topsoil and turfs from excavations (and only if necessary, imported topsoil). Landscaped verges and edges should be finished level with path surface and taper down and away from the path surface to allow surface water to run off onto adjacent verges.

2.3 Construction methodology for Ducting

The ducting installation will follow the following routine:

Excavation

- Chapter 8 Approved Pedestrian barriers will be used to demark the works area and to prevent unauthorised access into the works area.
- Route of the track to be marked out.
- The excavation will commence removing the ground carefully in layers. Spoil will be loaded directly onto 6 ton dumper.
- The trench will be excavated to the required depth and width for the ducting trench.
- If required by trench depth or nature of ground, make trench safe for personnel entry by battering sides.
- Where the trench can be stepped additional trench protection will not be required.
- Where it is not practicable to batter trench sides or step, Trench protection will be used. This will be stored onsite to be used as required. This will be either trench box or sheet piles, wailers and struts dependent on the location.
- Sufficient trench protection material will be delivered to site in advance of excavation.
- Remove any groundwater from the trench using 2" sub pump if necessary.

Duct Installation – Power Ducting

- Place lean mix bed into trench, level manually and compact with a mechanical trench compactor in line with the specification.
- Once the lean mix has been levelled place the ducts in the trench in the specified format.
- The ducts will be joined manually using the collars supplied by the ducting provider.
- Cable tie the ducts as required by the design specification.
- Manually insert the timber templates to space out the bottom row of ducts and apply the next level of lean mix over the ducts and level manually compacting in even layers using the trench compactor.
- Place the marker tape.
- Then repeat the process with another layer of ducts and template as per the design specification and compact with lean mix lean mix using a mechanical compactor.
- Apply the marker tape manually.
- Where required use shallow plating
- Backfill with leanmix stone and apply warning tape 300mm down from the surface
- All ducts must remain capped during the process until they are ready to use.
- Lubricant will be used when applying couplers.

Duct Installation – Telecom, CCTV & Public Lighting Ducting

- Place sand bed into trench, level manually and compact with a mechanical trench compactor in line with the specification.
- Once levelled place the ducts in the trench in the specified format.
- The ducts will be joined manually using the collars supplied by the ducting provider or the spigot and socket duct ends.
- Manually insert the timber templates to space out the bottom row of ducts and apply the next level of lean mix over the ducts and level manually compacting in even layers using the trench compactor.
- Place the marker tape.
- Then repeat the process with another layer of ducts and template as per the design specification and compact sand surround using a mechanical compactor.
- Apply the marker tape manually.
- Backfill with excavated material and apply warning tape 300mm down from the surface
- All ducts must remain capped during the process until they are ready to use.
- Lubricant will be used when applying couplers.

Backfilling-

- Backfilling can then commence with use of the dumper directly into the trench using the required material.
- The material will then be compacted using a mechanical trench compacter in layers in line with NRA specification (Purple Book)
- Backfilling along the section of the trench opposite the artificial quarry ponds at Gollierstown quarry will be undertaken in accordance with design measures that aim to reinstate the existing towpath substrated around the cable duct. The existing substrate will be reinstated at this location to maintain seepage pathways between the canal and the artificial pond to the north where the rare species Vertigo moulinsiana was recorded.

- Marker tape will then be used approximately 300mm from the finished surface or as per ESBN specification / design requirements.

2.6 MEASURES TO BE IMPLEMENTED DURING THE CONSTRUCTION PHASE

2.7 Best Practice Construction Approach

All construction works, relating to the activities and construction sequence outlined in Section 2.1 above, will be undertaken in accordance with the following:

- Inland Fisheries Ireland's *Requirements for the Protection of Fisheries Habitat during Construction and Development Works.*
- CIRIA (Construction Industry Research and Information Association) Guidance Documents
- Control of water pollution from construction sites (C532)
- Control of water pollution from linear construction projects: Technical Guidance (C648)
- Control of water pollution from linear construction projects: Site Guide (C649)
- Environmental Good Practice on Site (C692)
- NRA Guidance Documents
    - Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes
    - Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads
    - Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, during and Post Construction of National Road Schemes.

All work completed should be in compliance with the Wildlife Acts, 1976 – 2012;

In areas where aquatic Annex II-listed species (e.g. White-clawed Crayfish) or Flora Protection Order species are known to occur the works shall be carried out under licence from the NPWS.

2.8 Earthworks

- Excavation and infilling will be carried out in small progressive stages;
- Any topsoil that is of use for landscaping will be stored on the site. Where this is required during the construction phase, it will be stored suitably far away from the canal and other surface water features and covered to avoid excessive sediment run-off or wind blow;
- Given the proposed construction methodology the construction phase of the project is not anticipated to result in significant levels of silt laden run off. Nevertheless the site will be regularly monitored by construction staff for signs of run-off such as silt in surrounding vegetation and measures will be put in place to prevent this where necessary. It is noted

that for much of its length the southern side of the northern towpath is bounded by a vegetated bank that prevents the runoff of water from the towpath to the canal. This bank will be retained for its length adjacent to the proposed greenway. At locations where there is no bank present silt run off shall be captured using a toe board buried 50mm into the ground and fixed between the temporary construction boundary fencing posts at locations where the edge berm does not exist. The toe board will be required to tie-in with the existing vegetation bank at either end;

- Excavations will be carried out using a suitably sized excavator;
- Any excavated soil that is not re-used will be disposed of to a Local Authority approved waste disposal facility;
- In all circumstances, excavation depths and volumes will be minimised and excavated material will be re-used where possible.

2.9 Fuel Use and Storage

The works compound will be located off the R120 where the existing works compound was used for upgrading works to this road. This will ensure that all fuel and machinery are located greater than 70 metres from the Grand Canal. The use of machinery at the site carries the potential for accidental hydrocarbon contamination of the area, by fuel spillages or oil leaks for example. The works will be carried out in accordance with the following measures to avoid such impacts:

- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned.
- When not in use, all valves and fuel trigger guns from fuel storage containers will be locked.
- All plant refuelling will take place on site using mobile fuel bowsers. Only dedicated trained & competent personnel will carry out refuelling operations.
- Plant refuelling will take place as far as practicable from watercourses. A spill kit and drip tray shall be on site at all times and available for all refuelling operations. Equipment shall not be left unattended during refuelling.
- All pipework from containers to pump nozzles will have anti-siphon valves fitted.

- Strict procedures for plant inspection, maintenance and repairs shall be detailed in the contractor's method statements and machinery shall be checked for leaks before arrival on site.
- All site plant will be inspected at the beginning of each day prior to use.
- Defective plant shall not be used until the defect is satisfactorily fixed.
- All major repair and maintenance operations will take place off site.
- Care will be taken at all times to avoid contamination of the environment with contaminants other than hydrocarbons, such as uncured concrete or other chemicals.
- The plant refuelling procedures described above shall be detailed in the contractor's method statements.

2.10 Measures to Protect Water Quality & Surface Water Bodies

- A number of aqueducts occur along the Greenway Route. These aqueducts cross over watercourses such as the Tobermaclugg Stream. To prevent the ingress of any surface water or dust emissions to these watercourses during the construction phase temporary silt trap and impermeable barrier will be placed along the edge of the aqueduct while dust screens will be placed over the aqueduct guardrails.
- Suitable prevention measures should be put in place at all times to prevent the release of sediment to the Grand Canal and other drainage channels associated with construction areas and migration to adjacent watercourses. It is noted that for much of its length the southern side of the northern towpath is bounded by a vegetated bank that prevents the runoff of water from the towpath to the canal. This bank will be retained for its length adjacent to the proposed greenway. At locations where there is no bank present silt run off shall be captured using a toe board buried 50mm into the ground and fixed between the temporary construction boundary fencing posts at locations where the edge berm does not exist. The toe board will be required to tie-in with the existing vegetation bank at either end.
- To reduce erosion and silt-laden runoff the existing vegetated raised bank along the canal bankside (on the southern side of the proposed greenway will be retained throughout the length of the greenway.)

- Disturbance to natural drainage features should be avoided during the construction and/or maintenance of routes.
- Excavated material will not be stored immediately adjacent to watercourses.
- During route maintenance no construction activities should be undertaken at watercourse crossing in wet weather conditions.
- Any refuelling or lubrication of machinery will not be undertaken within 50m of a watercourse

2.11 Non-Native Invasive Species

While the presence of non-native invasive terrestrial plant species was not identified along the proposed Greenway Route during habitat surveys, the proposed works will involve the movement of soil on the site and will create disturbed ground that may be subject to colonization with invasive species such as Japanese Knotweed and Butterfly Bush. In stream works are not proposed as part of the Greenway, but are proposed as part of the ongoing maintenance works. There will be no in-channel works as part of the scheme but there is considered to be some potential for the spread of aquatic invasive species (e.g. Zebra Mussel or Elodea spp).

- Any vegetation clearance or construction works to be undertaken in the vicinity of areas identified as supporting non-native species will be undertaken in accordance with the Transport Infrastructure Ireland (TII) (formerly the National Roads Authority (NRA)) guidance measures for the control and management of noxious weeds and non-native invasive species (see NRA, 2010). Sites of known infestation shall be clearly marked prior to works and avoided during construction. The importance of preventing the spread of these species will form part of a tool box talk to all personnel prior to construction commencing.
- In the event that additional topsoil and quarried stone is required on the site, it will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.
- Sites of known infestation shall be clearly marked prior to works and avoided during construction. The importance of preventing the spread of these species will form part of a tool box talk to all personnel prior to construction stage.

Spread of Invasive Species

- All contractors should incorporate strict biosecurity protocols into their Construction Environmental Management Plans. This should include the thorough cleaning and disinfection of all machinery prior to arrival and departure from the site, to prevent the spread of invasive species.
- In the event that additional topsoil and quarried stone is required on the site, it will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.

2.12 Mitigation Measures from the Ecological Impact Assessment for species

2.12.1 Mitigation by avoidance

2.12.2 Habitats

The proposed greenway design has been underpinned by the mitigation hierarchy of avoidance, reduction and remediation. As such the final design of the greenway has been restricted to the footprint of the existing towpath and will avoid any areas of semi-natural grassland occurring along the northern bank of the canal. The approach will ensure that the project results in no loss of emergent reed and large sedge swamp habitat and tall herb swamp along the northern bank of the canal. Similarly there will be no loss of exposed banks, calcareous grassland, scrub and treelines bounding the northern side of the towpath. A topographical survey has been completed for the project and the construction phase will not require the removal of any trees during the construction phase.

The proposed greenway will not involve any new watercourse crossings and only existing crossing over the Tobermaclugg Stream and other minor watercourses will be utilised for the project. The absence of any new crossings will ensure potential habitat loss and disturbance to fauna along the canal is avoided.

2.12.3 Fauna

It is not proposed to include any public lighting along the greenway. The avoidance of lighting will ensure that potential adverse effects to light sensitive species, such as bats, badgers, otters, barn owl and a range of invertebrates will be avoided.

2.12.4 Birds

Impacts to breeding birds will be avoided by retaining all trees, scrub and woodland occurring either side of the greenway.

2.12.5 Otters

Construction Phase

Pre-Construction Surveys

Prior to any works being carried out, a pre-construction Otter survey will be undertaken within 2 – 3 weeks of works commencing. The survey will aim to identify the presence of any otter holts and/or couches along the canal. Particular attention will be required to be given to the presence of any holts along the northern bank of the canal and adjacent to or under the proposed construction footprint.

Camera trap monitoring will be included as a method of monitoring during the pre-construction surveys. Camera traps will be required to take still images at a scheduled time interval (i.e. every 5 minutes) to identify the presence of otters. This is required to offset the limitations of infrared camera traps being triggered by otters, whose body temperature, due to submersion in water, is frequently below that required to trigger cameras.

Based on the findings of otter surveys completed to date it is not predicted that the construction phase of the proposed greenway will result in direct disturbance to otter holts or couches and will not require otters to be excluded from such breeding/resting sites. However in the event that any holt or couch is identified within the footprint of the project site during pre-construction surveys a derogation licence under Section 25 of the Habitats Regulations, issued by the NPWS on behalf of the Department of Culture, Heritage and the Gaeltacht, will be required in advance of any works commencing. Such a derogation licence is required where a holt will be physically disturbed by works and/or where works may result in disturbance to an active breeding holt. Where works are to be undertaken within 150m of an active breeding holt the developer will be required to consult with the NPWS prior to such works commencing.

In the event that exclusions of an otter holt are required, they will be undertaken in accordance with the TII/NRA Guidelines (NRA, 2008).

It is noted that otters can breed at any time of the year, therefore in the event that otter holts are identified, it will be a requirement of the pre-construction surveys to establish the breeding status of such holts. The breeding status of a holt can be established by undertaking repeated monitoring of the holt over a number of consecutive days. Methods to monitor otter traffic at the holt can include camera traps and the placement of sand at entrances to record footprints. In the event that the holt is identified as inactive the entrance should be blocked to prevent the reoccupation of the holt by otters. The holt should be left blocked for another five days and if there are no signs of otter activity at the holt during this time then it should be destroyed immediately under licence. The destruction of any otter holt will be required to be supervised by the licence holder.

Protection of Water Quality

The measures outlined in Section 2.10 that aim to protect water quality will be implemented in full. The successful implementation of these measures will ensure significant effects to water quality and otter habitat is avoided during the construction phase.

Operation phase

The proposed greenway is an existing way-marked way and is currently used by both cyclists, and walkers, including dog walkers. The bank sides are also used by anglers for fishing. In light of its current usage as a recreational trail and amenity, it is not anticipated that any predicted increased use in the trail will result in significant disturbance to otters. Nevertheless, the design of the proposed greenway has sought to minimise any potential disturbance to otters as a consequence of the proposed trail surface upgrade through the provision of the following measures:

- The footprint of the proposed greenway will follow the footprint of the existing towpath and its extent will the restricted to the existing corridor occurring between the verge and bankside on the north side of the towpath and the existing verge and bank on the south side of the towpath.
- The emergent bankside vegetation occurring along the northern canal bank will be retained and the proposed greenway will be set back 1m from the canal throughout its length so that the existing shallow bank occurring along much of its length is retained in place. In addition enhancement management measures for the bankside emergent vegetation have been outlined (see Section 2.13 below) and the implementation of this management will enhance the cover afforded by this vegetation to the canal from the towpath.
- No habitats that provide potential cover for otters within the terrestrial zone 10m either side of the canal will be lost to the footprint of the proposed greenway.
- The project does not include any elements that will encourage access to the end of the canal bank. As stated above the emergent vegetation occurring along the canal will be retained.

2.12.6 Badgers

Construction Phase

Approach to Managing Disturbance to the Active Main Sett

An active main sett occurs along adjacent to the proposed greenway. One badger entrance emerges onto the northern side of the greenway. Due to the proximity of the construction footprint immediately adjacent to this sett, the construction works will have the potential to result in temporary disturbance to this sett during the excavation of trenches and the laying of ducting and the new trail surface. The proposed works will not require the destruction of the sett or any of its entrances. It is also anticipated, based on distribution, levels and direction of travel of the sett entrances that tunnels or chambers associated with the towpath will not occur under the footprint of the towpath will not be physically disturbed by the excavations. In light of this, it is not proposed to exclude badgers from the sett during the construction works in the vicinity of the project. Nevertheless, whilst no sett structures are anticipated to occur under the construction footprint

this cannot be confirmed with certainty until excavations are undertaken. In view of this a precautionary approach will be taken to the proposed works within a 50m buffer distance of the badger sett and works within this distance of the sett will only be completed upon receipt of a derogation licence issued by the NPWS that permit the works and potential disturbance to badgers to proceed.

In the event that a derogation licence permitting the works to proceed is issued by the NPWS, these works will be required to conform to the following measures:

- A preconstruction survey for the status of the (currently active) main sett occurring adjacent to the towpath will be undertaken. This survey will be required to determine whether the sett is still active or inactive in advance of the construction works. The surveys should be completed within two weeks of the commencement of the construction. To establish the status of the sett continuous monitoring over a 5 day period will be required. Methods to establish badger activity at the site will include the deployment of camera traps monitoring traffic at sett entrances; the provision of sand pads at sett entrances to record footprints; the search of sett entrance for badger hair and signs of fresh excavations, spoil etc.

- All construction works associated with the proposed greenway within 150m of the active badger sett will be completed between the month of July and November, inclusive, so that disturbance to badgers during the breeding season is avoided.

- In the event that the known badger sett (or any other badger sett identified in the future during pre-construction surveys) is confirmed to be inactive then an application to the NPWS seeking a derogation licence for construction works at any time of the year can be made.

- All construction works associated with the stretch of the proposed greenway within a 30 metre buffer area of the badger sett will be completed within a period of 3 to 4 consecutive days between the months of July and November. Every effort will be made to minimise the time required to complete remaining construction works within 150m of the active sett. The project Ecological Clerk of Works (ECoW), who will also be the licenced scientific agent on a derogation licence will liaise with the construction contractor to ensure that the construction timeframe within 150m of the active badger sett is minimised.

- The badger sett will be fenced off with temporary construction fencing at the start of the construction phase. The fencing will no block badger access to the one entrance lying at the foot of the bank adjacent to the towpath and the proposed greenway.

- All construction staff will be notified of the presence of the badger sett, its significance in term of the conservation of the local badger population on site and its sensitivity to disturbance.

- All construction work associated with the proposed greenway within 150m the sett shall cease by 6pm between between the months of March and September and by 4pm on any day between the months of October and February. This is to ensure no construction activity occurs at dusk when badgers start to emerge from their setts.

- All construction staff and machinery will be prevented from entering the protection zone.

- All chemicals or other potentially polluting materials associated with the construction operation of the greenway will be stored in secure bunded containers and in a bunded area at the construction site compound, which will be located a significant distance from the known badger sett location.

- Trenches associated with the proposed ducting will either be required to be covered at the end of each working day or include a save means of escape for any badger falling in.

- No blasting or piling will be undertaken as part of the construction works along the proposed greenway.

- All construction works within 30m of the active badger sett will be monitored by the project ECoW who will be the named licence holder.

- In the event that a badger tunnel or chamber is found to occur within the excavation footprint, the ECoW will direct the construction crew to cease operations. The ECoW will survey the tunnel/chamber to ensure that no badgers are present or have been harmed by the excavations. Once the ECoW has confirmed that no badgers are present or have been harmed the newly exposed tunnel entrance will be blocked by the ECoW.

General Pre-Construction Badger Survey

Prior to any works being carried out, a pre-construction badger survey will be undertaken. This survey should be completed well in advance of the commencement of construction to allow for derogation licence applications in the event that additional badger setts are identified. In the event that additional setts are identified adjacent to the construction footprint then all measures outlined above for the known active main sett will be required to be implemented.

Operation phase

The proposed greenway is an existing way-marked way and is currently used by both cyclists, and walkers, including dog walkers. In light of its current usage as a recreational trail and amenity it is not anticipated that any predicted increased use in the trail will result in significant disturbance to badgers.

The design of the proposed greenway will minimise any potential operation phase disturbance to badgers and the known badger sett ensure that the existing high bank bounding the northern towpath in the vicinity of the badger sett is retained and that no vegetation occurring on the bank and surrounding the site is removed as part of the development. The absence of any proposal to include lighting along the canal will also ensure that existing night time light levels in the vicinity of the badger sett are retained.

2.12.7 White-clawed crayfish

The design of the project which will avoid any requirements for instream works along the canal will ensure that physical disturbance to crayfish and their habitat is avoided.

The mitigation measures outlined in Section 2.10 to minimise potential risks to water quality in the canal and along watercourses passing under the canal will protect crayfish against any potential adverse effect that could otherwise arise as a result of perturbations to water quality.

2.12.8 Vertigo Moulinsiana

This species has been recorded in association with fringing emergent vegetation around the pond to the north of the towpath in the vicinity of Gollierstown Bridge. The hydrology of this fringing area is influenced by seepage from the canal. As such the design has sought to retain similar subsurface conditions along this section of the canal so that seepage pathways from the canal to the pond can be maintained. Backfilling along the section of the trench opposite the artificial quarry ponds at Gollierstown quarry will be undertaken in accordance with design measures that aim to reinstate the existing towpath substrated around the cable duct. The existing substrate will be reinstated at this location to maintain seepage pathways between the canal and the artificial pond to the north where the rare species *Vertigo moulinsiana* was recorded.

2.13 Enhancement

An opportunity for habitat enhancement has been identified in the vicinity of Gollierstown Bridge. The section of the northern canal bank either side of Gollierstown Bridge and between the existing ramps and the canal will be closed off during the construction phase while the embankment underlying the ramps are stabilised and the ramps are re-graded to cater for universal access along this section of the greenway. It is proposed that tree planting be undertaken in this area to prevent access. Planting will be undertaken using thorny species and other thicket species, such as hazel that are typical of the canal verge. In addition to this an opportunity will be taken to provide an artificial holt in the fill material that underlies the ramp. Once surrounding scrub and woodland vegetation is established this will represent a suitable location for otters to use as breeding site.

During ecological surveys in 2018 management practices unsympathetic to the emergent tall reed and tall herb swamp habitat along the canal bankside were evident. These practices included the close cropping of the vegetation associated with this habitat and the casting of cuttings on to this habitat which in turn results in eutrophication of the habitat and adjacent canal waterbody. As part of the proposed greenway it is proposed that the management regime of these bankside habitats is enhanced by 1) avoiding the close cropping of the bankside vegetation. This vegetation should not be cut to less than 0.5m and where the vegetation is less than 0.5m in height no cutting should be undertaken; 2) All cutting generated during ongoing vegetation management along this section of the canal will be collected and disposed of offsite at an approved waste disposal site.

2.13 Ecological Clerk of Works

It will be a requirement of the contractor to provide for an Ecological Clerk of Works (ECoW) to supervise works along the towpath, in particular in relation to excavation activities. The ecological clerk of works must be fully qualified and experienced with proof of qualifications and previous project experience and be a member of the Institute of Ecology and Environmental Management. The role and responsibility of the ECoW during the construction phase are outlined in Appendix 1.

2.14 Monitoring

At present there are no design specifications for lighting the Greenway and there is a general assumption against the incorporation of lighting unless in urban areas or potentially at access points. If lighting is proposed, the type and regimes proposed will be of a style that will minimise impacts on bats and other nocturnal animals, with reference to best practice (Collins, 2016);

Monitoring plans (during and post construction) for protected species comprising otters, badgers and Vertigo moulinsiana be implemented to ensure adverse environmental effects are avoided. Details of the monitoring to be undertaken are outlined in the EcIA for the greenway. The implementation of the monitoring measures will form part of the planning consent.

3 Receiving Environment

3.1 Introduction

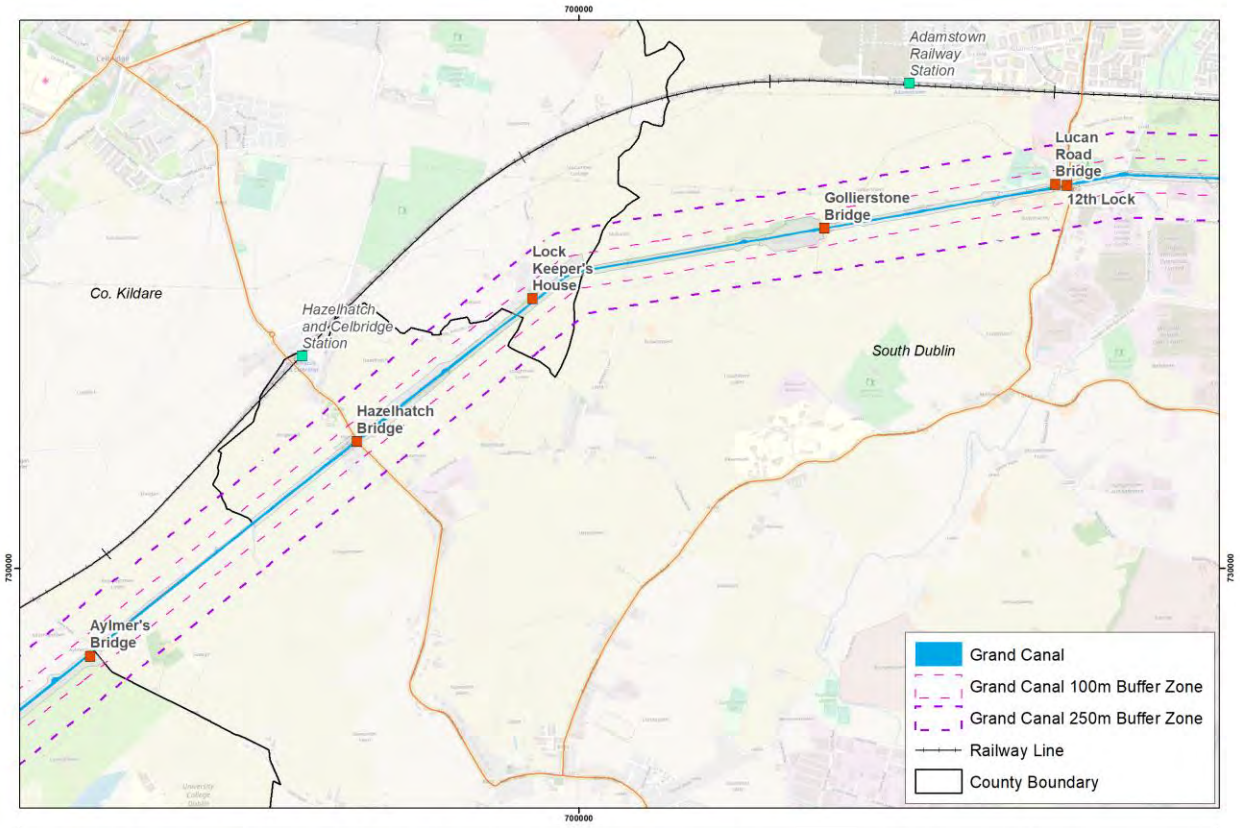
Schedule 6 of the Planning and Development Regulations, 2001, as amended, outline the aspects of the environment likely to be significantly affected by a proposed development. These are:

- Human beings
- Fauna and flora
- Soil
- Water
- Air/climatic factors
- Landscape
- Cultural heritage, including the architectural and archaeological heritage and cultural heritage
- Material assets
- The inter-relationship between the above factors.

The Grand Canal

The Grand Canal comprises of some 144km extending from Dublin city and connecting with the River Shannon on the Offaly/Galway boundary. The Grand Canal is a focus for a wide range of uses, especially for recreation and tourism purposes. The visual quality of the surrounding areas is intrinsic to maintain the attractiveness of the Grand Canal corridor. As an ecological corridor the Grand Canal is of great significance as it links and connects with a number of habitats and key watercourses along an east-west orientation. It functions as an important stepping stone for a range of species.

A summary of each of the above topics as they relate to the receiving environment is provided below:


700000
Adamstown Railway Station
Lucan Road Bridge
12th Lock
Gollierstone Bridge
Lock Keeper's House
Co. Kildare
Hazelhatch and Celbridge Station
South Dublin
Hazelhatch Bridge
730000
Aylmer's Bridge
Grand Canal
Grand Canal 100m Buffer Zone
Grand Canal 250m Buffer Zone
Railway Line
County Boundary
700000
Grand Canal: Aylmer's Bridge to 12th Lock
Data: SDCC; Waterways Ireland; OpenStreetMap
CRS: IRENET95 ITM
0
0.75
1.5
Km
1:17,500
N

3.3.1 Human Beings

The project area is located largely within Newcastle Electoral District. The immediate area is primarily agricultural with a dispersed settlement pattern of housings in the western area; this alters further east with landuse becoming increasingly industrial or enterprise related. Table 3 below shows the breakdown for Newcastle Electoral District.

Table 2 Electoral District

ED Name	ED ID	Total Population 2006	Total Population 2011	Total Population 2016	Deprivation Score 2006	Deprivation Score 2011	Deprivation Score 2016	Population Change 2006	Population Change 2011	Population Change 2016
Newcastle	3018	2625	3749	4257	5.08	6.22	4.19	11.72	42.82	0.14

Figure 3 overleaf shows the total population and Figure 4 population density for the project area and a wider 15km buffer

Figure 2 Total population per Electoral District 15km buffer.

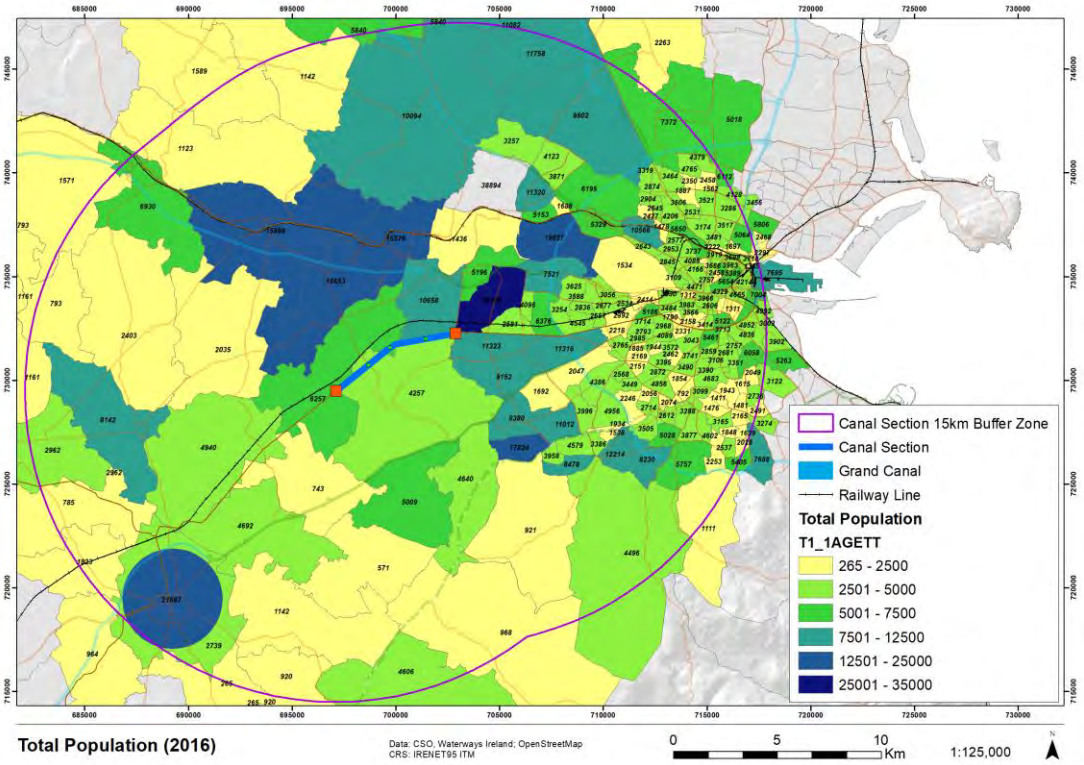
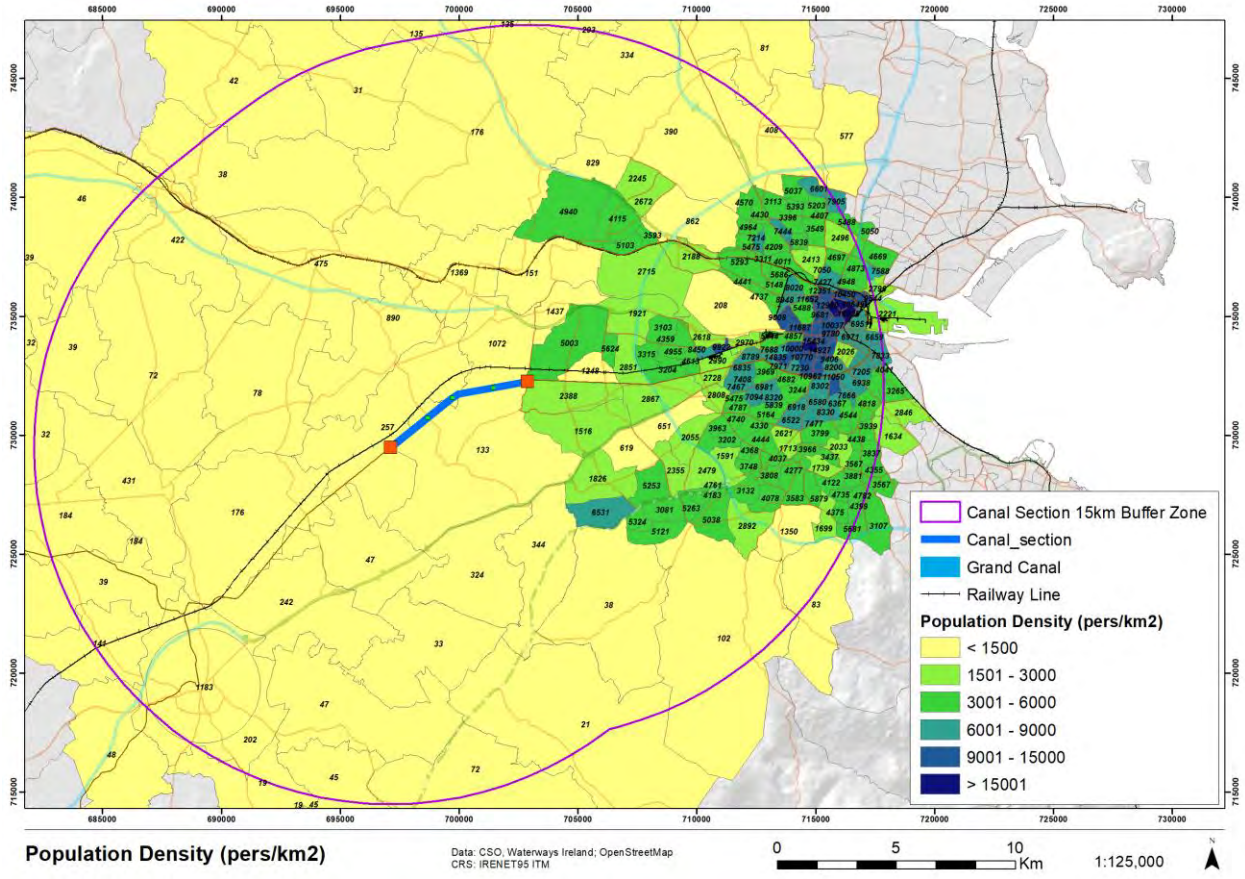


Figure 3 Population Density



In terms of potential sensitive receptors to environmental effects, such as noise, air quality and dust the following summarised the approach.

Sensitive Receptors

Based on the "Draft Advice Notes for Preparing Environmental Impact Statements issued by the EPA" (EPA, 2017), the following types of sensitive receptors should be noted in particular during impact assessment:

- homes;
- hospitals;
- hotels and holiday accommodation; and
- schools and rehabilitation workshops.

The Grand Canal towpath along this section is not situated near homes, the exception being one property close to the towpath near Hazelhatch. Barges are moored at Hazelhatch bridge but do appear to be permanently occupied, and the public house at Hazelhatch is not a dwelling house.

3.3.2 Flora and Fauna

A screening under Article 6 of the EU Habitats Directive has also been prepared for this planning application and should be read in conjunction with this EIA Screening report. The following European Sites are located within 15km of the project site:

The same sites listed above are also designated as proposed Natural Heritage Areas. There are no Special Protection Areas (SPA) located within 15km of the proposed development site.

Figure 4 Special Areas of Conservation 15km of Grand Canal Greenway

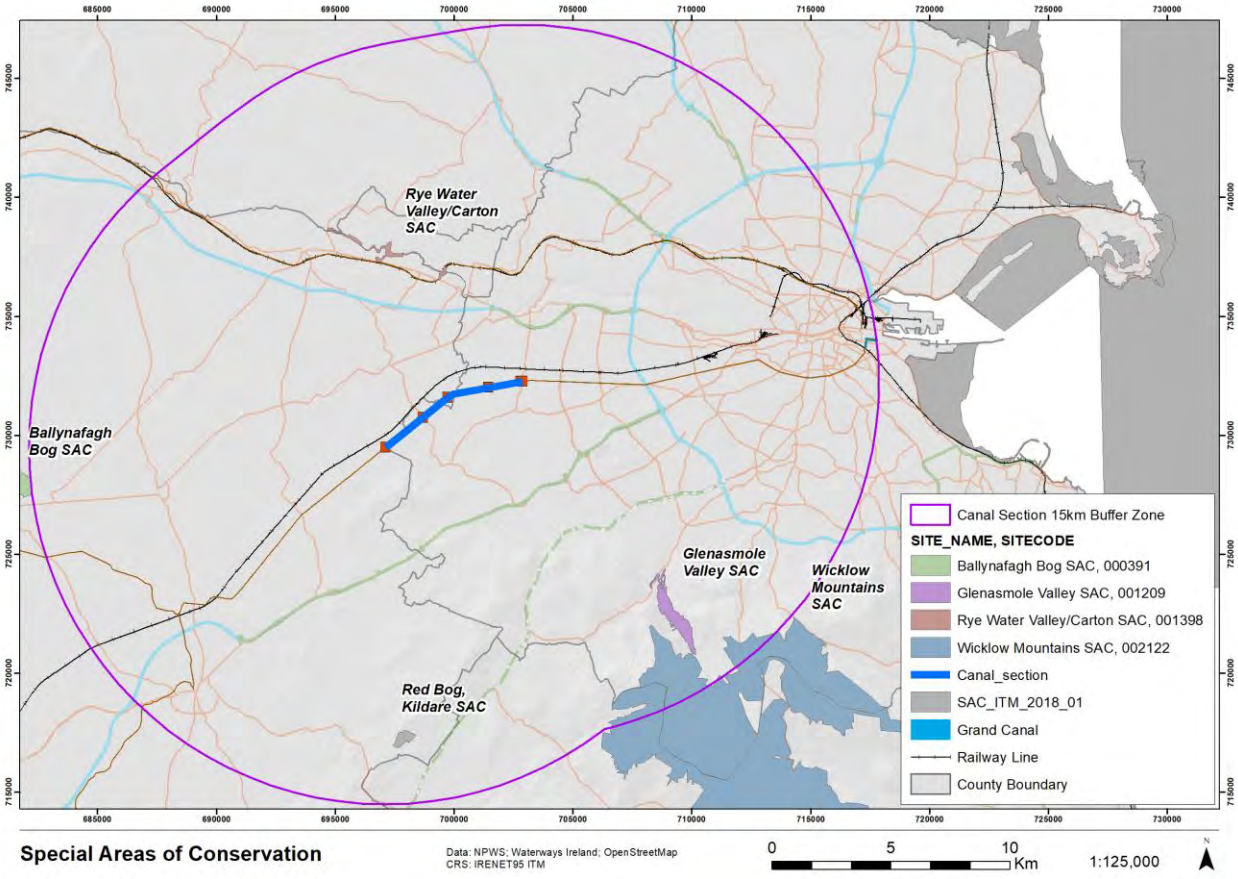


Figure 5 Special Protection Area 15km Grand Canal Greenway

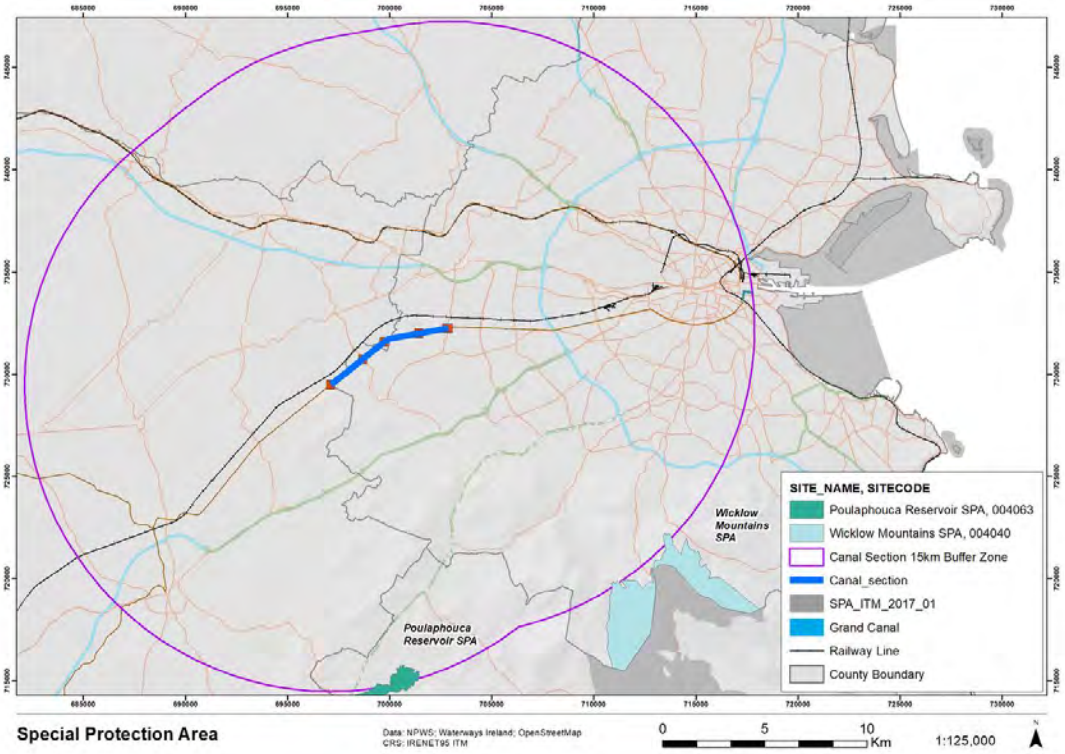


Figure 6 Natural Heritage Area 15km of Grand Canal Greenway

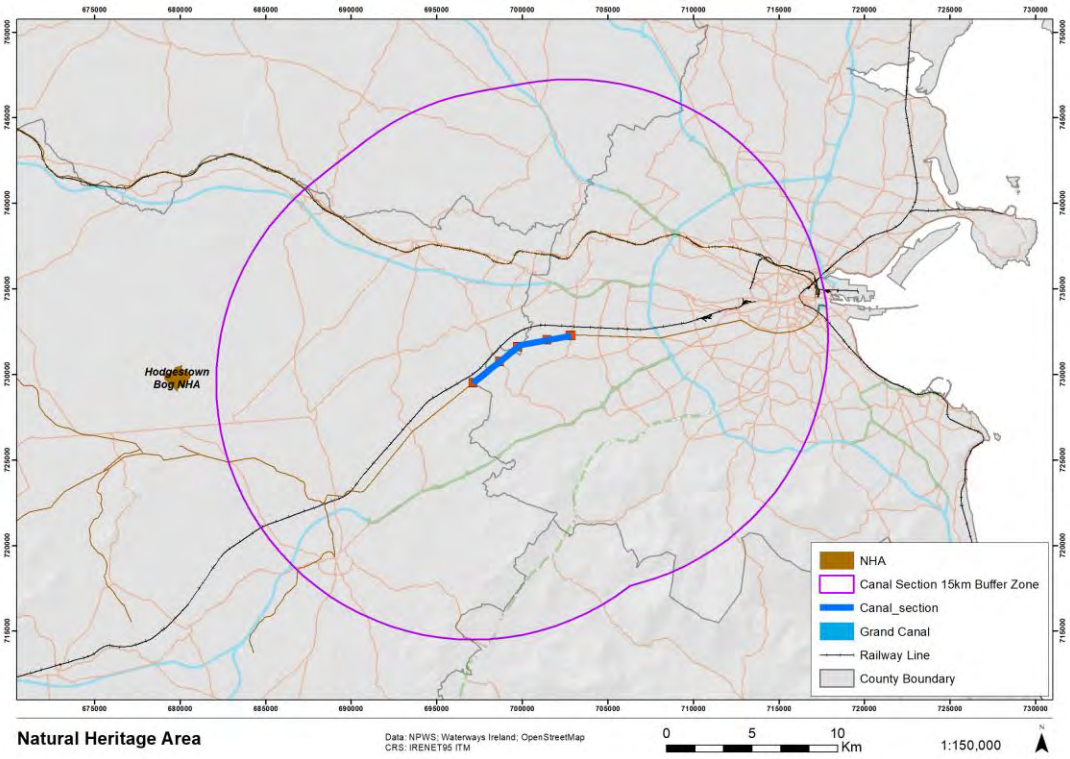
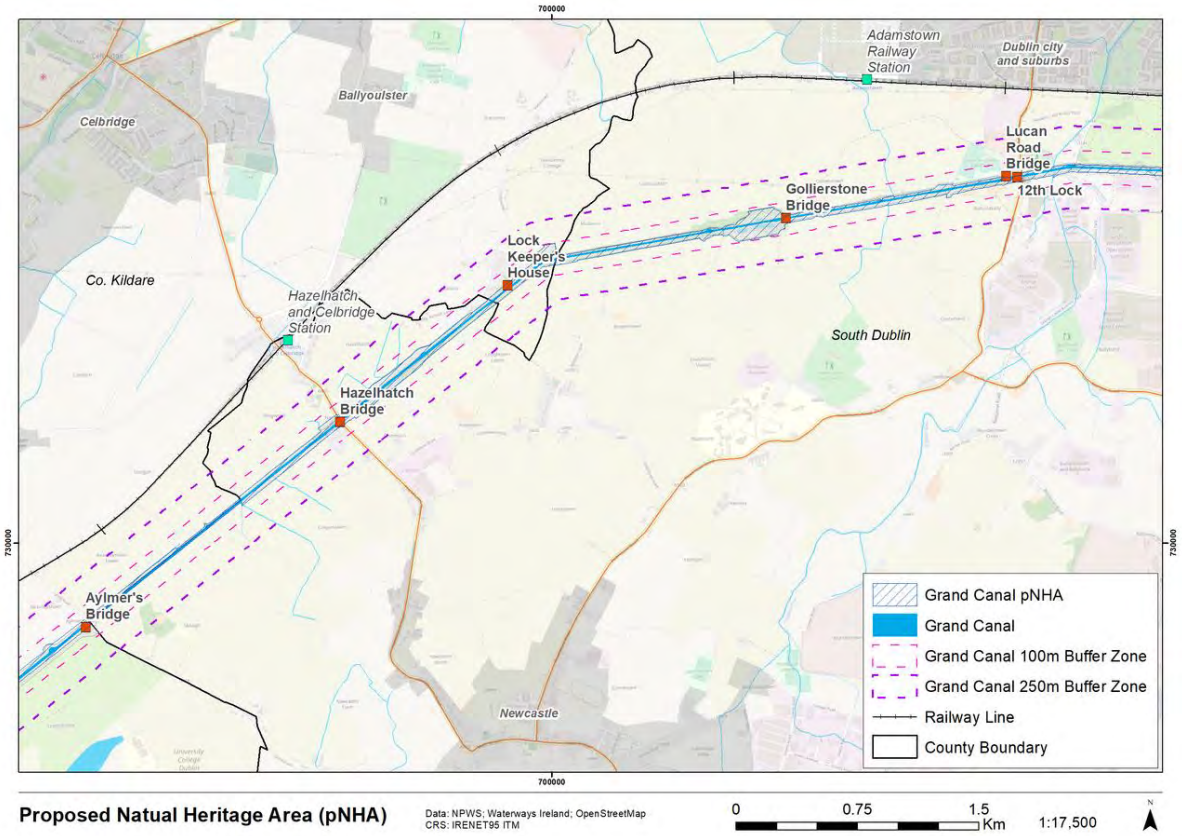


Figure 7 Proposed Natural Heritage Area within 15km of Grand Canal Greenway



3.3.3 Ecological Impact Assessment

A range of ecological surveys for the section of the Grand Canal between the 12th Lock and Hazelhatch have been completed in 2015 (ROD, 2016), 2016 (FERS, 2016a, 2016b) and 2018 (DEC Ltd.). These surveys have mapped habitats occurring along this section of the canal and have gathered baseline information on the presence and distribution of protected species supported by this section of the canal.

The entire stretch of the north bank of the Grand Canal between the 12th Lock and Hazelhatch has been identified as an Ecologically Sensitive Area (ESA) (ROD, 2016). The ROD 2016 report describes this ESA as follows:

This ESA is identified for the diverse vegetation within the open channel and the rich diversity and zonation on the canal verge. The aquatic diversity includes Sagittaria sagittifolia swamp amongst well-developed fringe Nuphar-Potamogeton communities. The Phragmites swamp is also well developed along the canal margins between Aylmers and Golierstown Bridges.

The south canal verge is also diverse with Common Spotted Orchid (Dactylorhiza fuchsii) and many constant species of neutral and dry calcareous grassland abundant. Beyond the south canal boundary there is a mature species-rich hedgerow/woodland including Oak, Ash, Spindle, Sycamore, Willow and Beech. The scrub and woodland mosaic along the north boundary of the canal between Hazelhatch and Aylmer Bridges is also diverse.

The habitats recorded along the section of the canal between Hazelhatch and the 12th Lock are listed in Table 4 below along with a brief summary description.

Table 3: Habitats occurring along the Grand Canal pNHA between the 12th Lock and Hazelhatch

Habitat Code	Habitat Name	Summary Description	Evaluation
BL1	Stone Walls	Examples of stone wall habitat along the proposed greenway are restricted to parapet walls along Gollierstown Bridge and the stone walls associated with the 12th Lock towards the eastern end of the alignment.	Low to Moderate Value, Locally Important
BL3	Buildings and artificial surfaces	This habitat type comprises areas of existing paved or hard-core surface along the northern two-path, buildings and Gollierstown Bridge.	Low to Moderate Value, Locally Important
ED2	Spoil and bare ground	Examples of this habitat occur to the south of the canal near the 12th Lock. Areas of bare ground surround an existing shed complex at this location.	Low Value
FL8	Other artificial lakes and ponds	A number of artificial ponds occur to the west of Gollierstown Bridge on the northern and southern side of the canal. Five ponds are located to the north of the canal and the northern towpath, while three are located to the south of the canal. All ponds are likely to have arisen	High Value, Locally Important to Nationally Important

		as a consequence of the historical quarrying activity undertaken at Gollierstown quarry.	
FS1	Reed and tall sedge swamp	This habitat fringes much of the northern and southern canal bank. This habitat is dominated by a restricted range of species and is frequently flailed, with cut debris being left in situ.	Moderate to High Value, Locally Important
FW3	Canal	The canal between the 12th Lock and Hazelhatch supports a community of emergent aquatic vegetation that includes Charophytes, arrowhead, pondweeds, b	Nationally Important
GA1	Improved agricultural grassland	This habitat dominates the land cover to the north and south of the canal and pNHA boundary. It is generally intensively managed for livestock grazing.	Low Value
GA2	Amenity Grassland	Examples of this habitat occurring along the canal are restricted to the garden area of a residential dwelling towards the eastern end of the proposed greenway route.	Low Value
GS1	Dry calcareous and neutral grassland	Examples of this habitat occur in to the west and east of Gollierstown Bridge, while more discrete examples occur along the raised bank bounding the northern side of the northern towpath. Examples of this habitat are representative of the Annex 1 Habitat 6210.	High Value, Locally Important to Nationally Important

GS2	Dry meadows and grassy verges	Examples of this habitat occur along the verge of the northern towpath, particularly along the northern side of the towpath, where occasional management by mowing is undertaken.	High Value, Locally Important
TM	Towpath habitat mosaic	Towpath Mosaic is a bespoke habitat category developed by Waterways Ireland to describe the uniform habitat components that occur between open canal (FW3) and the vegetation either side of the towpath including the canal verge. This approach and habitat category is consistent with other Waterways Ireland canal surveys (see also Smith & Gittings, 2014). Due to the narrow bands of varying habitats along the canal bank, a towpath mosaic was used to map the transition from emergent vegetation at the edge of the canal to the semi- natural neutral/calcareous dry grassland communities found consistently throughout the canal towpath and boundary. This zonation in habitat was typically categorised as incorporating habitat types reed and large sedge swamp (FS1) to marsh (GM1) to wet grassland (GS4) and then to dry meadows and grassy verges (GS2) at the edge of the towpath. The towpath mosaic occurs over a width of approximately 2-3 m or	Low to High Value, Locally Important

		less. Additionally, a towpath mosaic consisting of amenity grassland (GA2), spoil and bare ground (ED2), dry meadows and grassy verges (GS2) and scrub (WS1) was often a common zonation identified along the canal bank.	
WD1	Broadleaved woodland	Linear stretches of broadleaved woodland occurs along much of the northern boundary of the lands adjacent to the canal's northern boundary. Well developed examples occur towards the west of the alignment in association with areas of steep fill and also in the vicinity of Gollierstown Bridge.	High Value, Locally Important
WN5	Riparian woodland	Examples of riparian woodland, characterised by mature willows and ash occur along the banks of the canal.	High Value, Locally Important
WN6	Wet Woodland	Examples of wet woodland occur to the north of the canal in the vicinity of Hazelhatch. This woodland has developed at the base of steep embankment that formers the northern bank of the canal at this location. It is dominated by a willows and ash with some oak and alder also occurring. Beech and sycamore are also frequent in this woodland habitat.	High Value, Locally Important
WL1	Hedgerows	Hedgerows forms field boundaries along agricultural field systems to the north and south of the canal, but are restricted	Low to High Value, Locally Important

		along the lands immediately adjacent to the canal	
WL2	Treeline	Treelines are the dominant linear woodland habitat occurring in the vicinity of the canal and they form a boundary along sections of the canal and also bound the towpath to the north.	Moderate to High Value, Locally Important
WS1	Scrub	Examples of scrub habitat occur through the lands adjacent to the canal and northern towpath.	Moderate to High Value, Locally Important

The section of the Grand Canal along the proposed greenway supports a range of flora and fauna. No protected flora has been recorded along this section of the canal.

The canal supports a population of otters, which are resident along this section of the canal. Spraints, prey remains, feeding sites, slides and couches were all recorded along this section of the canal.

A population of badgers also frequently the northern boundary of the canal and an active main badger sett is located here.

A range of bat species rely on the canal and fringing habitats as a foraging resource. The dominant species occurring along this section of the canal are Leisler's bat, Soprano pipistrelle and Common pipistrelle. Other species occurring include Daubenton's bat, Natterer's bat, Whiskered bat, Brown long-eared bat and Nathusius pipistrelle.

A diverse range of bird species (in excess of 20 species) were recorded along this section of the canal. Notable species observed along it include Barn Owl.

The canal supports important populations of both smooth newt and common frog.

The canal and adjacent habitats support a range of invertebrate species. An internationally important population of the Annex II listed species white-clawed crayfish are supported by the canal, while another Annex II-listed species, Vertigo moulinsiana, has been recorded to the north of the canal in the vicinity of Gollierstown Bridge. Other invertebrate species occurring include a range of odonata species (brown hawker; common hawker; variable damselfly; common blue damselfly; blue-tailed damselfly; large-red damselfly; common

darter) and lepidoptera species (oblique carpet; speckled wood; large white; green-veined white; small white; common blue; small tortoiseshell; meadow brown and painted lady). A population of the anthill building species yellow meadow-ant occurs in calcareous grassland habitat to the west of Gollierstown Bridge.

The main species found within the Grand Canal are: Roach (*Rutilus rutilus*), Perch (*Perca fluviatilis*); Pike (*Esox lucius*); Tench (*Tinca tinca*); European Eel (*Anguilla anguilla*); Bream (*Abramis brama*); Rudd (*Scardinius erythrophthalmus*). Roach are the dominant species detected within the Grand Canal in terms of biomass and abundance. The Annex II listed River Lamprey (*Lampetra fluviatilis*) have been recorded at two locations on the Grand Canal, at the 11th Lock and 6th Lock., both of which are located upstream from the proposed greenway.

3.3.4 Soil and Geology

The soils within the project area are predominantly surface water gleys with an increase in Luvisol soils further east towards the 12th Lock. The quaternary geology within the study are dominated by soil- till derived from Limestone; there are occasional areas of bedrock close to the surface /rock outcrops. The figures below shows the Quaternary geology and soil types.

Figure 8 Quaternary geology

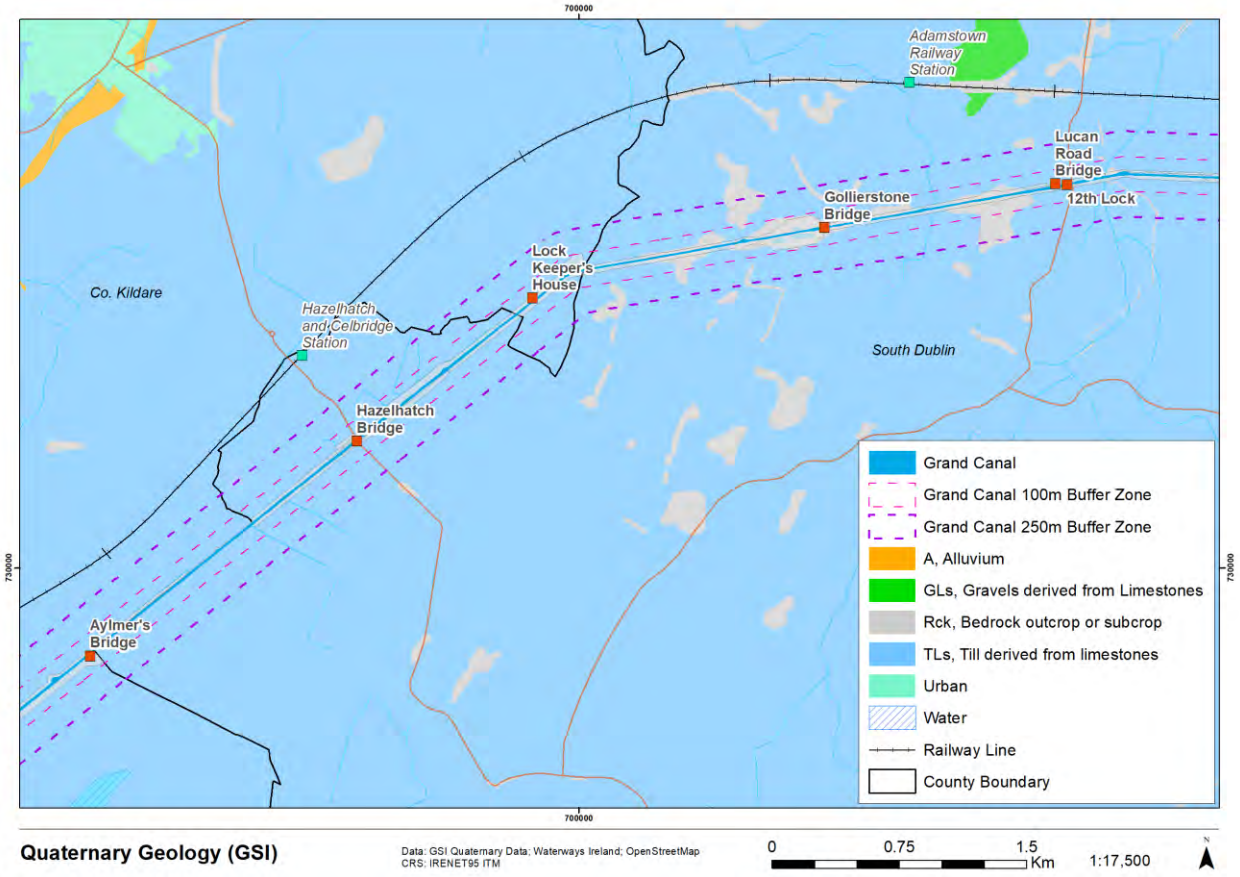
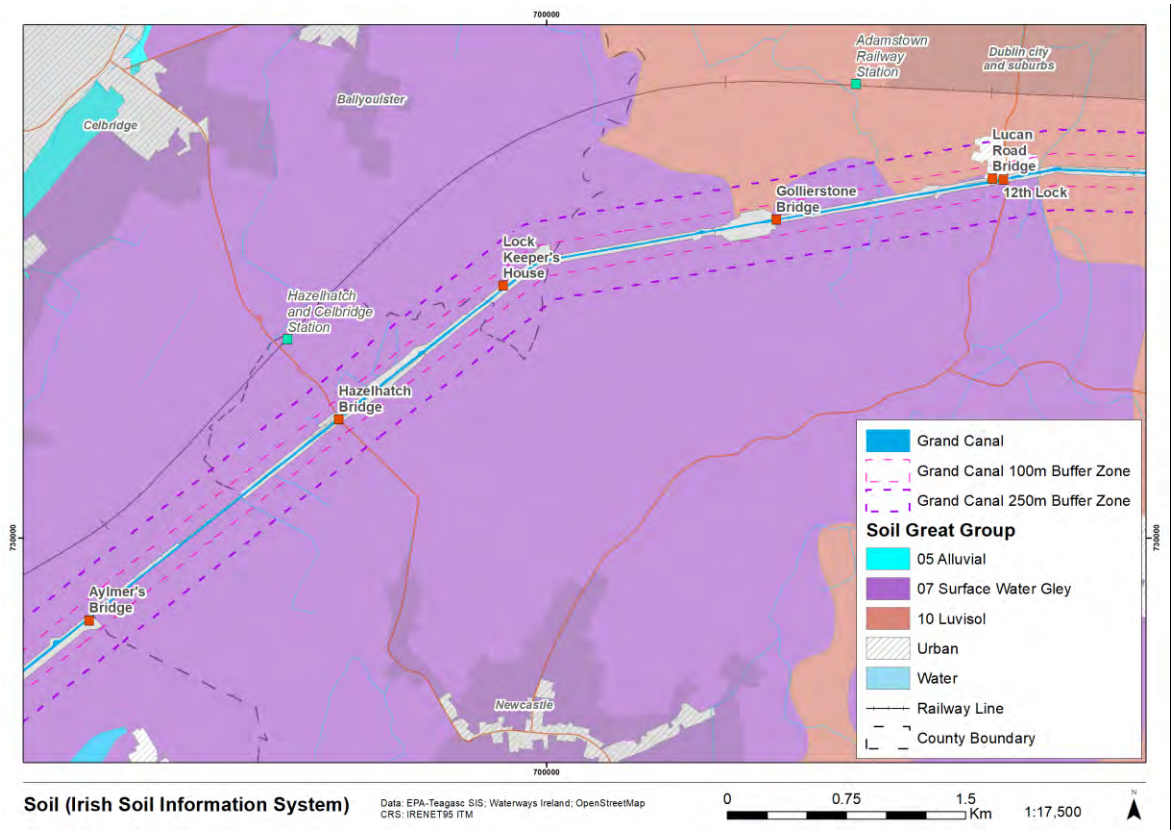


Figure 9 Soils



3.3.5 Water

The Water Framework Directive (WFD) is a key initiative aimed at improving water quality throughout the EU. It applies to rivers, lakes, groundwater, estuarine and coastal waters. The Directive requires an integrated approach to managing water quality on a river basin basis; with the aim of maintaining and improving water quality. The catchments based approach is now embedded in the WFD Programme for River Basin Management Plan for Ireland 2018 – 2021. A catchment is an area where water is collected by the natural landscape and flows from source through river, lakes and groundwater to the sea. The study area lands are situated within the Liffey and Dublin Bay Catchment (Code:09). The area of this catchment covers 1,624,42km2 and supports a total population density of 777 people per km2.

3.3.5.1 Surface water

Surface water status is classified under the WFD from 'high' to 'bad' status. In measuring this status both ecological and chemical parameters are measured and the overall status is determined by the lower threshold achieved for both ecological and chemical parameters.

According to the EPA's online Map Viewer, two watercourses cross the Grand Canal in this study area. One is of poor quality according to the EPA catchments.ie website (code Liffey 150); whilst

the watercourse further east is of moderate quality (code Liffey 170). The Grand Canal is classified as an Artificial Water Body under the WFD. The figure below shows the surface water status from the Water Framework Directive mapping site (www.catchments.ie).

Figure 10 Status of Water Quality (surface)

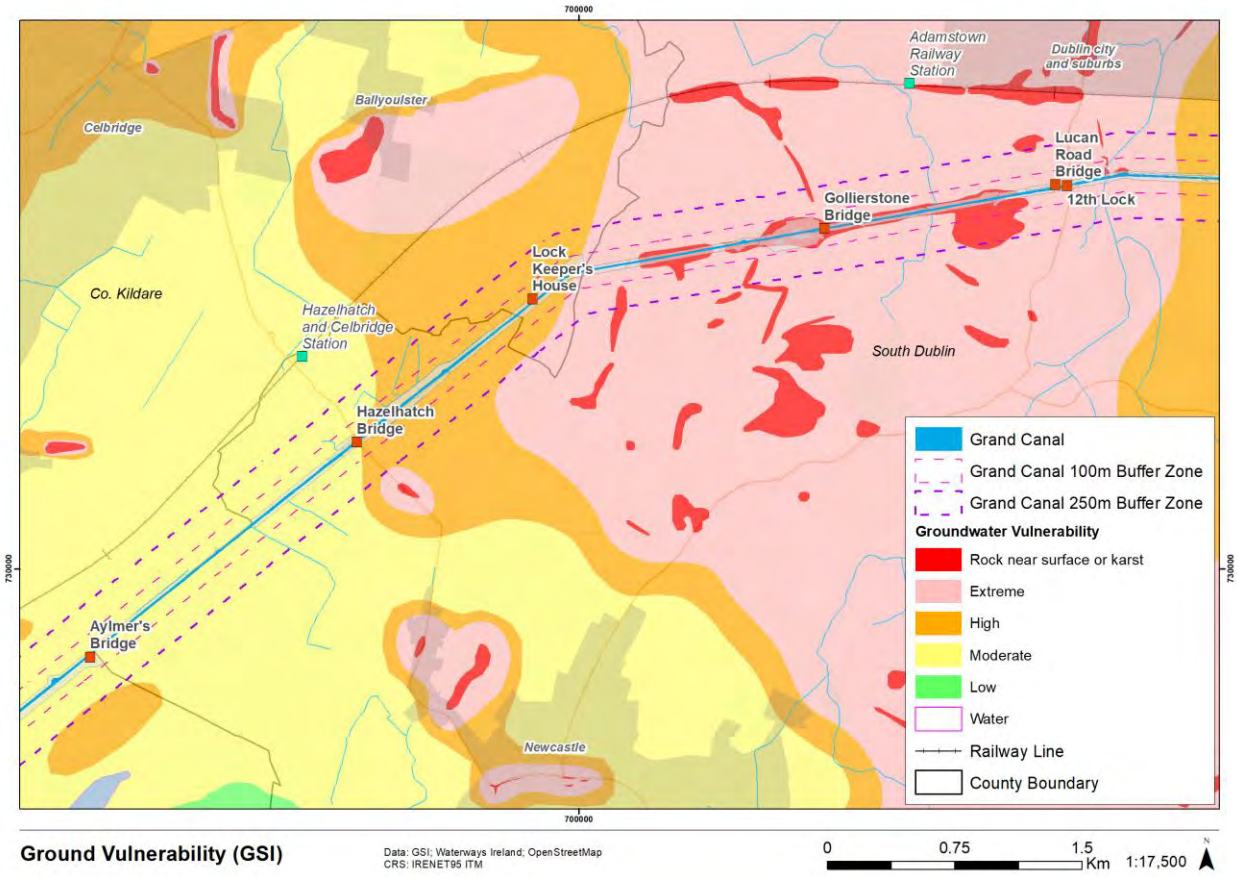
3.3.5.2 Groundwater

Groundwater is a further significant resource and refers to water stored underground in saturated rock, sand, gravel, and soil. Surface and groundwater functions are closely related and form part of the hydrological cycle. The protection of groundwater from land uses is a critical consideration and groundwater vulnerability is becoming an important management tool. The entire island of Ireland has been designated as a Protected Area for Groundwater under the WFD. Groundwater is important as a drinking water supply as well as the supply to surface waters. In addition, groundwater supplies surface waters. Groundwater is exposed to higher concentrations of pollutants that are retained in the layers of rock and soil. The exposure to pollutants lasts much longer as groundwater moves at a slower pace through the aquifer. The quality of our drinking water supply, fisheries and terrestrial based habitats is intrinsically linked with groundwater quality. The Geological Survey of Ireland (GSI) aquifer categories are based on their vulnerability to pollution, i.e. the ease at which it can enter the subsurface layers. The classification of extreme or high vulnerability means that the groundwater in these areas is very vulnerable to contamination due to hydrogeological and soil factors.

The Geological Survey of Ireland's Groundwater Vulnerability Mapping shows the groundwater vulnerability for the study area within a catchment where groundwater vulnerability is considered

Extreme and/or High, as the figure below illustrates. Groundwater overall is identified as being of good status according to the WFD classification (catchments.ie).

Figure 11 Groundwater Vulnerability



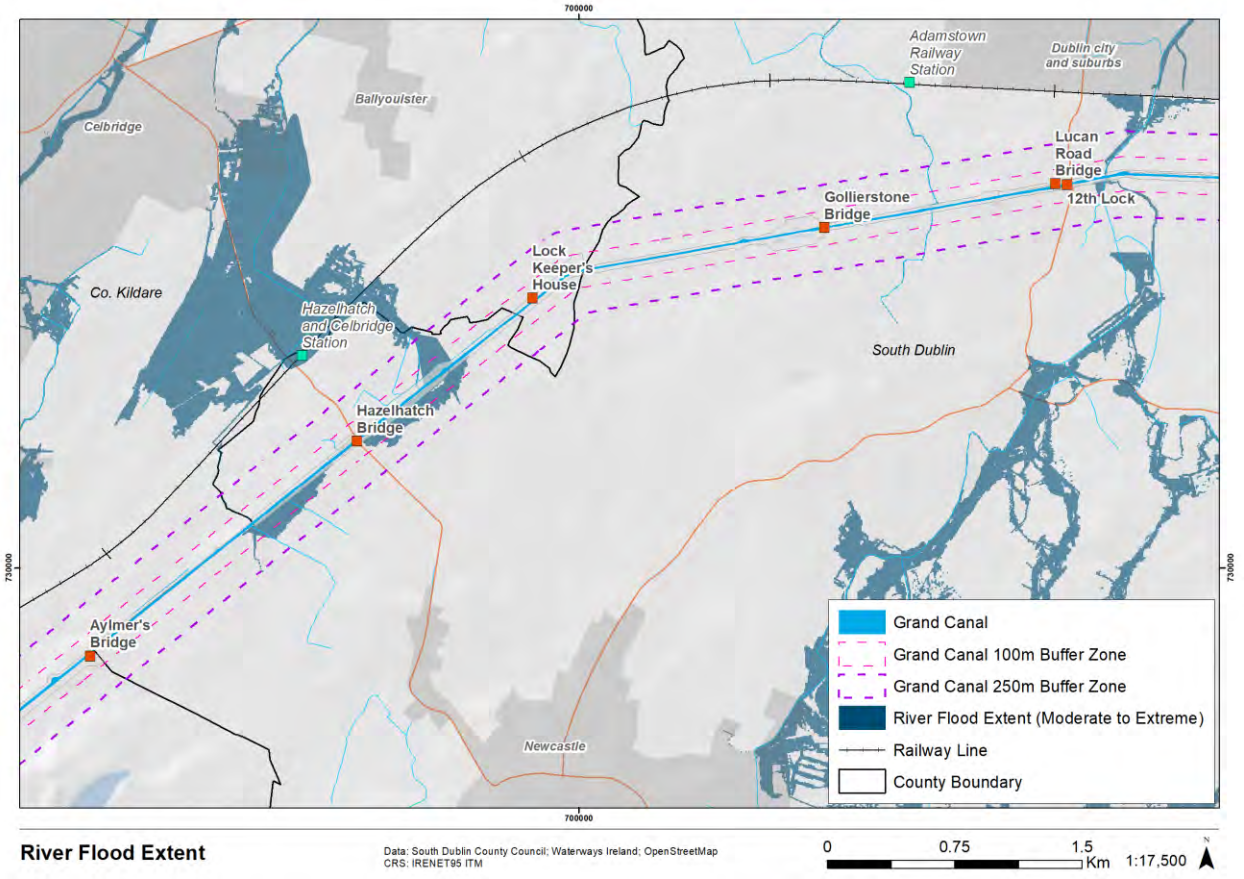
3.3.5.3 Flooding

The Planning System and Flood Risk Management, Guidelines for Planning Authorities, 2009, issued by the DoEHLG and undertaken in conjunction with the OPW, requires Planning Authorities to prepare a Strategic Flood Risk Assessment (SFRA). The primary purpose of the SFRA is to determine flood risk within a particular geographical area. It should be noted the SFRA is an ever evolving document, which is to be reviewed and updated on a regular basis in the light of emerging information, flood data and an improved understanding of flood risk. The figure below shows flood risk extents. The area particularly associated with the western part of the study area, around Hazelhatch of the canal, similar classifications are present.

3.4.5.4 Water seepage from the Grand Canal

The levels in the ponds immediately adjacent to the canal are likely to be influenced by water seepage from the canal. Trial pits undertaken along the northern towpath in November 2018 indicated that water was seeping through the canal linear and under the towpath stone-work.

Figure 12 Flood Risk map



3.3.6 Air and Climatic Factors

All developments, agriculture, energy generation, industry and commercial activity and waste generation contribute emissions to air and greenhouse gas (GHG) emissions; however the emission of pollutants from vehicles is one of the main threats to air quality in Ireland and contributes significantly to the increase of greenhouse gases. The latest annual report on Air Quality in Ireland 2017 (EPA, 2017) states that overall air quality in the country is good. Measured values of sulphur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), Ozone (O3), particulate matter (PM10 and PM2.5), heavy metals, benzene and polycyclic aromatic hydrocarbons (PAH) were all below limit and target values set out in the CAFE Directive and 4th Daughter Directive. However, when some of these parameters are compared to the tighter WHO Air Quality Guideline values, it highlights some potential issues. Ireland is above these guideline values with respect to PM10, PM2.5, ozone, NO2 and PAH.

The primary sources of pollutants are traffic (source of nitrogen dioxide and particulate matter), and domestic solid fuel use (particulate matter). Longer term encouraging a modal shift from cars

to walking and cycling will benefit local air quality and reduce greenhouse gas emissions from transport at a local scale.

Air Quality for the project area, recorded in the nearest monitoring stations further east (Tallaght, in South Dublin and Ballyfermot, Dublin City) is classified as 'good' as of 19th November 2018 (http://www.epa.ie/air/quality/).

3.3.7 Landscape

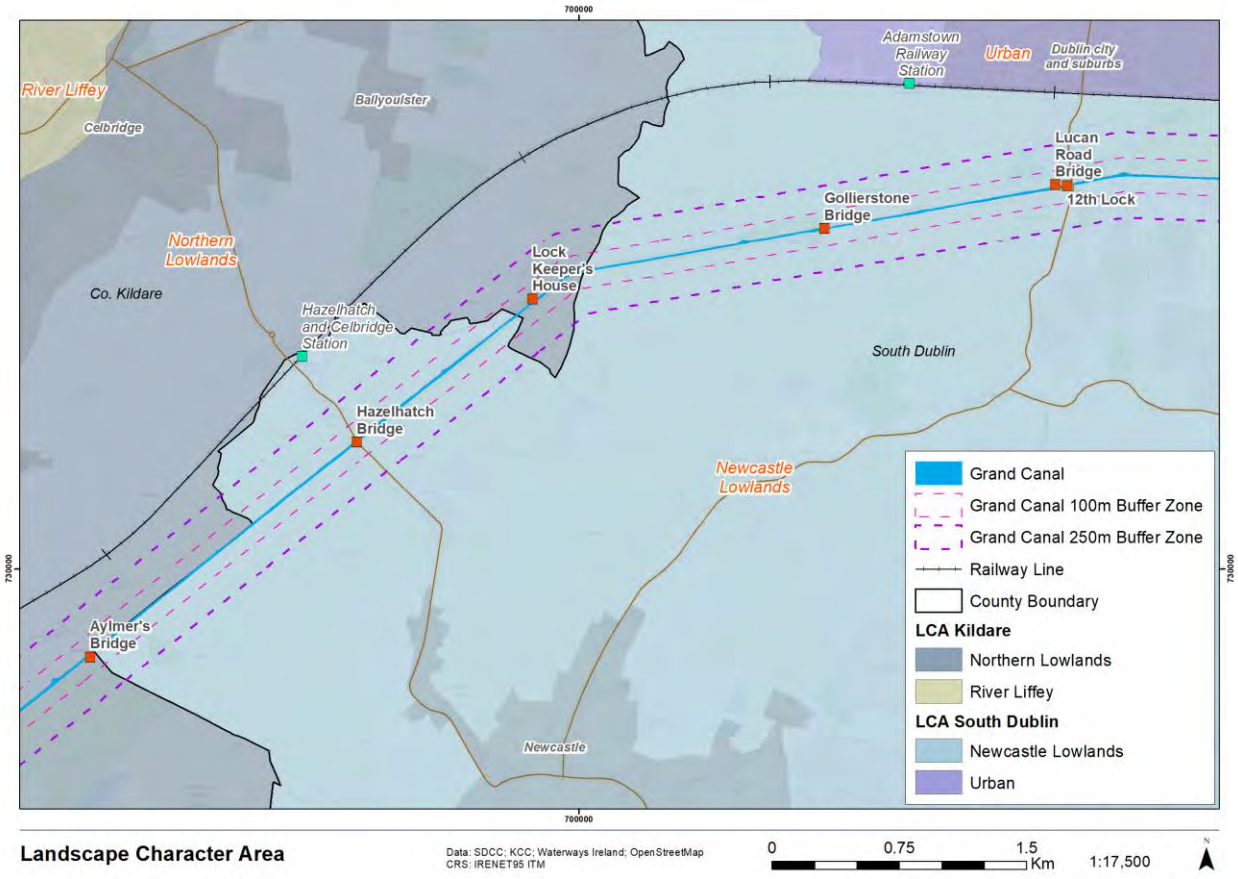
The Landscape Character Assessment of South Dublin (2015) identifies the subject lands as part of the Newcastle Lowlands, with key characteristics as follows:

- Low-lying and gently undulating agricultural lands over limestone
- Established communication corridors include the Grand Canal and railway corridor traverse east to west and two aerodromes at Weston and Baldonnel
- Agricultural landuse primarily pasture and tillage
- Increasing influence of urban activities closer to the motorways, national roads and regional roads
- Long history of historic settlement and human activity with medieval landscape complex associated with Newcastle village and surrounds.
- Number of demesnes associated with former country houses and institutions including reuse of older country houses at sites such as Peamount and Baldonnel

Extent western boundary from N4 encompassing Grand Canal, south of Newcastle and extending eastwards to the R136.

The Grand Canal itself is an important landscape type in its own right, and the variety of habitats, sense of enclosure, agricultural use and increasing urbanisation further east all create a distinctive landscape area. It functions also as a refuge or quiet area, particularly in the area around Collierstown Bridge and further west with the pub and lock at Hazelhatch a popular recreational spot for walkers and mooring for barges.

Figure 13 Landscape Character Area



3.3.8 Cultural Heritage

South Dublin County is particularly rich in industrial heritage, much of which was constructed in 18th century onwards. This has been recognised by SDCC who commissioned a survey to record this valuable resource.[2] The Industrial Heritage inventory contains 517 entries and includes bridges, infrastructure relating to water and sewage, gas and electricity, waterways with a particular emphasis on the Grand Canal infrastructure and associated monuments, railways (*c.* 1846), tramways, roads, fire stations and Garda stations. The industrial heritage features of the Grand Canal are recognised through protective measures such as listing on the Record of Protected Structures in the South Dublin County Council Development Plan 2016-2022, as well as the National Inventory of Architectural Heritage (NIAH). Figure 10 below shows recorded archaeological features within 250m of the study area; Figure 11 shows the features on the National Inventory of Architectural Heritage, and Table x presents further detail on the NIAH record.

[2] An industrial heritage survey of the South Dublin administrative area was undertaken in 2012 by Carrig Conservation International and McMahon. This survey comprises a desktop survey report and database. This section is based on the results of that survey.

Archaeology

Figure 14 Recorded Archaeological Sites within 250m of the project lands

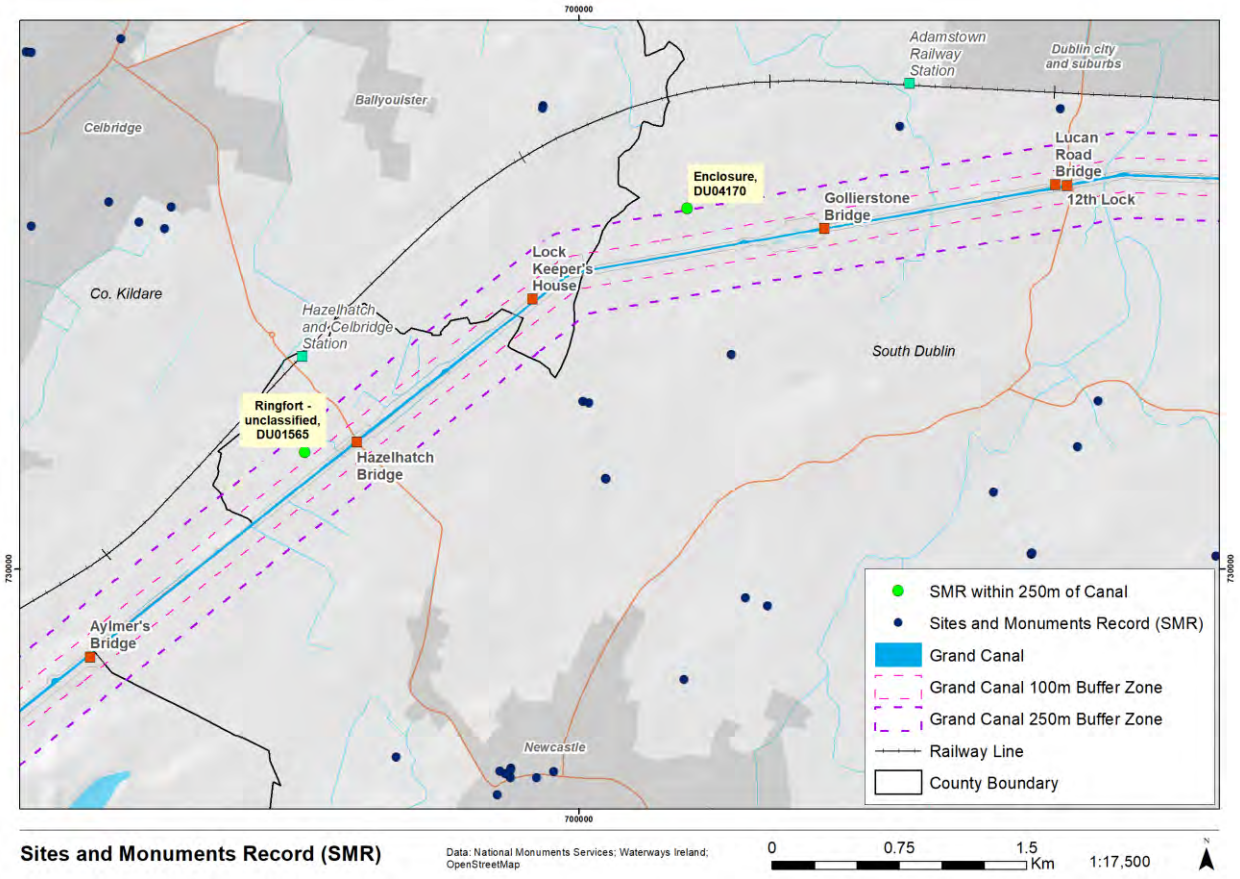


Figure 15 National Inventory of Architectural Heritage.

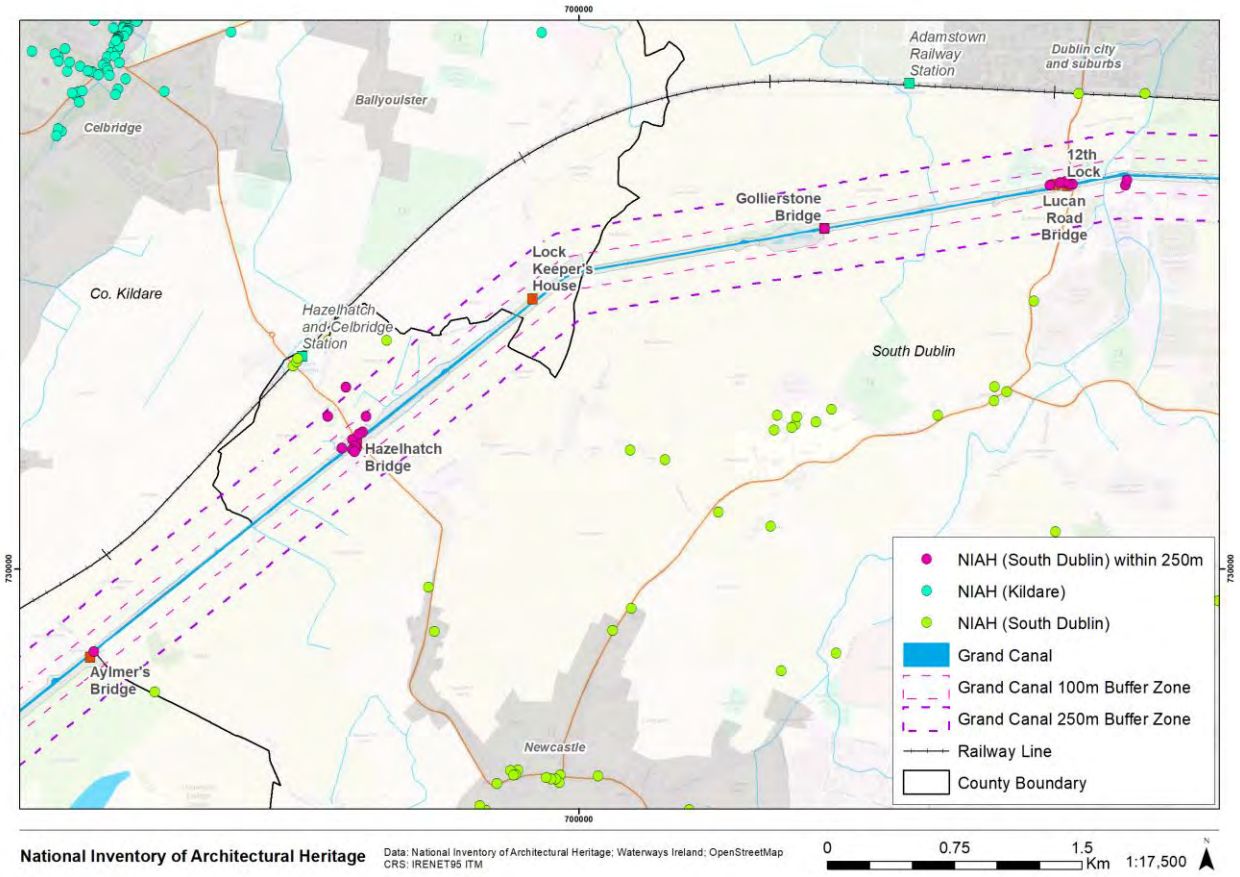


Table 4 National Inventory of Architectural Heritage

Name	Townland	County	Date		Significance	Structure
12th Lock Bridge	BALLYMAKAILY	Dublin	1760	1780	Regional	bridge
12th Lock	BALLYMAKAILY	Dublin	1760	1780	Regional	lock
	BALLYMAKAILY	Dublin	1850	1870	Regional	mill (water)
	BALLYMAKAILY	Dublin	1850	1870	Regional	mill (water)
Lock Keeper's Cottage	BALLYMAKAILY	Dublin	1750	1780	Regional	lock keeper's house
Grange Cottage	GRANGE (BA. W BY.)	Dublin	1800	1830	Regional	farm house
	GRANGE (BA. W BY.)	Dublin	1800	1830	Regional	outbuilding
Alymer Bridge	SKEAGH	Dublin	1780	1785	Regional	bridge
	HAZELHATCH	Dublin	1840	1860	Regional	water pump

Name	Townland	County	Date		Significance	Structure
Ringwood House	RINGWOOD	Dublin	1790	1810	Regional	country house
Hazelhatch Bridge	HAZELHATCH	Dublin	1790	1795	Regional	bridge
Hazelhatch House	HAZELHATCH	Dublin	1780	1830	Regional	farm house
	HAZELHATCH	Dublin	1750	1770	Regional	house
	HAZELHATCH	Dublin	1750	1770	Regional	store/warehouse
McEvoy's	HAZELHATCH	Dublin	1770	1800	Regional	public house
Bank House	HAZELHATCH	Dublin	1800	1830	Regional	house
The Hatch Bar	COMMONS (NE. BY.) NEWCASTLE ED	Dublin	1750	1780	Regional	house
	COMMONS (NE. BY.) NEWCASTLE ED	Dublin	1800	1830	Regional	forge/smithy
	COMMONS (NE. BY.) NEWCASTLE ED	Dublin	1800	1830	Regional	stables
Hazelhatch House	HAZELHATCH	Dublin	1830	1850	Regional	farm house
Gollierstown Bridge	GOLLIERSTOWN	Dublin	1770	1790	Regional	bridge

3.3.9 Material Assets

Hazelhatch train station on the main Dublin Kildare line is located some 600m north of the western part of the Grand Canal. The R120 is currently subject to significant works at the eastern part of the project area including upgrading of the road, and works to the canal bridge.

The Regional Waste Management Plan 2015-2021 for the Eastern-Midlands Region encompasses the local authorities: Dublin City, Dún Laoghaire- Rathdown, Fingal, South Dublin, Kildare, Louth, Laois, Longford, Meath, Offaly, Westmeath and Wicklow. The regional plan provides the framework for waste management for the next 3 years and sets out a range of policies and actions in order to meet the specified mandatory and performance targets.

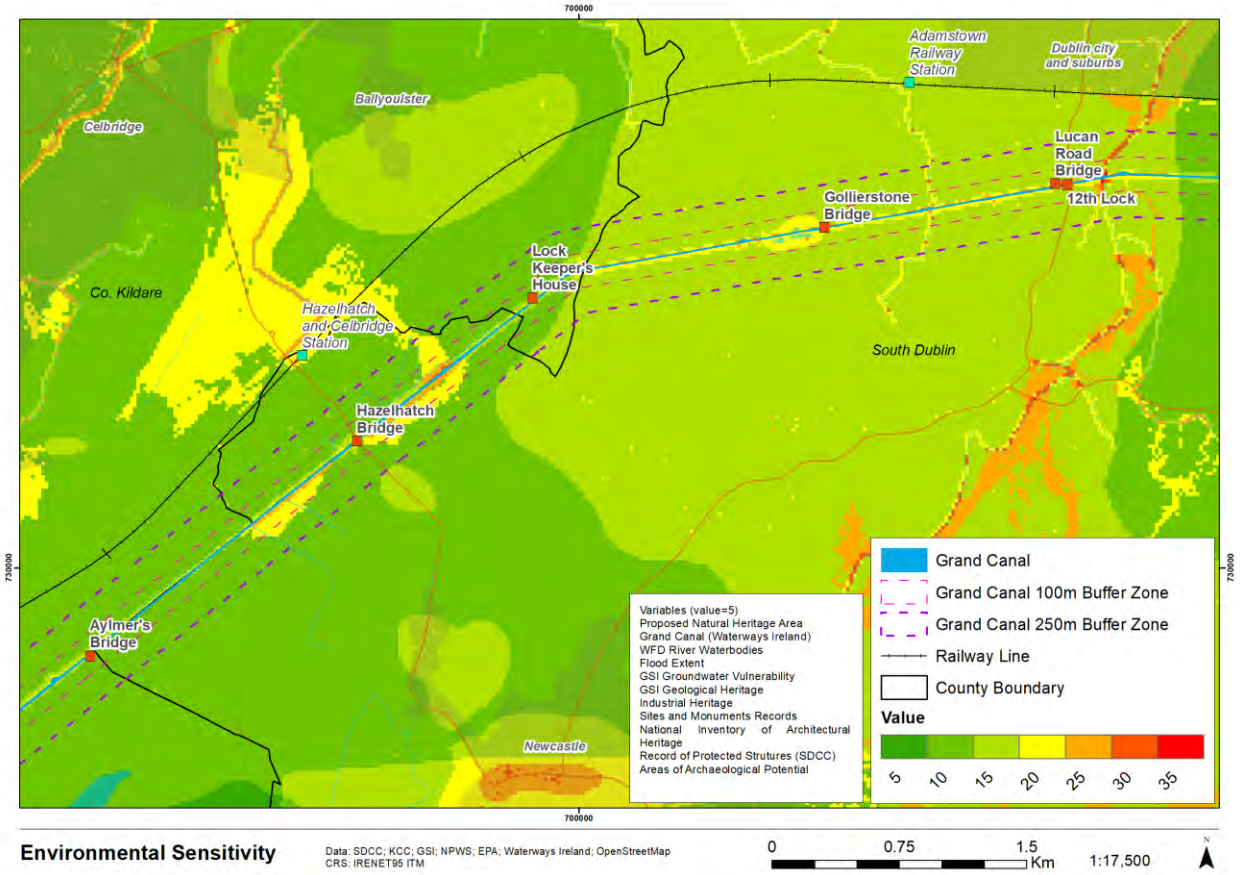
Waste is baled at the South Dublin County Council operated Baling Station at Ballymount and is disposed of in the Council's engineered landfill at Arthurstown, Co. Kildare. In addition, South Dublin County Council will be committing a certain amount of waste to the thermal treatment plant in Ringsend within Dublin City Councils administrative area, the construction and use of which forms a part of the waste management strategy for the Greater Dublin Area.

There are no proposals to provide toilets or water supply as part of these works.

3.3.10 Inter-relationship between parameters

In considering the relationships between the above parameters, an environmental sensitivity map was prepared that combines flood risk, statutory designated sites for natural heritage, built heritage designations and water resources. This is presented in the following Figure 17. The figure below shows areas of greater environmental sensitivity in orange –yellow tones. The area of greatest overall environmental sensitivity within the project footprint itself is the area around Gollierstown Bridge. This is due partly to the presence of both the bridge structure itself, and two ponds that very significant from an ecological perspective supporting a range of habitats and species. The stream that feeds into the canal further east from Gollierstown is also an area of greater environmental sensitivity. Finally, the area around Hazelhatch is identified as a significant area of environmental sensitivity, in part due to the flood risk issues.

Figure 16 Environmental Sensitivity



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4 EIA Screening

4.1 Environmental Factors to be considered in the EIA Screening.

Schedule 6 of the Planning and Development Regulations, 2001, as amended, outline the aspects of the environment likely to be significantly affected by a proposed development. These are:

- Population and Human Health
- Biodiversity
- Land, Soils & Geology
- Water
- Air
- Climate
- Material Assets
- Cultural Heritage
- Landscape

and the inter-actions between the above factors.

This EIA Screening report will therefore assess the development for potential impacts on the above parameters and against the criteria provided in Schedule 7A of the Regulations.

The criteria contained in Schedule 7A can provide the basis for determining whether a proposed development may create significant impacts on the environment. The criteria are used to help in the screening process to determine whether a development is likely to have a significant effect on the environment. The criteria used in this EIA Screening Report are those listed in Annex III of the EIA Directive of 2014.

4.2 Impact Assessment

Having considered the above environmental factors, the aim of the next section is to address likely impacts on the environment by the implementation of the proposed development. Whether an EIA would be deemed relevant to the scale of the project and the environment will then be determined. The following sections presents the EIA Screening Report based on the criteria contained in Schedule 7a and are grouped under the following headings.

1. Characteristics of the Proposed Development - Table 4.1
2. Location of the Proposed Development - Table 4.2 and
3. Characteristics of Potential Impact Tables 4.3 and 4.4

The screening process assesses the most significant potential impacts in relation to the themes outlined below in Table 4.3. These are considered as follows:

The likely significant effects of projects on the environment must be considered in relation to criteria set out in points 1 and 2 of this Annex, with regard to the impact of the project on the factors specified in Article 3(1), taking into account:

(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
(b) the nature of the impact;

(c) the transboundary nature of the impact;
(d) the intensity and complexity of the impact;
(e) the probability of the impact;
(f) the expected onset, duration, frequency and reversibility of the impact;
(g) the cumulation of the impact with the impact of other existing and/or approved projects;
(h) the possibility of effectively reducing the impact.

Having considered the above environmental factors the aim of the next section is to address likely impacts on the environment by the implementation of the proposed development. A brief overview of the sensitivities and impacts will be highlighted. Whether an EIA would be deemed relevant to the scale of the project and the environment will then be determined. The following sections presents the EIA Screening based on the criteria contained in Schedule 7a and are grouped under the following headings:

1. Characteristics of the Proposed Development - *Table 4.1*
2. Location of the Proposed Development - *Table 4.2* and
3. Characteristics of Potential Impact - *Tables 4.3* and *4.4*

Table 4.1 Characteristics of the Proposed Development

Screening Question	Response
1. Characteristics of projects The characteristics of projects must be considered, with particular regard to:	
(a) the size and design of the whole project	No, the proposed Greenway utilises the existing towpath and will vary in width from 2.5 to 3.5m at any stage. As it uses the existing towpath and a public road, landtake is minor. The route will commence at Hazelhatch and use the northern towpath for the full length to the 12th Lock, a distance of 7km. The habitat survey of 2015 classified the area as an Ecologically Sensitive Area and this requires particular approach, mitigation measures and enhancement measures to minimise and offset landtake and reduction of habitats.
(b) cumulation with other existing and/or approved projects;	There are currently no major infrastructural schemes in preparation in the project area. However, the upgrading of the Regional Road at the 12th Lock is a significant infrastructural works that is currently ongoing.

Screening Question	Response
1. Characteristics of projects The characteristics of projects must be considered, with particular regard to:	
	At a larger scale, there are proposals in train or in receipt of planning consent for Greenway development in Counties Offaly and Kildare. Overall, the effects will relate to increased recreational use of the Greenway over time; as this is an established recreational route with no additional lighting proposed, it is considered that no significant cumulative effects will arise. The Ecological Cumulative Impact Assessment (2016) for the Grand Canal made the following conclusions: It is considered that cumulative impacts, if any, are most likely to arise during the construction phase. The most significant potential for adverse cumulative impact is in the loss of habitat. The Greenway will be required to implement strict construction management plans and provide compensation for any loss of habitat where possible. Given the existence of such management controls, it is considered that the cumulative impacts can be mitigated during construction and will be inconsequential during operational phases in the long term. (2016, pg 60). The installation of the cable duct, which will be encased in concrete in the cable trench and the backfilling of the trench could result in changes to the existing hydrogeological regime to the north of the canal. Seepage from the canal is likely to influence the status of the artificial pond habitats occurring to the north of the canal. Any changes in the rate of seepage to the pond during the construction phase will have the potential to undermine the status of this fringing habitat and negatively affect the status of the Vertigo moulinsiana population supported by it. Measures identified in the above ECIA have been incorporated into the Best Practice Guidelines that will apply during construction.

Screening Question	Response
1. Characteristics of projects The characteristics of projects must be considered, with particular regard to:	
(c) the use of natural resources, in particular land, soil, water and biodiversity;	Natural resources will be used in terms of surfacing of the towpath as necessary and will use a variety of surface dressings as outlined in Section 2.1.1. The primary surface will be compacted dust and stone for much of the Greenway through rural areas with bound surface used only where the existing bound surfaces are deteriorated or limited traffic will be permitted. There may be some removal of soil to facilitate the surface dressing but measures to conserve and manage soil are detailed in Section 2 of this report. Minor amounts of water and fuel will be used to clean machinery and fuel machinery required during construction works.
(d) the production of waste;	Yes, but not significant. Solid waste may be produced during construction but materials will be only ordered as required. Any wastes from the construction process will either be reused within the scheme, or recycled/disposed of at an authorised waste facility.
(e) pollution and nuisances;	The construction phase presents the greatest risk of pollution to water resources, and disturbance/damage to flora and fauna. Potential sources of water pollution to both surface and groundwater include fuel, lubricants, suspended solids and asphalt. Silt-laden surface runoff could arise during construction during vegetation stripping and the resurfacing of section of grass towpath and/or during the resurfacing of existing gravel towpath and public roads. The input of such runoff to the Grand Canal will have the potential to negatively affect water quality within the Canal. The quantities of potentially polluting materials that will be used in the vicinity of the Grand Canal throughout the construction phase will be small and their ingress to the Grand Canal or the Tobermaclugg Stream will

Screening Question	Response
1. Characteristics of projects The characteristics of projects must be considered, with particular regard to:	
	become quickly diluted downstream. The bulk of all material required for the construction phase will be stored at the proposed construction compound which will be located over 70m from the nearest point of the Grand Canal and 50m from the nearest drainage ditch. The location of the compound away from receiving watercourses will significantly minimise the potential for the discharge of contaminated surface water runoff from this area to any surrounding watercourse. The volumes of surface water draining the project site represents a miniscule fraction of the volumes discharging to the Liffey Estuary upstream of the Dublin Bay European Sites. In the event that contaminated waters enter the Grand Canal (which is the most likely receiving water as the project site runs parallel to it) it is highly likely based on the above that any associated pollutants will be adequately diluted within the canal waters. Potential pollution to water resources from operation include increased surface run off containing suspended solids associated with increased cycling or pedestrian traffic. However this is not predicted to represent a risk to surface water quality due to its proposed use as a cycling and walking route, both of which are not predicted to have the potential to generate polluting water emissions to the canal. However, best practice in design, construction and operation will be implemented and adherence to Environmental Construction Guidelines will be implemented. Additional measures have also been integrated in relation to the surface water quality, please see Section 2.2 Best Practice Construction Approach.

Screening Question	Response
1. Characteristics of projects The characteristics of projects must be considered, with particular regard to:	
	In addition, noise disturbance during construction may impact on bird species associated with the canal or adjacent areas of scrub or the ponds at Gollierstown. However this is temporary in duration and significant levels of machinery are not anticipated to be used.
(f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;	The risks of major accidents are not considered to be significant subject to best construction practices being followed through the construction phase. This will include proper site management, maintenance and operation of all machinery and works associated with the construction phase, on site safety and training. Use of appropriately trained and professional staff and specific measures for the ESA which encompasses the whole project area to avoid disturbance to identified habitats associated with the ESAs. To avoid disturbance to this ESA measures as outlined in Section 2.3. will be applied
(g) the risks to human health (for example due to water contamination or air pollution).	As above, significant risks to human health are not identified for this proposal. The environmental protection measures, particularly for the construction phase are detailed in Section 2 and subject to full and proper implementation, potential risks associated with construction activity will not arise.
Will the proposed development create a significant amount of nuisance during its construction or operation?	The Grand Canal is already a well-established walking route. . It is not anticipated that significant noise levels will arise during construction (they will be temporary and restricted to machinery associated with surfacing) and operational noise is not identified as being significant.

Conclusion: No significant effects likely to arise associated with the characteristics of the proposed development.

Rationale: The works associated are minor in character and relate to upgrading the existing towpath. Design measures have included reducing the width of the towpath and ensuring a 1m buffer to avoid disturbance to the canal bank and also to the northern habitats of the towpath. The proposed greenway will result in the loss of examples of low value towpath mosaic habitat along the section of the Grand Canal between the 12th Lock and Hazelhatch. The Level 3 habitats

(as defined in Fossit, 2000) occurring within the footprint of the proposed greenway along the towpath mosaic are comprised of spoil and bare ground (ED2), recolonising bare ground (ED3) and grassy verge habitat (GS2) Detailed measures as presented in Section 2 as well as avoidance of the semi-natural habitats, whose presence underpin the classification of this area as an ESA, will ensure that subject to full implementation and adherence to same, significant effects are avoided.

Table 4.2 Location of the Proposed Development

Screening Question	Response
The environmental sensitivity of geographical areas likely to be affected by projects must be considered, with particular regard to: (a) the existing and approved land use;	The Grand Canal itself although an artificial structure represents a significant east west ecological corridor nationally. The project area is identified as an Ecologically Sensitive Area and this requires a very sensitive and informed approach given the national significance of the Grand Canal and the location of this proposed Greenway representing an important ecological resource within South Dublin and beyond.
(b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground	The works are relatively minor in nature, utilising an existing towpath along an artificially constructed canal that is over 200 years old. The proposed Greenway is not identified as giving rise to significant effects in relation to abundance, availability, quality and regenerative capacity of nature resources.
(c) the absorption capacity of the natural environment, paying particular attention to the following areas: (i) wetlands, riparian areas, river mouths; (ii) coastal zones and the marine environment; (iii) mountain and forest areas; (iv) nature reserves and parks; (v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Directive 92/43/EEC and Directive 2009/147/EC;	The proposed development is not predicted to result in changes to the patterns of surface water runoff that currently exist. The proposed greenway trail surface will be a porous surface that will facilitate drainage to ground. During periods of high rainfall storm water runoff will follow the same patterns as currently exist. The operation phase of the trail will not have the potential to result in the ongoing discharge of trail surface materials. The proposed trail surface will be a compacted surface that does not lend itself to suspension in storm water. (i) Gollierstown ponds are very important wetland areas within the study area; The 2 watercourses that enter the Grand Canal are also of significance There is potential seepage of water from the Grand Canal into the surrounding habitats that contributes to important wetland habitat. (ii) not applicable (iii) not applicable (iv) not applicable (v) The Screening Statement for Appropriate Assessment that accompanies this report has assessed

Screening Question	Response
	the likely significant effects of the proposal on the conservation management objectives of European Sites within a 15km buffer of the route and determined a finding of no likely significant effects. A range of species protected under national and European legislation occur along the canal. These include bats, otters, white-clawed crayfish, Vertigo moulinsiana and badger. Due to the design of the project and the avoidance of any night time artificial lighting and the retention of all trees and woodland habitats along the canal there will be no potential for the project to result in adverse effects to bat species. There may be some temporary disturbance to otters during the construction phase of the project, however these are not considered to represent significant effects due to the absence of any breeding holts or couches along the northern bank of the canal and the behaviour of otters along the canal which are predominantly crepuscular being active from twilight and through the night. As such otter activity is not expected to overlap with construction phase activity. Furthermore the approach to the construction phase which will involve the commencement and completion of works in short sections and on a section by section basis thus ensuring that construction works will at all times be localised to discrete areas along the canal. This will significantly minimise as potential risk of disturbance to otters. In addition the EcIA for the proposed greenway has included recommendations for the future management of the emergent bankside vegetation along the canal. The implementation of this recommendation as part of the operation phase of the project will not only enhance the value of this marginal habitat but will also provide

Screening Question	Response
	more permanent screening of the proposed greenway from the canal. An assessment of the operation phase potential to disturb otters has been provided in the EcIA. This assessment has provided a review of the evidence, or lack thereof, of significant disturbance effects to otters as a result of recreational activity. In light of this evidence and the proposed future management of the canal bank vegetation which will improve screening between the canal and the proposed greenway, the proposed development is not predicted to have the potential to result in significant disturbance to otters. The proposed greenway does not include any requirement for instream works and there will be no potential to directly affect white-clawed crayfish habitat occurring along the canal. Furthermore with the implementation of all construction phase mitigation measures to safeguard surface water quality will ensure that this phase of the project will not have the potential to result in indirect effects to this species through perturbations to water quality. Surface water runoff during the operation phase will not pose a risk to water quality within the canal. For the majority of its length the southern boundary of the canal towpath is bounded by a raised bank that prevents surface water from draining to the canal. Where land levels fall to the north surface water will naturally drain in a northerly direction. Along sections where raised banks occur on both sides of the canal surface water will drain to ground through the permeable trail surface. Only at discrete sections along the canal will it be possible for surface water to drain to the south to the canal. However given proposed use of the trail during the operation phase, which will be for walking and cycling there will be risk of surface water becoming contaminated and presenting a risk to water quality. As such there will be no risk to white-clawed crayfish and

Screening Question	Response
	their habitat, through perturbations to water quality, during the operation phase of the project. The project will not have the potential to result in direct effects to Vertigo moulinsiana and its habitat along the canal. The area confirmed to support this species will be fenced off during the construction phase and no construction activity will be permitted in this area. In order to ensure potential indirect effects to this species are avoided the trail surface in the vicinity of the Vertigo moulinsiana population has been designed to maintain existing seepage pathways between the canal and the Vertigo habitat. This design will ensure that potential adverse effects to the hydrology underpinning the status of this habitat is avoided. The potential exists for short term disturbance to badgers and the active sett identified adjacent to the canal. Mitigation measures have been outlined to ensure that this disturbance is minimised and does not result in significant disturbance to badgers. Given that the proposed greenway is an existing recreational trail and that badgers have co-existed with the trail and associated recreational use for some time the operation phase of the project is not predict to have the potential to result in disturbance to this species. Greenway design requires the maintenance of 1m verge between the towpath and the canal and given the recreational activity will take place during daylight hours, the use of this area by otters may give rise to temporary disturbance during construction phase only. The habitats along the route support foraging and commuting routes for bat populations. In addition, the presence of canal bridges and buildings, could support bat roosts. Daubentons Bats are recorded along the Grand Canal corridor. See section above on Annex II species for Otter which is also an Annex IV species

Screening Question	Response
(vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;	Whilst surface water quality within the wider area is variable, there are no direct or indirect effects identified for the project and potential risks to these surface waters. The greatest risk would relate to the construction phase and detailed measures in Section 2 will apply.
(vii) densely populated areas;	The route generally traverses lightly populated rural areas. No negative effects are identified in relation to this criterion; positive effects relating to increased recreational use are identified.
(viii) landscapes and sites of historical, cultural or archaeological significance	The Landscape Character Assessment for South Dublin identified the Grand Canal as being of high sensitivity in parts and is a designated Quiet Area in terms of noise. However given the proposal relates to the existing towpath, no visual intrusions that would detract from the landscape character or visual amenity is anticipated. No architectural conservation areas are listed within or adjoining this section of the Grand Canal and no impacts are identified. The proposed development is not considered likely to directly impact on archaeological sites or protected structures such as canal bridges although careful consideration will be required to balance pedestrian and cycling safety and protected structures such as bridges to avoid over use of heavy signage and result in visual clutter. These are not identified as being impacted by the proposed Greenway.

Conclusion: No significant effects likely to arise associated with the location of the proposed development.

Rationale: Works relate to upgrading of existing towpath and this is considered to result in minor to negligible impacts in terms of habitat loss of significant habitats, landscape character, cultural heritage and visual amenity; increased use of the path will also provide an opportunity to raise awareness of these resources and increase user's appreciation of the natural and cultural heritage. Sensitive signage and design of gates/fencing will be used where such items are required.

The screening process assesses the most significant potential impacts in relation to the themes outlined below in Table 4.3.These are considered as follows:

Type and characteristics of the potential impact.

The likely significant effects of projects on the environment must be considered in relation to criteria set out in points 1 and 2 of this Annex, with regard to the impact of the project on the factors specified in Article 3(1), taking into account:

(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);

(b) the nature of the impact;

(c) the transboundary nature of the impact;

(d) the intensity and complexity of the impact;

(e) the probability of the impact;

(f) the expected onset, duration, frequency and reversibility of the impact;

(g) the cumulation of the impact with the impact of other existing and/or approved projects;

(h) the possibility of effectively reducing the impact.

Table 4.3- Characteristics of Potential Impacts on environmental parameters

Environmental Topic	**Potential Impact**
Human Beings	Potential temporary negative impacts to farmers and recreational users along the canal associated with construction works; i.e.; locally significant noise, air, dust and traffic disturbance. Positive long term impact on completion associated with increased accessibility of the area for walkers and cyclists.
Flora and Fauna	Temporary impacts associated with construction and longer term operational impacts associated with increased footfall. Invasive species recorded at locations along the canal so risk of spreading of same is a key issue. Biosecurity measures are provided for and presented in Section 2 of this screening report; subject to full adherence to same this impact is avoided. Potential water quality impacts Removal or clearance of vegetation close to towpath, no tree removal proposed.

Environmental Topic	Potential Impact
	The construction phase represents the greatest potential risk to water quality and flora and fauna, and measures applied in Section 2 will reduce this risk and provide good practice in construction.
Soil and Geology	Permanent and minor negative impact related to works phase, particularly in relation to areas requiring excavation and fill works. Significant amounts of fill are not anticipated; surface dressing only.
Water	Potential exists for alterations to hydrology which may impact upon watercourses and other water based habitats such as the wet grassland although given the approach to Best Practice Construction it is considered sufficient safeguards are included in this approach. If not mitigated, surface water quality impacts arising from the construction stage could arise.
Air Quality and climate	Localised impacts arising from machinery such as mini diggers or excavators. Emissions during works phase will be minimized through best practice. Traffic emissions are not considered likely to be significantly increased and objective is to reduce non authorised traffic access and increase pedestrian and cycling use with accompanying local positive impacts.
Noise and Vibration	Noise during the construction phase may result in nuisance however; noise and vibration during works phase will be minimized through best practice. Traffic noise and vibration are not considered likely to be significantly increased as a result.
Cultural Heritage	None identified; other than potential visual clutter and indirect impacts on protected structures in absence of mitigation.
Landscape	No significant alteration of landscape character
Interrelationship between above parameters	The key interrelationship arises between water quality and habitats in particular.

Conclusion: No significant effects likely to arise associated with the potential impacts on environmental parameters.

Rationale: As the preceding table shows, potential impacts relate primarily to temporary impacts at construction stage and the implementation of the Best Practice Construction measures will provide safeguards to avoid significant impacts at this stage; to avoid ingress of surface water or dust emissions over watercourses associated with the Grand Canal, temporary silt trap and impermeable barrier will be installed. To further reduce erosion and silt-laden run off, natural vegetation buffers (See Section 2.10) will be created where possible, between the construction footprint and the Grand Canal and other drainage channels.

Table 4.4 Characteristics of the potential impacts

Characteristics of potential impacts **The potential significant effects of proposed development in relation to criteria set out under Tables 3.3. and 3.2 above, and having regard in particular to:**	
(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);	Minor and localised temporary impacts are identified primarily at construction stage only. Operational impacts will relate to increased pedestrian and cycling usage of the canal towpath during daylight hours.
(b) the nature of the impact;	Impacts are identified as temporary as they relate to the construction stage and sufficient and detailed measures as shown in section 2, supervised by an Ecological Clerk of Works will provide additional oversight of the proper implementation of these measures. Post works monitoring for potential disturbance effects on species using the canal, in particular bats and otters are also provided for as part of these works.
(c) the transboundary nature of the impact;	Potential transfrontier impacts could arise in the event of pollution to the canal and adjoining watercourses; dependant on significance, duration and magnitude of such an event.
(d) the intensity and complexity of the impact;	Whilst best practice guidelines and adherence to statutory requirements will address and mitigate for several environmental parameters during the design, construction and operation process; the principal potential impacts relate to water quality, and its subsequent impact on species dependent on water quality of the canal itself.
(e) the probability of the impact;	The design of the proposals, , best practice construction reduces and mitigates against significant effects arising, particularly in relation to the construction stage which is identified as giving rise to the greatest risk.
(f) the expected onset, duration, frequency and reversibility of the impact;	Subject to implementation and adherence to measures in Section 2, impacts identified for topics are not significant and will be temporary and reversible in nature, as they relate to construction phase only.
(g) the cumulation of the impact with the impact of other existing and/or approved projects;	However, longer term there are a number of walking and cycling routes that may give rise to increased use of the Grand Canal towpath by walkers and cyclists.

	Overall, the effects will relate to increased recreational use of the Greenway over time; as this is an established recreational route with no additional lighting proposed, it is considered that no significant cumulative effects will arise. The Ecological Cumulative Impact Assessment (2016) for the Grand Canal made the following conclusions: It is considered that cumulative impacts, if any, are most likely to arise during the construction phase. The most significant potential for adverse cumulative impact is in the loss of habitat. The Greenway will be required to implement strict construction management plans and provide compensation for any loss of habitat where possible. Given the existence of such management controls, it is considered that the cumulative impacts can be mitigated during construction and will be inconsequential during operational phases in the long term. (2016, pg 60). Measures identified in the above ECIA have been incorporated into the Best Practice Guidelines that will apply during construction.
(h) the possibility of effectively reducing the impact.	Measures are detailed in Section 2 and are derived from best practice guidelines and those developed from the Ecological Cumulative Impact Assessment of the Grand Canal.

Conclusion: No significant effects likely to arise associated with the characteristics of the potential impacts.

Rationale: Minor, localised and temporary impacts are identified and the avoidance of the areas of Ecological Sensitivity mitigates disturbance to the areas of greatest habitat sensitivity along the Grand Canal Greenway. The use of the habitat maps particularly where target notes identified invasive species will inform works along the canal and provide safeguards to ensure other impacts such as accidental spread of invasive species is avoided.

5 Conclusion

5.1 Screening Conclusion

Article 4(5) of the EIA Directive states:

> *The competent authority shall make its determination, on the basis of information provided by the developer in accordance with paragraph 4 taking into account, where relevant, the results of preliminary verifications or assessments of the effects on the environment carried out pursuant to Union legislation other than this Directive.*
>
> *The determination shall be made available to the public and:*
> *(a) where it is decided that an environmental impact assessment is required, state the main reasons for requiring such assessment with reference to the relevant criteria listed in Annex III; or*
> *(b) where it is decided that an environmental impact assessment is not required, state the main reasons for not requiring such assessment with reference to the relevant criteria listed in Annex III, and, where proposed by the developer, state any features of the project and/or measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment.*

The Grand Canal Greenway has been assessed as a sub-threshold EIA development. This EIS Screening Report has concluded that the effects of the proposed development are considered not to be of likely significance, due to the minor development footprint, the characteristics and sensitivities of the receiving environment and design and mitigation measures. The Grand Canal Greenway has been assessed as a sub-threshold EIA development. This EIS Screening Report has concluded that the characteristics of the proposed development are considered potentially not significant due to the minor development footprint.

The existence and reuse of the towpath reduces any additional land take and proposed works are minor in nature being confined to resurfacing when required, removal of some overhanging vegetation but no tree removal. The implementation of the environmental management practices (See Section 2.2) will also provide safeguards in relation to potential impacts identified in the preceding tables

The overall conclusion for this screening appraisal is that, having considered the appropriate criteria, Environmental Impact Assessment for the Grand Canal Greenway is not required.

Appendix F – Route Options Drawing

This drawing is produced using the Irish Transverse Mercator (ITM) Geographic Coordinate System

A1

Comhairle Contae Átha Cliath Theas
South Dublin County Council

LEGEND:

- PATH ROUTE OPTION 1
- PATH ROUTE OPTION 2
- PATH ROUTE OPTION 3
- PATH ROUTE OPTION 4
- PATH ROUTE OPTION 5

Revision	Description	Initials	Date

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Client: SOUTH DUBLIN COUNTY COUNCIL

Project: GRAND CANAL GREENWAY
HAZELHATCH BRIDGE TO 12th LOCK BRIDGE

Dwg. Title: PATH ROUTE OPTIONS

Drawn By: KT | Date: MAY 2018

Checked by: RG | Scale: NTS @ A1

Dwg. Progress: SKETCH

Dwg. No.: 18_065_00_1020

Appendix G – SDCC Determinations

PD/ 156/18

COMHAIRLE CHONTAE ATHA CLIATH THEAS

SOUTH DUBLIN COUNTY COUNCIL

Record of Executive Business and Chief Executive's Orders

Planning and Development Act 2000 (as amended) - Part XAB

Planning and Development Regulations 2001 (as amended) - Part 8

THE GRAND CANAL GREENWAY 12TH LOCK TO HAZELHATCH
Appropriate Assessment (AA) Screening Determination

Pursuant to the requirements of the above, South Dublin County Council is proposing to develop the proposed Grand Canal Greenway (the Greenway) from 12th Lock to Hazelhatch in the townlands of Hazelhatch, Loughtown Lower, Balscott, Stacumney Cottage, Mullauns, Coolscuddan, Gollierstown, and Ballymakaily.

Having regard to Article 6(3) of the Habitats Directive and Part XAB of the Planning and Development Act 2000 (as amended), the guidance contained in the Department of Housing Planning Community and Local Government's *"Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities"* (2010) and following an examination of the objective information provided in the *"Screening Statement for Appropriate Assessment Grand Canal Greenway"* (the Screening Report) prepared by Doherty Environmental Consulting Ltd, South Dublin County Council, as the Competent Authority, determines that the Greenway, individually or in combination with other plans and projects, does not have the potential to give rise to likely significant effects on European sites, their conservation objectives or integrity, and therefore does not require an AA.

The principle reasons supporting this determination include:

- Given the nature, scale and design of the proposed Greenway there will be low risk of significant impacts to the water quality of watercourses within the vicinity of the proposed Greenway, including the Grand Canal and the Tubbermaclugg Stream and Skinkeen Stream which flow under the Grand Canal, and therefore there will be no potential for the hydrological pathway connecting the Greenway to European Sites in Dublin Bay to function as an impact pathway.
- The assessment of the hydrological pathway has shown that, given the low volumes of water runoff discharging to watercourses in the vicinity and the minor fraction of freshwater flows of these watercourses to the Liffey Estuary, the Greenway will not have the potential to result in likely significant effects on the conservation status of Dublin Bay European Sites which occur within the zone of influence of this project.

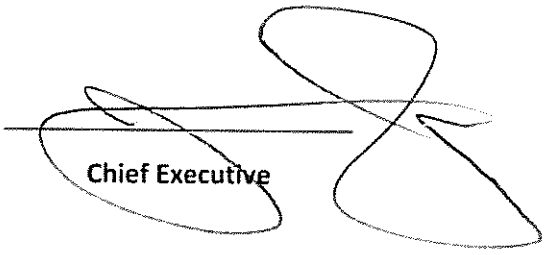
Therefore a Stage 2: Appropriate Assessment will not be required to inform the Greenway either alone or in combination with other plans or projects, with respect to any Natura 2000 site and its Conservation Objectives.

Brian Keaney

Senior Planner

ORDER: That South Dublin County Council as the Competent Authority having considered the AA Screening Report prepared by Doherty Environmental Consultants Ltd, makes a determination that a Stage 2: Appropriate Assessment will not be required to inform the Grand Canal Greenway 12th Lock to Hazelhatch either alone or in combination with other plans or projects, with respect to any Natura 2000 site and their conservation objectives.

Date: 13/12/18



PD/ 155 /18

COMHAIRLE CHONTAE ATHA CLIATH THEAS

SOUTH DUBLIN COUNTY COUNCIL

Record of Executive Business and Chief Executive's Orders

Planning and Development Act 2000 (Part XI) (as amended)

Planning and Development Regulations, 2001(Part 8) (as amended)

THE GRAND CANAL GREENWAY 12TH LOCK TO HAZELHATCH
Environmental Impact Assessment (EIA) Screening Determination

Pursuant to the requirements of the above, South Dublin County Council is proposing to develop the proposed Grand Canal Greenway (the Greenway) from 12th Lock to Hazelhatch in the townlands of Hazelhatch, Loughtown Lower, Balscott, Stacumney Cottage, Mullauns, Coolscuddan, Gollierstown, and Ballymakaily

Having regard to EIA Directive 2011/92/EU as amended by Directive 2014/52/EU (the EIA Directive), the guidance contained in the Department of Housing Planning Community and Local Government's *"Impact Assessment Guidance for Consent Authorities regarding Sub-Threshold Development"* (2003) and on the basis of the objective information provided in the *"Grand Canal Greenway EIA Screening Report"* (the Screening Report) carried out by Minogue and Associates, South Dublin County Council as the Competent Authority determines that the Greenway, individually, and in combination with other plans and projects, does not require an EIA.

It is considered that the Screening Report, has been carried out giving full consideration to the EIA Directive and in particular to Annex I, II and III of that Directive, which sets out requirements for mandatory and sub-threshold EIA.

As the Greenway is sub-threshold, it has, therefore, been assessed on a case-by case basis in accordance with the Criteria for Determining Whether or Not a Development Would or Would Not be Likely to have Significant Effects on the Environment as outlined within Annex III of the EIA Directive.

It is further considered that the Screening Report contains a fair and reasonable assessment of the likelihood of significant effects of the Greenway on the environment. Having regard to the foregoing and in particular:

- The size and design of the whole project;
- Cumulation with other existing and/or approved projects;
- The use of natural resources, in particular land, soil, water and biodiversity;
- The production of waste;
- Pollution and nuisances;
- The risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; and
- The risks to human health (for example due to water contamination or air pollution).

It is considered that the environmental effects arising from the Greenway will generally be localised, minor in nature and occur principally during the construction phase.

Brian Keaney

Senior Planner

ORDER: That South Dublin County Council as the Competent Authority having considered the EIA Screening Report prepared by Minogue and Associates, makes a determination that the proposed Grand Canal Greenway 12th Lock to Hazelhatch would not be likely to have significant effects on the environment and that the project does not require an Environmental Impact Assessment.

Date: 13/12/18

Chief Executive

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