Chapter 12
Biodiversity

Contents

12. Biodiversity

12.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) presents the output of the biodiversity assessment and contains information regarding, *inter alia*, the biodiversity baseline scenario, the potential impacts on biodiversity, the mitigation measures and the predicted residual effects of the Templeogue / Rathfarnham to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme).

The likely significant effects of the Proposed Scheme on biodiversity during both the Construction Phase and Operational Phases (including routine maintenance) have been assessed. The potential Construction Phase impacts assessed include those on air, water quality, habitats, and on flora and fauna from construction activities such as utility diversions, road resurfacing, road realignments and the provision of new / replacement structures. The assessment undertaken for the Proposed Scheme identified numerous Key Ecological Receptors (KERs) within the study area that could potentially be impacted by the Proposed Scheme. These KERs are examined in detail in this Chapter. The methodologies used to collate information on the baseline biodiversity environment and assess the likely significant impacts of the Proposed Scheme are detailed in the following sections.

The aim of the Proposed Scheme, when in operation, is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the Proposed Scheme are described in Chapter 1 (Introduction). The Proposed Scheme, which is described in Chapter 4 (Proposed Scheme Description) has been designed to meet these objectives.

The design of the Proposed Scheme has evolved through comprehensive design iteration process with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Scheme are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

12.2 Methodology

In accordance with the requirements of Directive 2014 / 52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92 / EU on the assessment of the effects of certain public and private projects on the environment (referred to as “the EIA Directive”), this Chapter of the EIAR identifies, describes and assesses the likely direct and indirect significant effects of the Proposed Scheme on biodiversity, with particular attention to species and habitats protected under both EU and Irish law.

The EIA Directive does not provide a definition of biodiversity. However, as noted in the European Commission, “Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment” (European Commission, 2013), Article 2 of the Convention on Biological Diversity, gives the following formal definition of biodiversity:

‘*biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*’ (CBD 2006).

Alongside the term ‘*biodiversity*’ the terms ‘*ecology*’ and ‘*ecological*’ are also used throughout this Chapter as broader terms to consider the relationships of biodiversity receptors with one another and with the wider environment.

This Chapter also refers to the Appropriate Assessment Screening Report (hereafter referred to as the AA Screening Report) and the Natura Impact Statement (hereafter referred to as the NIS) which have also been prepared on behalf of the National Transport Authority (NTA) and submitted with the application for approval, so as to enable An Bord Pleanála (the Board), as competent authority, to carry out the assessments required pursuant to Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as “the Habitats Directive”).

A review of the Proposed Scheme was undertaken which identified numerous KERs within the study area that could potentially be impacted by the Proposed Scheme. These KERs are examined in detail in this Chapter.

The methodologies used to collate information on the baseline biodiversity environment and assess the likely significant effects of the Proposed Scheme are detailed in the following sections.

12.2.1 Ecological Survey Study Area

The Proposed Scheme extents are illustrated in the General Arrangement Drawings (BCID_ARP-GEO_GA-1012_XX_00-DR-CR-9001) in Volume 3 of his EIAR. Ecological surveys were carried out for each of the biodiversity receptors listed in Table 12.1, within a specific study area (as described in Table 12.1), and focused on assessing potential impacts within the Zone of Influence (ZoI) of the Proposed Scheme. The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (hereafter referred to as the CIEEM Guidelines) (CIEEM 2018) define the ZoI for a development is the area over which ecological features may be subject to significant impacts as a result of the Proposed Scheme and associated activities (see Section 12.3.1 for more detail on the ZoI as it relates to the Proposed Scheme and the various ecological receptors).

The ecological surveys were designed based upon the characteristics of the Proposed Scheme and its likely significant impacts on the baseline environment during construction and / or operation. The study areas are described in Table 12.1 and, where relevant, are also shown on Figures 12.1.1, Figure 12.1.2, Figure 12.1.3 and Figure 12.5 in Volume 3 of this EIAR.

Table 12.1: Ecological Survey Study Areas for Each Ecological Receptor

Ecological Receptor	Study Area Description
Habitats	The area within or immediately adjacent to the Proposed Scheme footprint where habitats could be directly or indirectly affected during construction/operation. The extent of the study area for habitats is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Rare and / or Protected Flora	The area within or immediately adjacent to the Proposed Scheme footprint where rare and/or protected flora could be directly or indirectly affected during construction/operation. The extent of the study area for rare and/or protected flora is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Fauna species other than those listed below (includes badger, otter, other protected mammal species, amphibians, and reptiles)	The area within or immediately adjacent to the Proposed Scheme footprint where fauna species could be directly or indirectly affected during construction/operation. The extent of the study area for fauna species (other than bats and breeding birds) is illustrated in Figure 12.5 Volume 3 of this EIAR.
Bats	The area suitable for roosting, foraging and/or commuting bats (e.g., bridges, hedgerows, treelines, woodland and watercourses) within or immediately adjacent to the Proposed Scheme footprint where bats could be directly or indirectly affected during construction/operation. The extent of the study area for bats is illustrated in Figure 12.1.1 in Volume 3 of this EIAR.
Wintering Birds	The area suitable for wintering birds within or immediately adjacent to the Proposed Scheme footprint where wintering birds could be directly affected during construction/operation. The extent of the study area for wintering birds is illustrated in Figure 12.1.2 in Volume 3 of this EIAR.
Nesting Bird Suitability i.e. Kingfisher	Watercourses adjacent to the Proposed Scheme footprint where nesting birds i.e. kingfisher could be directly affected during construction/operation. The extent of the study area for kingfisher suitability is illustrated in Figure 12.1.3 in Volume 3 of this EIAR.
Aquatic Ecology	Watercourses adjacent to the Proposed Scheme footprint where the aquatic ecology could be directly or indirectly affected during construction/operation. The extent of the study area for aquatic ecology is illustrated in Figure 12.1.3 in Volume 3 of this EIAR.

12.2.2 Relevant Guidelines, Policy and Legislation

The assessment supporting this Chapter has been undertaken in accordance with the following guidance documents:

- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);

- Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (hereafter referred to as the CIEEM Guidelines) (CIEEM 2018);
- National Road Authority (NRA) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority (NRA 2005a);
- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority (NRA 2005b);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes. National Roads Authority (NRA 2006a);
- Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA 2006b);
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2008a);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide. (NRA 2008b);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009);
- The Management of Invasive Alien Plant Species on National Roads - Technical Guidance (TII 2020a);
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII 2020b);
- Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (Collins, J (ed.) 2016);
- The Bat Workers' Manual (Mitchell-Jones and McLeish 1999);
- Bat Mitigation Guidelines for Ireland V2. Irish Wildlife Manuals No. 134 (Marnell, Kelleher and Mullen 2022);
- The Irish Bat Monitoring Programme 2015 - 2017. Irish Wildlife Manuals 103. (Aughney *et al*. 2018);
- United Kingdom Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) (UKHA 2001a; UKHA 2001b; UKHA 2005);
- National Parks and Wildlife Service (NPWS) Circular NPW 1 / 10 & PSSP 2 / 10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities (NPWS 2010);
- Circular Letter NPWS 2 / 07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species / applications for derogation licences (NPWS 2007a);
- Circular Letter PD 2/07 and NPWS 1 / 07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites (NPWS 2007b); and
- All-Ireland Pollinator Plan 2021-2025, National Biodiversity Data Centre Series No. 25, Waterford. March 2021(NBDC 2021).

It should be noted that in some instances standard survey methodology described in some of the guidance documents listed above was modified for practical reasons. Owing to the nature of the Proposed Scheme, being largely within an urban transport corridor, a practical approach was adopted to capture likely presence of protected species and or likely impacts arising as a result of the construction and operation of the Proposed Scheme. Thus, in respect of badger, the NRA 2005b guidance recommends surveys up to 150m beyond corridor boundaries corridor. This is not feasible for much of the existing urban corridor. Similarly, the guidance in respect of bat surveys (NRA 2006b) advocates surveys up to 1km from the route corridor. For similar reasons this is not considered practical, and the focus of the multi-disciplinary and follow-on surveys has been on areas that could, based on evidence from the desktop study, suitable habitat and professional judgement support the protected species. In respect of otters, accessible riparian areas along at least 150m up and downstream of any proposed watercourse crossing were searched.

Policy and Planning Documents:

- Department of Culture, Heritage and the Gaeltacht (DCHG) National Biodiversity Plan 2017 - 2021 (DCHG 2017);
- Dublin City Council (DCC) Dublin City Development Plan 2022-2028 (DCC 2022);
- Dublin City Biodiversity Action Plan 2021 - 2025 (DCC 2021);
- South Dublin County Council (SDCC) South Dublin County Development Plan (2022-2028) (SDCC 2022);
- South Dublin County Heritage Plan 2010-2015 (SDCC 2010);
- Connecting with Nature Biodiversity Acton Plan for South Dublin County 2020-2026 (Draft) (SDCC 2020 Draft);
- Dún Laoghaire – Rathdown County Development Plan 2022- 2028 (DLRCC 2022); and,
- Dún Laoghaire – Rathdown County Biodiversity Action Plan 2021 – 2025: Nature Recovery, Restoration & Reconnection (DLRCC 2021).

Legislation:

- The Habitats Directive;
- The Birds Directive;
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (hereafter referred to as the Water Framework Directive (WFD));
- S.I. No. 477 / 2011 - European Communities (Birds and Natural Habitats) Regulations 2011, as amended (hereafter referred to as the Birds and Habitats Regulations);
- The EIA Directive;
- Planning and Development Acts 2000 to 2022;
- Wildlife Acts 1976 to 2022;
- S.I. No. 235 / 2022- Flora (Protection) Order, 2022 (hereafter referred to as the Flora Protection Order); and,
- Inland Fisheries Acts 1959 to 2019.

12.2.3 Data Collection and Collation

12.2.3.1 Desk Study

A desk study involved collection and review of relevant published and unpublished sources of data, collation of existing information on the ecological environment and consultation with relevant statutory bodies.

The following sources were consulted during the desk study to inform the scope of the ecological surveys:

- Online data available on European sites and on Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the NPWS (NPWS Database 2022);
- Online data records available on National Biodiversity Data Centre Database (NBDC Online Database 2022);
- Ordnance Survey Ireland (OSI) orthophotography (from 1995 to 2012) for the Proposed Scheme study area;
- Bus Connects Drone Imagery, surveyed 2020 (NTA 2020);
- Records of rare and / or protected species for the 10km (kilometre) grid squares O12 and O13, held by the NPWS;
- Habitat and species GIS datasets provided by the NPWS, including Article 12 and Article 17 data;
- Bat records from Bat Conservation Ireland's (BCI) database;
- Records from the Botanical Society of Britain and Ireland (BSBI);

- Information contained within the Flora of County Dublin (Doogue *et al.,* 1998);
- Environmental information/data for the area available from the EPA website (EPA 2022);
- Information on the status of European Union (EU) protected habitats and species in Ireland (NPWS 2019a, NPWS 2019b and NPWS 2019c); and
- Information on light-bellied Brent goose inland feeding sites (Scott Cawley Ltd. 2017).

A desk study was carried out to identify suitable bat foraging and / or commuting habitat (e.g. woodland and mature treelines) that may be affected by the Proposed Scheme (e.g. areas where vegetation will, or is likely to be, directly affected by works associated with the Proposed Scheme). Following this, transect routes for bat activity surveys were designed within these areas to encompass a representative sample of the habitats present within the Proposed Scheme area.

A desk study was carried out to identify any potential suitable inland feeding and / or roosting sites for wintering birds located within or directly adjacent to the Proposed Scheme. This included a review of recent aerial photography and known inland feeding sites for the Special Conservation Interest (SCI) bird species light-bellied Brent goose *Branta bernicla hrota* (Scott Cawley Ltd. 2017). The desk study identified sites in which significant suitable foraging and/or roosting habitat which would be directly lost as a consequence of the Proposed Scheme, for further wintering bird surveys.

A desk study was carried out to identify all hydrological crossing points within the footprint of the Proposed Scheme. Construction methodologies for the Proposed Scheme do not involve in-stream works, modifications to banks or significant disturbance as a result of the Proposed Scheme. Aquatic habitat surveys, suitability assessments for nesting birds, and otter surveys were carried out and the results of these are presented in order to contextualise the potential ecological receptors. However, as mentioned previously, no instream works are proposed as part of the Proposed Scheme and the desk study identified no sites where water bodies may be subject to significant disturbance.

12.2.3.2 Ecological Surveys

This Section describes the various ecological survey methodologies used to collate baseline ecological information in the preparation of this Chapter. The ecological surveys carried out are summarised in Table 12.2.

Table 12.2: Ecological Surveys and Survey Dates Between 2018 and 2022

Survey	Survey Date(s)	Surveyor Reference
Habitat survey	June to August 2018 August 2020 October 2020 May and August 2022 December 2022*	Scott Cawley Ltd.
Mammal surveys (excluding bats)	June to August 2018 August 2020 October 2020 February 2021 March 2022 December 2022**	Scott Cawley Ltd.
Bat surveys:	Walked transect activity surveys June to August 2018 September and October 2019 May 2020 July 2020 Identification of potential roost features (PRFs) June to August 2018	Scott Cawley Ltd.

	August 2020 March 2022 December 2022*	
Nesting bird suitability assessment	October 2020	Scott Cawley Ltd.
Fisheries/ aquatic surveys	October and November 2020	Triturus Environmental Ltd.
Wintering bird survey	February to March 2020 November 2020 to March 2021 October 2021 to April 2022	Scott Cawley Ltd.
Amphibian habitat suitability assessment	June to August 2018 August 2020	Scott Cawley Ltd.
Reptile habitat suitability assessment	June to August 2018 August 2020	Scott Cawley Ltd.
Survey of one proposed Construction Compound TR6 along the Spawell Link Road,. ** Survey of the River Dodder, in the vicinity of the existing underpass beneath the Spawell Link Road, to the north of Construction Compound TR6.	December 2022	Scott Cawley Ltd.

12.2.3.3 Habitat Survey

Habitat surveys were carried out by Scott Cawley Ltd. between June and August 2018, and August and October 2020. Confirmatory surveys were subsequently undertaken on the Proposed Scheme again in May and August 2022 to check and update the presence and extent of habitats found in the 2018 and 2022 habitat surveys. Aquatic habitat surveys were undertaken by Triturus Environmental Ltd. during October and November 2020. Additionally, one location along the Spawell Link Road (which is currently a Construction Compound for another unrelated development was identified for use for the Proposed Scheme) was surveyed on 22nd December 2022. All habitats located within or immediately adjacent to the Proposed Scheme footprint were surveyed and mapped to level three of the Heritage Council's A Guide to Habitats in Ireland habitat codes, after Fossitt (Fossitt 2000) and in accordance with Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.,* 2011). The level of field data quality (as per Smith *et al.* 2011) was also recorded. Plant species present that were either representative of a habitat or considered to be of conservation interest (i.e., those listed on the Flora Protection Order or listed in the 'Threatened' category or higher on the Ireland Red List No. 10 Vascular Plants (Wyse Jackson *et al*., 2016) and the Ireland Red List No. 8 Bryophytes (Lockhart *et al*., 2012)) were recorded, along with their relative abundances. Non-native invasive plant species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations were also recorded. The habitat's extent was mapped onto an aerial photograph, with Global Positioning System (GPS) points taken where a habitat's extent could not be clearly identified from the aerial photograph. Vascular plant nomenclature follows that of the New Flora of the British Isles Fourth Edition (Stace 2019).

12.2.3.4 Aquatic Surveys

A desk study was carried out to identify all hydrological crossing points within the footprint of the Proposed Scheme. No watercourses are being intersected or interfered with by the Proposed Scheme.

Following on from Inland Fisheries Ireland (IFI) consultation response and the known ecological sensitivity of the River Dodder and (its tributaries), aquatic habitat surveys were carried out at a number of locations, namely CBC1012 AR001 along the River Dodder at Rathdown Park, along the Owenadoher River at Rathfarnham Mill

CBC1012AR002 as well as upstream survey sites on the Owenadoher River at CBC1012AR004 and CBC1012AR003 (Triturus Environmental Ltd., 2020 – refer to Appendix A12.2 in Volume 4 of the EIAR).

No surveys were undertaken in 2022 in respect of the Proposed Scheme, as no watercourses are being intersected or interfered with, but the results of the 2020 surveys are presented in order to contextualise the receiving environment.

Fisheries habitat assessments were undertaken in 2020 to establish the fisheries importance of each site for all fish species of conservation value and were carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency 2003) and Fishery Assessment Methodology (O'Grady 2006) to broadly characterise the river sites (i.e., channel profiles, substrata, etc.). Surveys were carried out for salmonids using the Life Cycle Unit method (Kennedy 1984; O'Connor and Kennedy 2002) by assigning quality scores to each type of habitat. Higher scores in the Life Cycle Unit method of fisheries quantification are representative of poorer value, with lower scores being more optimal despite this appearing counter-intuitive. Lamprey habitat was assessed using the novel Lamprey Habitat Quality Index (LHQI) scoring system as devised by Triturus Environmental Ltd., which loosely follows the same rationale as the Life Cycle Unit score for salmonids above (Kennedy 1984; O'Connor and Kennedy 2002). Larval lamprey habitat quality as well as the suitability of adult spawning habitat was assessed based on the information provided in Maitland (2003). Water quality assessments were undertaken using the Macroinvertebrate Q-sampling methodology (Toner *et al.* 2005).

Areas surveyed in 2020 are shown on Figure 12.1.3 in Volume 3 of this EIAR.

12.2.3.5 Mammals (Excluding Bats)

The footprint of the Proposed Scheme was surveyed for badger *Meles meles* and otter *Lutra lutra* activity as part of the multi-disciplinary walkover survey, undertaken between June and August 2018, in August and October 2020, February 2021, and March 2022. A search for signs of otter along the River Dodder, to the north-east of Construction Compound TR6 along the Spawell Link Road, was also undertaken on 22nd December 2022. The presence / absence of these species was surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings as well as by direct observation. In addition, the study area was surveyed for the presence of badger sett and otter holts. Where present, any evidence of use was recorded.

Following on from Inland Fisheries Ireland (IFI) consultation response and the known ecological sensitivity of the River Dodder and (its tributaries), aquatic habitat surveys were carried out at a number of locations, namely CBC1012 AR001 along the River Dodder at Rathdown Park, along the Owenadoher River at Rathfarnham Mill CBC1012AR002 as well as upstream survey sites on the Owenadoher River at CBC1012AR004 and CBC1012AR003 (Triturus Environmental Ltd., 2020). A corridor of approximately 150m upstream and downstream of the Proposed Scheme was surveyed to identify the presence of otter holts.

Although no watercourses are being intersected or interfered with in respect of the Proposed Scheme, additional otter surveys at proposed road crossing points over the Dodder_040, and Grand Canal were completed in February 2021 and March 2022.

No species-specific surveys were considered necessary for other protected mammal species for which field signs are less frequent and / or less reliable than other larger mammals, such as pine marten *Martes martes*, Irish stoat *Mustela erminea hibernica* and Irish hare *Lepus timidus hibernicus*. Nevertheless, during all surveys, attention was paid to activity signs such as searching soft muds for tracks, and to look for droppings. Potential presence of these species in suitable habitat was determined based on the habitat preferences described in Exploring Irish Mammals (Hayden and Harrington 2000).

12.2.3.6 Bats

The following sections describe the methodologies employed to carry out the various bat surveys undertaken in 2018, 2019, 2020 and 2022 to inform the EIAR. The bat surveys were carried out under the following licence, issued by the NPWS:

- DER / BAT 2019-02 (amended) – Derogation licence to disturb bat roosts throughout the State.
- DER / BAT 2020-67 (amended) – Derogation licence to disturb bat roosts throughout the State.

- DER / BAT 2021-01 (amended) – Derogation licence to disturb bat roosts throughout the State.
- DER / BAT 2022-02 (amended) – Derogation licence to disturb bat roosts throughout the State.

12.2.3.6.1 Bats - Walked Transect Surveys

Walked bat activity transect surveys were conducted along preselected transect routes at seven locations along the Proposed Scheme. Transect routes were located at La Touch Bridge, Portobello, referred to as CBC1012BT001, Pearse Bridge Rathfarnham referred to as CBC1012BT002, along the River Dodder within Bushy Park referred to as CBC1012BT003, adjacent to Rathfarnham Castle, referred to as CBC1012BT004, Owendore Crescent referred to as CBC1012BT005, adjacent to Terenure College, referred to as CBC1012BT006 and adjacent to Dodder Valley Park, referred to as CBC1012BT007. The walked transect routes are shown on Figure 12.1.1 in Volume 3 of this EIAR.

Walked transect surveys comprised of four visits to each transect route across the three seasons of autumn, spring and summer as guided by Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2016) (see Table 12.2. for specific dates). Surveys were conducted in June to August 2018, September and October 2019, May 2020, and July 2020. Surveys commenced approximately 30 minutes after sunset to ensure that bats had emerged from their roosts. Surveys involved the surveyor walking each transect route at a slow pace using with a handheld ultrasound bat detector (Elekon Batlogger M) to record any bat species present.

Transect routes CBC1012BT001, CBC1012BT002, CBC1012BT003, CBC1012BT004 and CBC1012BT006 were surveyed across all seasons. Transect routes CBC1012BT005 and CBC1012BT007 were surveyed in spring and summer 2020 to capture changes to the Proposed Scheme.

All bat calls were analysed using Elekon BatExplorer software. Calls were manually identified against species descriptions provided within British Bat Calls - A Guide to Species Identification (Russ 2012).

12.2.3.6.2 Bats - Bridge Inspections

Bridges in the footprint of the Proposed Scheme, were visually inspected to assess their potential to support roosting bats. One bridge with visible crevices was identified: namely Pearse Bridge Rathfarnham. The bridge was graded to inform the decision on whether or not follow up dusk / dawn surveys were required. The standard approach to bridge assessments uses four simple grades to describe the presence, or likely presence of bats. It follows Billington and Norman (1997) and involves a grading system where the bridges examined are categorized as follows:

- **Grade 0 = no potential for bats**: These are bridges where there are no opportunities for bats to roost in crevices or under mats of dense ivy. Modern concrete bridges and masonry bridges which have been well-pointed often fall under this category.

- **Grade 1 = crevices possibly of use to bats**: These are bridges which have small and a limited number of crevices which may be sub-optimal, perhaps due to dampness or localised disturbance. The possibility that bats could use these crevices cannot be entirely ruled out but is regarded to be low.

- **Grade 2 = ideal crevices but no bat present**: These are generally more substantial crevices, often more than 150mm deep, dry and sheltered which offer good roosting opportunities. No evidence of bats is confirmed. The possibility that bats could use these crevices is regarded to be likely.

- **Grade 3 = evidence of bats**: Bats are seen *in-situ* or their droppings or other field signs are seen.

Following on from the visual assessment, which identified a large deep suitable crevice under the barrel of the bridge which could not be examined fully due to height, it was deemed necessary to undertake follow up dawn surveys at Pearse Bridge to establish if the bridge is being used as a roost.

Bat re-entry surveys were conducted at Pearse Bridge Rathfarnham, referred to as CBC1012RI001 between 2018 and 2020. The dawn re-entry surveys were conducted on the 27th July 2018, 16th October 2019, 22nd May 2020

and 24th July 2020 and commenced approximately 1.5 to 2 hours before sunrise to approximately.15 minutes after sunrise (in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2016). The surveys were carried out using handheld ultrasound bat detectors (Elekon Batlogger M) and direct observation.

All bat calls were analysed using Elekon BatExplorer software. Calls were manually identified against species descriptions provided within British Bat Calls - A Guide to Species Identification (Russ 2012).

12.2.3.6.3 Bats - Tree Surveys

Trees located within the footprint of the Proposed Scheme were assessed for their potential to support roosting bats (i.e. Potential Roost Features (PRFs)) as part of the multi-disciplinary walkover survey carried out between June and August 2018 and August 2020 and again in March 2022 to confirm presence and condition of identified PRF's.. During the habitat survey of existing Construction Compound (proposed to be used as Construction Compound TR6), on 22nd December 2022, trees containing PRFs were also recorded within the vicinity of this Construction Compound.

A number of trees located along the Proposed Scheme were examined from ground level for the potential to support roosting bats. They were assessed based on the presence of features commonly used by bats. Examples of such features include:

- Natural holes;
- Cracks / splits in major limbs;
- Loose bark; and
- Hollows / cavities.

12.2.3.7 Nesting Bird Suitability Assessment

The suitability of water features and associated foraging, roosting, and nesting habitats, located within or directly adjacent to the Proposed Scheme, were assessed for kingfisher *Alcedo atthis* potential in September 2020 and during follow on surveys in March / April 2022. Where suitable habitat existed, surveys extended approximately 500m upstream and downstream of the proposed crossing point. Evidence of kingfisher activity at any potential nest holes was recorded.

12.2.3.8 Wintering Birds

A desk study was carried out to identify any potential suitable inland feeding and / or roosting sites for wintering birds located within or directly adjacent to the Proposed Scheme. This included a review of recent aerial photography and known inland feeding sites for the SCI bird species light-bellied Brent goose (Scott Cawley Ltd. 2017).

The desk study identified three sites along or adjacent to the Proposed Scheme with potential for wintering birds that would be subject to direct habitat loss. These were located at amenity grassland at Dodder View Road / Church Lane (referred to as CBC1012WB001), Dodder View Road / Rathfarnham Park (referred to as CBC1012WB002), and Bushy Park (referred to as CBC1012WB003) (refer to Figure 12.1.2 in Volume 3 of the EIAR). Transects CBC1012WB001 and CBC1012WB002 were surveyed over seven consecutive weeks across February and March 2020, and additionally twice a month, between the months of November 2020 and March 2021. While all three transects were surveyed again twice a month, between the months of October 2021 and March 2022. The results of the desk study and field surveys have informed the assessment of potential impacts on wintering bird species arising from the Proposed Scheme.

The approach for wintering bird surveys was a 'look-see' methodology (based on Gilbert *et al.,* 1998). All birds present within a site were identified with reference to Collins Bird Guide (Svensson 2009) to confirm identification (where necessary) and were recorded using the British Trust for Ornithology (BTO) species codes. The total flock size of birds present, their general location within the site and any activity exhibited were also recorded. Bird droppings were recorded along walked transect lines.

12.2.3.9 Reptiles

The suitability of habitats, located within and immediately adjacent to the Proposed Scheme, were assessed for breeding and / or hibernating reptile species common lizard *Zootoca vivipara*, as part of the multi-disciplinary walkover surveys undertaken between June and August 2018 and in August 2020.

12.2.3.10 Amphibians

An assessment of the suitability of surface water features, such as watercourses, drainage ditches and ponds for amphibian species (common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris*) along the footprint of the Proposed Scheme, and suitable lands immediately adjacent, was carried out as part of the multi-disciplinary walkover surveys undertaken between June and August 2018 and in August 2020.

12.2.4 Appraisal Method for the Assessment of Impacts

The biodiversity and ecological impacts of the Proposed Scheme have been assessed using the following guidelines:

- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- The EPA Guidelines (EPA 2022);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013);
- CIEEM Guidelines (CIEEM 2018); and,
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009).

12.2.4.1 Valuing the Ecological Receptors

Biodiversity receptors (including identified sites of biodiversity importance) have been valued with regard to the ecological valuation examples set out in the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009). These include International Importance, National Importance, County Importance, and Local Importance.

Habitat areas within Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are considered in the context of assessing impacts on the conservation objectives and site integrity of a given European site with regard to the Appropriate Assessment (AA) tests set out in Article 6(3) of the Habitats Directive. An AA Screening Report and Natura Impact Statements have been submitted with the application for approval as to enable the Board to carry out the requisite assessments for the purposes of Article 6(3) of the Habitats Directive. For the purposes of the appraisal of likely significant effects on biodiversity arising from the Proposed Scheme, as part of this chapter of the EIAR, all European sites are valued as internationally important.

In accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009), biodiversity features within the ZoI of the Proposed Scheme which are '*both of sufficient value to be material in decision making and likely to be affected significantly'* are deemed to be KERs. These are the biodiversity receptors which may be subject to likely significant impacts from the Proposed Scheme, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of Local Importance (Higher Value) or greater.

12.2.4.2 Characterising and Describing the Impacts

The parameters considered in characterising and describing the magnitude or scale of the likely significant effects of the Proposed Scheme are outlined in Table 12.3.

Table 12.3: Parameters used to Characterise and Describe the Magnitude or Scale of Potential Impacts

Parameter	Categories
Type of impact	Positive / Neutral / Negative May also include Cumulative Effects, 'Do Nothing Effects', 'Do Minimum Effects', Indeterminable Effects, Irreversible Effects, Residual Effects, Synergistic Effects, Indirect Effects and / or Secondary Effects
Extent	The size of the affected area / habitat and / or the proportion of a population affected by the effect
Duration	The period of time over which the effect will occur*.
Frequency and Timing	How often the effect will occur; particularly in the context of relevant life-stages or seasons
Reversibility	Permanent/Temporary Will an impact reverse; either spontaneously or as a result of a specific action

Note: *The above terms / definitions for describing the duration of impacts are provided in the EPA Guidelines (EPA 2022): Momentary Effects - effects lasting from seconds to minutes; Brief Effects - effects lasting less than a day; Temporary Effects - effects lasting less than a year; Short-term Effects - effects lasting one to seven years; Medium-term Effects - effects lasting seven to 15 years; Long-term Effects - effects lasting 15 to 60 years; Permanent Effects - effects lasting over 60 years.

The likelihood of an impact occurring, and the predicted effects, are also an important consideration in characterising impacts. The likelihood of an impact occurring is assessed as being certain, likely or unlikely and; in some cases, it may be possible to definitively conclude that an impact will not occur.

Professional judgement is used in considering the contribution of all relevant criteria in determining the overall magnitude of an impact.

12.2.4.3 Impact Significance

In determining impact significance, the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009) and the CIEEM Guidelines (CIEEM 2018) were followed, which requires examination of the following two key elements:

- Impact on the integrity of the ecological feature; and,
- Impact on its conservation status within a given geographical area.

12.2.4.3.1 Integrity

The term 'integrity' should be regarded as the coherence of ecological structure and function, across the entirety of a site that enables it to sustain all of the biodiversity or ecological resources for which it has been valued (NRA 2009).

The term 'integrity' is most often used when determining impact significance in relation to designated areas for nature conservation (e.g., Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or proposed Natural Heritage Areas (pNHAs) / Natural Heritage Areas (NHAs) but can often be the most appropriate method to use for non-designated areas of biodiversity value where the component habitats and / or species exist with a defined ecosystem at a given geographic scale.

An impact on the integrity of an ecological site or ecosystem is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites' habitats and / or species; affecting the nature, extent, structure and functioning of component habitats; and / or, affecting the population size and viability of component species.

12.2.4.3.2 Conservation Status

The definitions for conservation status given in the Habitats Directive, in relation to habitats and species, are also used in the CIEEM Guidelines (CIEEM 2018) and the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009):

- For natural habitats, conservation status means the sum of the influences acting on the natural habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species, at the appropriate geographical scale; and
- For species, conservation status means the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations, at the appropriate geographical scale.
- An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status.

After the definitions provided in the Habitats Directive, the conservation status of a habitat is favourable when:

- Its natural range and areas it covers within that range are stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and,
- The conservation status of its typical species is favourable as defined below under species.

And, the conservation status of a species is favourable when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and,
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

According to the CIEEM Guidelines (CIEEM 2018) and the Guidelines for Assessment of Ecological Impacts of National Road Schemes methodology (NRA 2009), if it is determined that the integrity and / or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e., local, county, national, international). In some cases, an impact may not be significant at the geographic scale at which the ecological feature has been valued but may be significant at a lower geographical level. For example, a particular impact may not be considered likely to have a negative effect on the overall conservation status of a species which is considered to be internationally important. However, an impact may occur at a local level on this internationally important species. In this case, the impact on an internationally important species is considered to be significant at only a local, rather than international level.

12.3 Baseline Environment

The Proposed Scheme has an overall length of approximately 10km from end to end online, with additional offline upgrades ((comprising the installation of traffic management measures, i.e., minor upgrades to junctions and traffic signage) and quiet street treatment of approximately 2km and 1.5km respectively. The Proposed Scheme will be comprised of two main alignments, namely from Templeogue to Terenure (3.7km), and from Rathfarnham to the City Centre (6.3km).

The Templeogue to Terenure section will commence on the R137 Tallaght Road, east of the M50 junction 11 interchange. From here, the Proposed Scheme is routed via the R137 along Tallaght Road and Templeogue Road, through Templeogue Village, to Terenure Cross, where it joins with the Rathfarnham to City Centre section. Habitats present within the Templeogue to Terenure Section largely include artificial surfaces associated with the road and adjacent urban areas – commercial and residential habitats, although wider verges such as at the edge of Tymon Park, and wooded verges are also noted. The Proposed Scheme continues along the R137 Templeogue Road intersecting urban habitats but also passing by the open playing fields of Terenure College and Bushy Park including mature treelines before residential development on both side of the road towards Terenure,

The Rathfarnham to City Centre section will commence on the R821 Grange Road at the junction with Nutgrove Avenue, and is routed along the R821 Grange Road, the R115 Rathfarnham Road, the R114 Rathfarnham Road, Terenure Road East, Rathgar Road, Rathmines Road Lower, Richmond Street South, Camden Street Upper and Lower and Wexford Street as far as the junction with the R110 at Kevin Street Lower and Cuffe Street where

priority bus lanes end. From Cuffe Street to Dame Street along Redmond's Hill, Aungier Street, and South Great George's Street the route will involve a traffic lane and a cycle track in both directions where it will join the prevailing traffic management regime in the city centre. The habitats are characterised by built environment with occasional patches of amenity grassland, treelines, and scattered trees and parkland streetscape (associated with Rathfarnham Castle) occur. Approaching Springfield Avenue, the Proposed Scheme crosses the River Dodder corridor with amenity grassland, wooded walkways, before returning to the urban transport corridor that is largely lined for much of its length by residential and commercial development lining both sides of the roads with occasional gardens and or streetscape planting, as well as parking areas in area such as Terenure.

In addition to the above, an alternative cycle facility will be provided along Harold's Cross Road / Terenure Road North between Terenure Cross and Parkview Avenue, as well as along Bushy Park Road, Wasdale Park, Wasdale Grove, Zion Road and Orwell Road. These areas are characterized by suburban and urban built environment with some treelines, hedgelines and amenity grassland verges throughout.

Freshwater habitats are present adjacent to sections of the Proposed Scheme, including the River Dodder which is crossed twice by the Proposed Scheme and the Grand Canal, which is crossed once along the existing road bridge at Rathmines Road lower / Richmond Street.

12.3.1 Zone of Influence (ZoI)

The ZoI, or distance over which a likely significant effect may occur, will differ across the KERs, depending on the predicted impacts and the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken have established the habitats and species present along the alignment of the Proposed Scheme. The ZoI is then informed and defined by the sensitivities of each of the ecological receptors present, in conjunction with the nature and potential impacts associated with the Proposed Scheme. In some instances, the ZoI extends beyond the study area as described in Section 12.2.1 (e.g., surface water quality effects of a sufficient magnitude can extend, and affect, receptors at significant distances downstream).

The ZoI of the Proposed Scheme in relation to terrestrial habitats is generally limited to the footprint of the Proposed Scheme, and the immediate environs (to take account of shading or other indirect impacts, such as air quality). Hydrogeological / hydrological linkages (e.g., rivers or groundwater flows) between impact sources and wetland / aquatic habitats can often result in impacts occurring at significant distances.

The underlying aquifers are either Locally Important Bedrock Aquifer or Poor Bedrock Aquifer. These types of aquifers are associated with low permeability which decreases with depth. An upper shallow zone of higher permeability may exist in the top few metres and is associated with relatively short flow paths. Therefore, any influence on the groundwater as a result of the proposed works will be localised and will not extend to any groundwater dependant habitats which are all located over 400m from any proposed work. This ZoI is determined by the professional judgement of the hydrogeology specialists. This is further discussed with reference to specific construction activities in Chapter 14 (Land, Soils, Geology & Hydrogeology).

The unmitigated ZoI of air quality effects is generally local to the Proposed Scheme and not greater than a distance of 50m from the Proposed Scheme boundary, and 500m from Construction Compound during the Construction Phase, and up to 200m the Proposed Scheme boundary or local road networks experiencing a change in AADT (Annual Average Daily Traffic) flows greater than 1,000 during the Operational Phase (refer to Chapter 7 (Air Quality) for more detail).

With regards to hydrological impacts, the distances over which water-borne pollutants are likely to remain in sufficient concentrations to have a likely significant effect on receiving waters and associated wetland / terrestrial habitat is highly site-specific and related to the predicted magnitude of any potential pollution event. Evidently, it will depend on volumes of discharged waters, concentrations and types of pollutants (in this case sediment, hydrocarbons, and heavy metals), volumes of receiving waters and the ecological sensitivity of the receiving waters. In the case of the Proposed Scheme, this includes: all estuarine habitats downstream of where the Proposed Scheme will drain to, or cross water bodies listed in Table 12.4 and the marine environment of Dublin Bay (see Figure 12.2 in Volume 3 of this EIAR).

As such, the potential ZoI for aquatic plant and animal species includes all estuarine habitats located downstream of where the Proposed Scheme will drain to the proposed crossing points listed in Table 12.4 and the marine

environment of Dublin Bay. The ZoI for impacts to aquatic fauna species, such as Atlantic salmon *Salmo salar* and lamprey species *Lampetra* spp., is limited to those water courses that will be crossed by the Proposed Scheme or water bodies to which runoff from the Proposed Scheme could drain to during construction and operation.

Table 12.4: Water bodies Hydrologically Connected to the Proposed Scheme and Within its ZoI

Waterbody Name	Connectivity to the Proposed Scheme
Grand Canal (Grand Canal Main Line (Liffey and Dublin Bay))	Crossed by the Proposed Scheme
Owenadoher River (Owenadoher_010)	Surface water connectivity
River Dodder (Dodder_040; Dodder_050)	Crossed by the Proposed Scheme
Liffey Estuary Upper	Surface water connectivity
Liffey Estuary Lower	Surface water connectivity, downstream of Grand Canal and River Dodder
Dublin Bay	Surface water connectivity, downstream of Grand Canal and River Dodder, and Liffey Estuary Upper and Lower

The ZoI for small mammal species, such as the pygmy shrew *Sorex minutus*, would be expected to be limited to no more than approximately 100m from the Proposed Scheme boundary due to their small territory sizes and sedentary lifecycle. The ZoI for otters, badgers, stoat, and hedgehogs *Erinaceus europaeus* may extend over greater distances than small mammal and bird species due to their ability to disperse many kilometres from their natal / resting sites. The ZoI of impacts for significant disturbance impacts to badger and otter breeding / resting places may extend as far as approximately 150m from the Proposed Scheme boundary. This ZoI (i.e., approximately 150m from Proposed Scheme boundary) for badgers and otters has been defined in accordance with the Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2005a) and the Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2005b) and is considered to be of a precautionary distance. During construction-related disturbance, the screening effect provided by surrounding vegetation and buildings would likely reduce the actual distance of the ZoI for badgers and otters.

The ZoI of potential effects to bat roosts would not be expected to exceed approximately 200m in most cases but as effects are dependent on many factors (such as species, roost type, surrounding habitat, commuting routes etc.), this is assessed on a case-by-case basis and the ZoI may increase / decrease from this distance accordingly. Given the large foraging ranges for some species, the ZoI of potential landscape scale impacts, such as habitat loss and severance, could extend for several kilometres from the Proposed Scheme but the most significant effects are likely to occur within 1km of important roost sites (e.g., maternity roosts). Leisler's bats *Nyctalus leisleri* have been recorded foraging up to 13km from maternity roost sites (Shiel *et al.,* 1999).

The ZoI of the Proposed Scheme in relation to likely significant effects on most breeding bird species is generally limited to habitat loss within the footprint of the Proposed Scheme, and disturbance / displacement during construction and disruption in territorial singing due to noise during operation. Disturbance effects may extend for several hundred metres from the Proposed Scheme.

The ZoI in relation to indirect impacts to wintering birds could extend up to approximately 300m from the Proposed Scheme for general construction activities, as many species (such as waterbirds) are highly susceptible to disturbance from loud and unpredictable noise during construction. However, as many estuarine bird species use inland habitat areas at distances from the coast, the ZoI for *ex situ* impacts could extend a considerable distance from the Proposed Scheme. In the case of the Proposed Scheme, impacts to wintering birds within this 300m band could affect the use of potential *ex-situ* sites for bird species listed as SCIs of European sites.

Current understanding of construction related noise disturbance to wintering waterbirds is based on the research presented in Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance (Cutts *et al.,* (2009) and Exploring Behavioural Responses of Shorebirds to Impulsive Noise (Wright *et al.,* (2010). In terms of construction noise, levels below 50dB (decibels) would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from

birds (i.e., birds becoming alert and some behavioural changes (e.g., reduced feeding activity)), but birds are expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity (British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228–1) (BSI 2008)) are generally below 60dB or, in most cases, are approaching the 50dB threshold.

The ZoI in relation to amphibian species is likely to be limited to direct habitat loss and severance within the Proposed Scheme boundary and / or indirect impacts to water quality in wetland habitats hydrologically connected to the Proposed Scheme.

The ZoI in relation to the common lizard is likely to be limited to direct habitat loss and severance within and across the Proposed Scheme boundary and disturbance / displacement effects in the immediate vicinity during construction.

12.3.2 Desk Study

The results of the desk study review are provided in Appendix A12.1 in Volume 4 of this EIAR and are incorporated into the sections below under the various headings, as relevant.

12.3.3 Local Biodiversity Areas

The South Dublin County Development Plan 2022-2028 (SDCC 2022) highlights a number of areas considered to be of biodiversity value present within the SDCC administrative boundary. These areas that are located within the zone of influence of the Proposed Scheme are provided below:

- Habitats considered to be of importance, such as hedgerows and woodlands, which support a range of species and act as important ecological links / corridors across the wider landscape;
- Liffey Valley is important as an interconnecting biodiversity corridor with adjacent pNHA's such as Rye River / Carton pNHA. Relevant objectives contained in the South Dublin County Development Plan 2022-2028 include to protect and enhance the outstanding natural character and amenity of the area (SDCC 2022). Tree preservation orders have also been identified for areas adjacent to Lucan Road. Liffey Valley was designated by a Special Amenity Area Order (SAAO) by the then Minister for the Environment in 1990. It traverses the county boundaries of both SDCC and Fingal County Council (FCC). The valley has tremendous ecological significance in the form of a wide variety of habitats which support diverse plant and animal species including salmon, kingfisher and otter and flora including hairy St. John's-wort *Hypericum hirsutum*, and rare Red List plant species green figwort *Scrophularia umbrosa* and yellow archangel *Lamiastrum galeobdolon*. The objective of the order is to protect these outstanding landscapes, nature and amenities. The River Liffey is an important feature in this river catchment for terrestrial and aquatic species as well as greenspaces; and,
- Network of parks and public green spaces such as Dodder Valley Linear Park, Tallaght TU Campus, Bancroft Park and Tymon Park on the Tallaght section of the Proposed Scheme which support a variety of species and habitats and are considered to be a valuable biodiversity resource. The Dublin City Biodiversity Action Plan 2021 – 2025 (DCC 2021) highlights a number of areas considered to be of biodiversity value present within the boundaries of DCC. These areas that are located within the ZoI of the Proposed Scheme are provided below:
- Dublin City's Green Infrastructure Network. Habitats within the Proposed Scheme which are considered to contribute to the Green Infrastructure Network include grassland, hedgerows, treelines and woodlands, which support a range of species and act as ecological links / corridors across the wider landscape. Dublin City's network of parks and public green spaces, such as the Phoenix Park as well as Bushy Park, Terenure College and Sports Grounds, and Harold's Cross Park, support a variety of species and is considered to be a valuable biodiversity resource;
- Dublin City's network of rivers, streams and riparian zones. The Proposed Scheme will cross the River Dodder, Dublin City's third largest river. These watercourses support several rare or protected fauna associated with the rivers, including bat species, otter - which has been recorded in 11 of the city's rivers, kingfisher *Alcedo atthis*, and migratory fish. The Liffey Estuary and River Dodder is downstream / adjacent to the Proposed Scheme and is noted as being city's most important river for

legally-protected fish species supporting Atlantic salmon and brown trout *S. trutta*, the 'Critically Endangered' European eel *Anguilla anguilla,* brook lamprey *Lampetra planeri*, river lamprey *L. fluviatilis* and the 'Endangered' white-clawed crayfish *Austropotamobius pallipes;* and,

- The Grand Canal is contained within the ZoI of the Proposed Scheme and is designated as a pNHA. It is noted that this waterway forms an important ecological corridor for both aquatic and terrestrial species (including otter) and allow for the dispersal of a range of flora and fauna, which is particularly vital in an urban environment. It supports coarse fish species, including roach *Rutilus* sp., pike *Esox lucius*, rudd *Scardinius erythrophthalmus*, bream *Abramis brama* and tench *Tinca tinca*. It also contains the legally protected FPO species opposite-leaved pondweed *Groenlandia densa*, as well as the endangered Red List freshwater snail species glutinous snail *Myxas glutinosa*. Otter activity is often found where the canal crosses with streams and rivers throughout the city.
- A short section of the Proposed Scheme, in the vicinity of the junction of the R821 and R822 along Grange Road in Rathfarnham is located within the administrative area of Dún Laoghaire – Rathdown County Council. The Dún Laoghaire – Rathdown County Biodiversity Action Plan 2021-2025 (DLRCC 2021) identifies a "County-wide Ecological Network" which "forms the fundamental basis" of DLRCC's "Green Infrastructure and Biodiversity". This network is composed of "the most important biodiversity areas" within the county, and include protected sites, Annex habitats located outside protected sites, wildlife corridors and Locally Important Biodiversity Sites. Areas of DLRCC's "County-wide Ecological Network" which are located within the ZoI of the Proposed Scheme include:
- Wildlife corridors such as the Dodder Valley Corridor and Ticknock to the River Dodder Corridor. Such corridors are crucial to the survival of countless species such as badger, hedgehog, bats and birds. They bridge the gap between habitats, which otherwise would be small and isolated, and join them together, helping to restore and preserve biodiversity.

Local biodiversity areas listed above are considered under the relevant flora and / or fauna KERs that rely on these areas in the overall EIAR biodiversity assessment.

12.3.4 Designated Areas for Nature Conservation

12.3.4.1 European sites

The Proposed Scheme does not overlap with any European site. The Proposed Scheme is hydrologically connected to Dublin Bay via the receiving surface water network. The nearest European sites in Dublin Bay are South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC, which are located approximately 3.2km downstream of the closest point of the Proposed Scheme to the Liffey Estuary Upper. The Proposed Scheme is also hydrologically connected to the Wicklow Mountains SAC (via the River Dodder and the Owenadoher River), located approximately 6.1km upstream from the Proposed Scheme.

There are eight European sites located in Dublin Bay which are downstream of the Proposed Scheme. These sites include North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC and Dalkey Islands SPA. European sites are hydrologically connected to the Proposed Scheme via the River Dodder, the Owenadoher River, the Grand Canal, the Liffey Estuary Upper and Lower and Ringsend Wastewater Treatment Plant. In addition, Wicklow Mountains SAC is located upstream of the Proposed Scheme and is hydrologically connected to the Proposed Scheme via the Dodder_050.

There are two European sites containing marine mammals which are known to frequent Dublin Bay and the Liffey Estuary Lower namely; Rockabill to Dalkey Island SAC and Lambay Island SAC.

There are 26 no. European sites (SACs or SPAs) located within the vicinity of the Proposed Scheme, of which 17 no. are located within the ZoI. Each site, their distance to the Proposed Scheme and their designations (QIs / SCIs) are listed in Table 12.5, and illustrated in Figure 12.3 in Volume 3 of this EIAR. Sites within the ZoI are highlighted in blue in Table 12.5.

It is confirmed that, for the purposes of the EIAR, these European sites are all valued as being of International Importance.

Table 12.5: European sites (SACs and SPAs) Located within the ZoI (highlighted in light blue), and those in the Wider Area, of the Proposed Scheme Boundary.

Site Name	Distance	Designation – QIs or SCIs
SAC		
South Dublin Bay SAC [000210]	Approximately 3.2km east of the Proposed Scheme	Annex I Habitats: • 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]; and, • Embryonic shifting dunes [2110]. *S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019* Source: Conservation Objectives: South Dublin Bay SAC 000210. Version 1. (NPWS 2013a)
North Dublin Bay SAC [000206]	Approximately 5.7km east of the Proposed Scheme	Annex I Habitats: • 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]*; and, • Humid dune slacks [2190]. Annex II Species: • Petalwort *Petalophyllum ralfsii* [1395]. *S.I. No. 524/2019 – European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019* Source: Conservation Objectives: North Dublin Bay SAC 000206. Version 1. (NPWS 2013b)
Rockabill to Dalkey Island SAC [003000]	Approximately 11.3km south-east of the Proposed Scheme	Annex I Habitats: • Reefs [1170]. Annex II Species: • Harbour porpoise *Phocoena phocoena* [1351]. *S.I. No. 94/2019 – European Union Habitats (Rockabill To Dalkey Island Special Area Of Conservation 003000) Regulations 2019* Source: Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. (NPWS 2013c)
Howth Head SAC [000202]	Approximately 11.5km north-east of the Proposed Scheme	Annex I Habitats: • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and, • European dry heaths [4030]. *S.I. No. 524/2021 - European Union Habitats (Howth Head Special Area of Conservation 000202) Regulations 2021* Source: Conservation Objectives: Howth Head SAC 000202. Version 1. (NPWS 2016)
Wicklow Mountains SAC [002122]	Approximately 6.1km south of the Proposed Scheme	Annex I Habitats: • 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];

Site Name	Distance	Designation – QIs or SCIs
		• 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]; and, • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]. Annex II Species: • Otter *Lutra lutra* [1355]. Source: Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. (NPWS 2017a)
Knocksink Wood SAC [000725]	Approximately 10.1km south-east of the Proposed Scheme	Annex I Habitats: • Petrifying Springs with Tufa formation (Cratonuerion)* [7220] • Old Sessile oak woods with Ilex and Blechnum in the British Isles [91A0]; and, • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Anion incanae, Salicion albae)* [91E0]. *S.I. No. 93/2019- European Union Habitats (Knocksink Wood Special Area of Conservation 000725) Regulations 2019* Source: Conservation objectives for Knocksink Wood SAC [000725]. Version 1.0. Department of Housing, Local Government and Heritage. NPWS (2021b)
Ballyman Glen SAC [000713]	Approximately 12.2km south-east of the Proposed Scheme	Annex I Habitats • Petrifying Springs with Tufa formation (Cratoneurion)* [7220] • Alkaline fens [7230] *S.I. No. 92/2019- European Union Habitats (Ballyman Glen Special Area of Conservation 000713) Regulations 2019* Source: Conservation objectives: Ballyman Glen SAC [000713]. Version 1.0. Department of Housing, Local Government and Heritage. NPWS (2019d)
Baldoyle Bay SAC [000199]	Approximately 10.7km north-east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]; and, • Mediterranean salt meadows (Juncetalia maritimi) [1410]. *S.I. No. 472/2021 - European Union Habitats (Baldoyle Bay Special Area of Conservation 000199) Regulations 2021* Source: Conservation Objectives: Baldoyle Bay SAC 000199. Version 1. (NPWS 2012b)
Glenasmole Valley SAC [001209]	Approximately 4.5km south of the Proposed Scheme	Annex I Habitats: • 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]; and, • Petrifying springs with tufa formation (Cratoneurion) [7220]*. *S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021* Source: Conservation objectives for Glenasmole Valley SAC [001209]. Version 1.0. DCHG (NPWS 2021a)

Site Name	Distance	Designation – QIs or SCIs
Rye Water Valley/Carton SAC [001398]	Approximately 13.4km west of the Proposed Scheme	Annex I Habitats: • Petrifying springs with tufa formation (Cratoneurion) [7220]*. Annex II Species: • Narrow-mouther Whorl Snail *Vertigo angustior* [1014]; and, • Desmoulin's Whorl Snail *Vertigo moulinsiana* [1016]. *S.I. No.494/2018 – European Union Habitats (Rye Water Valley/ Carton Special Area of Conservation 001398) Regulations 2018* Source: Conservation Objectives for Rye Water Valley/Carton SAC [001398]. Version 1.0. Department of Housing, Local Government and Heritage (NPWS 2021c)
Ireland's Eye SAC [000203]	Approximately 14.6km north-east of the Proposed Scheme	Annex I Habitats: • Perennial vegetation of stony banks [1220]; and • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]. *S.I. No. 501/2017 – European Union Habitats (Ireland's Eye Special Area of Conservation 002193) Regulations 2017* Source: Conservation Objectives: Ireland's Eye SAC 002193. Version 1. (NPWS 2017a)
Malahide Estuary SAC [000205]	Approximately 13.5km north-east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • *Spartina* swards (Spartinion maritimae) [1320]; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]; • Mediterranean salt meadows (Juncetalia maritimi) [1410]; • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]; and, • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]*. *S.I. No. 91/2019 – European Union Habitats (Malahide Estuary Special Area of Conservation 000205) Regulations 2019* Source: Conservation Objectives: Malahide Estuary SAC 000205. Version 1. (NPWS 2013d)
Lambay Island SAC [000204]	Approximately 22.1km north-east of the Proposed Scheme	Annex I Habitats • Reefs [1170]; and, • Vegetated Sea cliffs of the Atlantic and Baltic coasts [1230]. Annex II Species • Grey seal *Halichoerus grypus* [1364]; and, • Harbour seal *Phoca vitulina* [1365]. *S.I. No. 294/2019 - European Union Habitats (Lambay Island Special Area Of Conservation 000204) Regulations 2019* *Source: Conservation Objectives: Lambay Island SAC 000204. Version 1. (NPWS 2013e)*
SPA		
South Dublin Bay and River Tolka Estuary SPA [004024]	Approximately 2.9km east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Oystercatcher *Haematopus ostralegus* [A130]; • Ringed Plover *Charadrius hiaticula* [A137]; • Grey Plover *Pluvialis squatarola* [A140]; • 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];

Site Name	Distance	Designation – QIs or SCIs
		• Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; • Arctic Tern *Sterna paradisaea* [A194]; and, • Wetlands and Waterbirds [A999]. *S.I. No. 212/2010 – European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024) Regulations 2010* Source: Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. (NPWS 2015a) and Natura 2000 – Standard Data Form (NPWS 2020a)
North Bull Island SPA [004006]	Approximately 5.8km east of the Proposed Scheme	• 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 tetanus* [A162]; • Turnstone *Arenaria interpres* [A169]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; and, • Wetlands and Waterbirds [A199]. *S.I. No. 211/2010 – European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006) Regulations 2010* Source: Conservation Objectives: North Bull Island SPA 004006. Version 1. (NPWS 2015b) and Natura 2000 – Standard Data Form (NPWS 2020c)
Dalkey Islands SPA [004172]	Approximately 12.2km south-east of the Proposed Scheme	• Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and • Arctic Tern *Sterna paradisaea* [A194]. *S.I. No. 238/2010 – European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172)) Regulations 2010* Source: *Conservation objectives for Dalkey Islands SPA [004172].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS (2022a) and Natura 2000 – Standard Data Form (NPWS 2020d)
Wicklow Mountains SPA [004040]	Approximately 6.2km south of the Proposed Scheme	• Merlin *Falco columbarius* [A098]; and, • Peregrine Falco peregrinus [A103]. *S.I. No. 586/2012 – European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040) Regulations 2012* Source: *Conservation objectives for Wicklow Mountains SPA [004040].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS (2022b) and Natura 2000 – Standard Data Form (NPWS 2020e)
Baldoyle Bay SPA [004016]	Approximately 10.9km north-east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Ringed Plover *Charadrius hiaticula* [A137]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141];

Site Name	Distance	Designation – QIs or SCIs
		• Bar-tailed Godwit *Limosa lapponica* [A157]; and • Wetlands and Waterbirds [A999]. *S.I. No. 275/2010 – European Communities (Conservation of Wild Birds (Baldoyle Bay Special Protection Area 004016) Regulations 2010* Source: Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013f) and Natura 2000 – Standard Data Form (NPWS 2020f)
Howth Head Coast SPA [004113]	Approximately 14.1km north-east of the Proposed Scheme	• Kittiwake *Rissa tridactyla* [A188]. *S.I. No. 185/2012 – European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012* Source: *Conservation objectives for Howth Head Coast SPA [004113].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS (2022c) and Natura 2000 – Standard Data Form (NPWS 2020f)
Ireland's Eye SPA [004117]	Approximately 14.5km north-east of the Proposed Scheme	• Cormorant *Phalacrocorax carbo* [A017]; • Herring Gull *Larus argentatus* [A184]; • Kittiwake *Rissa tridactyla* [A188]; • Guillemot *Uria aalge* [A199]; and, • Razorbill *Alca torda* [A200]. *S.I. No. 240/2010 – European Communities (Conservation of Wild Birds (Ireland's Eye Special Protection Area 004117) Regulations 2010* Source: *Conservation objectives for Ireland's Eye SPA [004117].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS (2022d) and Natura 2000 – Standard Data Form (NPWS 2020g)
Malahide Estuary SPA [004025]	Approximately 13.5km north-east of the Proposed Scheme	• Great Crested Grebe *Podiceps cristatus* [A005]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadornatadorna* [A048]; • Pintail *Anas acuta* [A054]; • Goldeneye *Bucephala clangula* [A067]; • Red-breasted *Merganser Mergus serrator* [A069]; • Oystercatcher *Haematopus ostralegus* [A130]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141]; • Knot *Calidris canutus* [A143]; • Dunlin *Calidris alpina* [A149]; • Black-tailed Godwit *Limosa limosa* [A156]; • Bar-tailed Godwit *Limosa lapponica* [A157]; • Redshank *Tringa totanus* [A162]; and, • Wetland and Waterbirds [A999]. *S.I. No. 285/2011 – European Communities (Conservation of Wild Birds (Malahide Estuary Special Protection Area 004025) Regulations 2011* Source: Conservation Objectives: Malahide Estuary SPA 004025. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013f) and Natura 2000 – Standard Data Form (NPWS 2020h)
Rogerstown Estuary SPA [004015]	Approximately 18.1km north-east of the Proposed Scheme	• Greylag Goose *Anser anser* [A043]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Shoveler *Anas clypeata* [A056]; • Oystercatcher *Haematopus ostralegus* [A130]; • Ringed Plover *Charadrius hiaticula* [A137]; • Grey Plover *Pluvialis squatarola* [A141];

Site Name	Distance	Designation – QIs or SCIs
		• Knot *Calidris canutus* [A143]; • Dunlin *Calidris alpina* [A149]; • Black-tailed Godwit *Limosa limosa* [A156]; • Redshank *Tringa totanus* [A162]; and, • Wetland and Waterbirds [A999]. *S.I. No. 271/2010 – European Communities (Conservation of Wild Birds (Rogerstown Estuary Special Protection Area 004015) Regulations 2010* Source: Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS, 2013g) and Natura 2000 – Standard Data Form (NPWS, 2020i)
Lambay Island SPA [004069]	Approximately 22km north-east of the Proposed Scheme	• Fulmar *Fulmarus glacialis* [A009]; • Cormorant *Phalacrocorax carbo* [A017]; • Shag *Phalacrocorax aristotelis* [A018]; • Greylag Goose *Anser anser* [A043]; • Lesser Black-backed Gull *Larus fuscus* [A183]; • Herring Gull *Larus argentatus* [A184]; • Kittiwake *Rissa tridactyla* [A188]; • Guillemot *Uria aalge* [A199]; • Razorbill *Alca torda* [A200]; and, • Puffin *Fratercula arctica* [A204]. *S.I. No. 242/2010 – European Communities (Conservation of Wild Birds (Lambay Island Special Protection Area 004069)) Regulations 2010* Source: *Conservation objectives for Lambay Island SPA [004069].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS (2022e) and Natura 2000 – Standard Data Form (NPWS 2020j)
The Murrough SPA [004186]	Approximately 26.2km south-east of the Proposed Scheme	• Red-throated Diver *Gavia stellata* [A001]; • Greylag Goose *Anser anser* [A043]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Wigeon *Anas penelope* [A050]; • Teal *Anas crecca* [A052]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; • Herring Gull *Larus argentatus* [A184]; and, • Little Tern *Sterna albifrons* [A195]. *S.I. No. 298/2011 – European Communities (Conservation of Wild Birds (The Murrough Special Protection Area 004186)) Regulations 2011* Source: *Conservation objectives for The Murrough SPA [004186].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS (2022f) and Natura 2000 – Standard Data Form (NPWS 2020k)
Skerries Islands SPA [004122]	Approximately 27.5km north-east of the Proposed Scheme	• Cormorant *Phalacrocorax carbo* [A017]; • Shag *Phalacrocorax aristotelis* [A018]; • Light-bellied Brent Goose *Branta bernicla hrota [*A046]; • Purple Sandpiper *Calidris maritima [*A148]; • Turnstone *Arenaria interpres* [A169]; and, • Herring Gull *Larus argentatus* [A184]. *S.I. No. 245/2010 – European Communities (Conservation of Wild Birds (Skerries Islands Special Protection Area 004122)) Regulations 2010.* Source: Conservation Objectives: *Conservation objectives for Skerries Islands SPA [004122].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS (2022g) and Natura 2000 – Standard Data Form (NPWS 2020l)

Site Name	Distance	Designation – QIs or SCIs
Rockabill SPA [004014]	Approximately 28.1km north-east of the Proposed Scheme	• Purple Sandpiper *Calidris maritima* [A148; • Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and, • Arctic Tern *Sterna paradisaea* [A194]. *S.I. No. 94/2012 – European Communities (Conservation of Wild Birds (Rockabill Special Protection Area 004014) Regulations 2012* Source: Conservation Objectives: Rockabill SPA [004014]. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013h) and Natura 2000 – Standard Data Form (NPWS 2020m)

12.3.4.2 Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs)

NHAs are designations under Section 18 of the Wildlife (Amendment) Act 2000 to protect habitats, species or geology of national importance.

In addition to NHAs, pNHAs are sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. pNHAs are offered protection in the interim period under the county or city development plans which requires that planning authorities give due regard to their protection in planning policies and decisions. The Proposed Scheme lies within the administrative boundaries of South Dublin County Development Plan 2022-2028 (SDCC 2022) and Dublin City Development Plan 2022-2028 (DCC 2022), with a small section located in the administrative boundary of Dun Laoghaire Rathdown County Development Plan 2022-2028 (DLR CDP2022-2028).

Many of the pNHA sites, and some of the NHAs in Ireland overlap with the boundaries of European sites.

The Grand Canal pNHA is the closest pNHA to the Proposed Scheme and is traversing the Proposed Scheme at La Touche Bridge, Portobello. The Dodder Valley pNHA is the next nearest pNHA to the Proposed Scheme. It is located approximately 366m south-west of the Proposed Scheme. The Royal Canal pNHA is hydrologically separate from the Proposed Scheme which is located approximately 1.6km north of the Proposed Scheme. The Grand Canal pNHA is located within the Dublin City County Development Plan 2022-2028 boundaries.

There are six pNHAs that are located downstream of the Proposed Scheme in Dublin Bay. These pNHAs are North Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA, Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, and South Dublin Bay pNHA. These sites will be hydrologically connected to the Proposed Scheme via the Grand Canal, River Dodder, Owenadoher River and River Liffey. These pNHAs lie within the administrative boundaries of the South Dublin County Development Plan 2022-2028, Dublin City Development Plan 2022-2028 and / or Fingal County Development Plan 2017-2023 (FCC 2017) and Dun Laoghaire Rathdown Development Plan 2022-2028 (DLRCDP 2022).

There is one NHA and 11 pNHAs containing SCI species that are known to forage and / or roost at inland sites across Dublin. These include Malahide Estuary pNHA, Baldoyle Bay pNHA, Rogerstown pNHA, Portraine Shore pNHA, North Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, South Dublin Bay pNHA, Booterstown Marsh pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA, Lambay Island pNHA, and Skerries Islands NHA.

There is one NHA and 26 no. pNHAs located in the wider area of the Proposed Scheme. These are listed in Table 12.6 and illustrated in Figure 12.4 in Volume 3 of this EIAR. Table 12.6 lists these sites, their distance from the Proposed Scheme, and the ecological features for which the sites are designated/proposed. Sixteen of these are located within the ZoI of the Proposed Scheme (see Table 12.6).

These pNHAs are valued as being of National Importance.

Table 12.6: NHA and pNHAs located within the ZoI of the Proposed Scheme Boundary (highlighted in light blue), and those in the Wider Area of the Proposed Scheme Boundary

Site Name	Distance	Description
NHAs		
Skerries Island NHA [001218]	Approximately 27.5km north-east of the Proposed Scheme	See Table 12.5 under Skerries Island SPA
pNHAs		
Booterstown Marsh pNHA [001205]	Approximately 3.3km east of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
Grand Canal pNHA [002104]	Traverses the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
South Dublin Bay pNHA [000210]	Approximately 3.2km east of the Proposed Scheme	See 6 under South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA
Royal Canal pNHA [002103]	Approximately 1.7km north of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
North Dublin Bay pNHA [000206]	Approximately 2.6km east of the Proposed Scheme	See Table 12.5 under North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA
Dolphins, Dublin Docks pNHA [000201]	Approximately 4..4km east of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	Approximately 8.6km south-east of the Proposed Scheme	Good example of a coastal system with habitats ranging from sub-littoral to coastal heath. Flora is well developed and includes some scare species. The islands are important bird sites. See also Table 12.5 under Rockabill to Dalkey Island SAC and Dalkey Islands SPA
Liffey Valley pNHA [000128]	Approximately 5.8km south-east of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, rare Red List plant species green figwort *Scrophularia umbrosa* and yellow archangel *Lamiastrum galeobdolon* and the diversity of habitat present.
Fitzsimon's Wood pNHA [001753]	Approximately 4km south-east of the Proposed Scheme	Birch woodland, which is very rare in County Dublin.
Dingle Glen pNHA [001207]	Approximately 8.8km south-east of the Proposed Scheme	Variety of habitat present, including woodland
Santry Demesne pNHA [000178]	Approximately 6.1km north-east of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, and woodland
Dodder Valley pNHA [000991]	Approximately 366m south-west of the Proposed Scheme	The last remaining stretch of natural riverbank vegetation on the River Dodder in the built-up Greater Dublin Area (GDA).
Ballybetagh Bog pNHA [001202]	Approximately 9.1km south-east of the Proposed Scheme	Marshland
Howth Head pNHA [000202]	Approximately 11.3km north-east of the Proposed Scheme	See Table 12.5under Howth Head SAC and Howth Head Coast SPA
Baldoyle Bay pNHA [000199]	Approximately 10.7km north-east of the Proposed Scheme	See Table 12.5 under Baldoyle Bay SAC and Baldoyle Bay SPA
Feltrim Hill pNHA [001208]	Approximately 11km north-east of the Proposed Scheme	Good example of knoll-reef phenomenon. Previously known to contain two rare plant species, namely spring squill *Scilla verna* and long-stalked crane's-bill *Geranium columbinum*
Sluice River Marsh pNHA [001763]	Approximately 11.5km north-east of the Proposed Scheme	Freshwater marsh
Glenasmole Valley pNHA [001209]	Approximately 4.5km south of the Proposed Scheme	See Table 12.5 under Glenasmole Valley SAC
Ireland's Eye pNHA [000203]	Approximately 14.7km east of the Proposed Scheme	See Table 12.5 under Ireland's Eye SAC and Ireland's Eye SPA
Malahide Estuary pNHA [000205]	Approximately 13.5km north-east of the Proposed Scheme	See Table 12.5 under Malahide Estuary SAC and Malahide Estuary SPA

Site Name	Distance	Description
Lugmore Glen pNHA [001212]	Approximately 5.7km south of the Proposed Scheme	Presence of the rare Red Data Book species Yellow Archangel (*Lamiastrum galeobdolon*).
Rye Water Valley/Carton pNHA [001398]	Approximately 13.3km west of the Proposed Scheme	Linear riverine site known to support Priority Annex I Petrifying springs with tufa formation (Cratoneurion) as well as two Annex II species snails, namely: Narrow-mouthed Whorl Snail *Vertigo angustior* and Desmoulin's Whorl Snail *V. moulinsiana*.
Portraine Shore pNHA [001215]	Approximately 17.8km north-east of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Rogerstown Estuary pNHA [000208]	Approximately 17.8km north-east of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Lambay Island pNHA [000204]	Approximately 22.1km north-east of the Proposed Scheme	See Table 12.5 under Lambay Island SAC and Lambay Island SPA
The Murrough pNHA [000730]	Approximately 24.6km south-east of the Proposed Scheme	See Table 12.5 under The Murrough Wetlands SAC and The Murrough SPA

12.3.4.3 Other Designated Sites

Other designations recognised in the Greater Dublin area including RAMSAR wetlands sites and UNESCO Dublin Bay Biosphere are considered in terms of the European and National sites assessment, whilst the three Special Area Amenity Order (SAAO) are local to specific Bus Connects corridors but are nonetheless captured in the overall EIAR biodiversity assessment and Natura Impact Statement by virtue of overlapping nature designations, namely European and Nationally designated sites.

12.3.4.3.1 Ramsar Sites

The Convention on Wetlands is an intergovernmental treaty adopted on 2 February 1971 in the Iranian city of Ramsar. The official name of the treaty 'The Convention on Wetlands of International Importance especially as Waterfowl Habitats' reflects the emphasis on the protection of wetlands primarily as habitat for waterbirds.

There are a number of Ramsar sites within the vicinity of the Proposed Scheme, namely:

- Rogerstown Estuary (Site code 412);
- Broadmeadow Estuary (Site code 833);
- Baldoyle Bay (Site code 413);
- North Bull Island (Site code 406); and,
- Sandymount Strand / Tolka Estuary (Site code 832).

As these Ramsar sites overlap with European sites and / or NHAs / pNHAs which this EIAR assessment is considering, no further discussion is provided.

12.3.4.3.2 UNESCO Dublin Bay Biosphere

Dublin Bay was initially recognised by the United Nations Education, Scientific and Cultural Organisation (UNESCO) for its rare and internationally important habitats and species of wildlife. North Bull Island supports a variety of plants and wildlife including an internationally significant population of light-bellied Brent geese that overwinters in the bay. UNESCO's concept of a Biosphere has evolved to include not just areas of ecological value but also the areas around them and the communities that live and work within these areas. Dublin Bay Biosphere Reserve now extends to over 300 km^2 of marine and terrestrial habitat encompassing North Bull Island and ecologically significant habitats such as the Tolka and Baldoyle Estuaries, Howth Head, Dalkey Island, Killiney Hill and Booterstown Marsh. Over 300,000 people live within the newly enlarged Biosphere.

While the Biosphere designation does not strictly add any specific new legal protection, it greatly enhances the many legal protections that already exist by improving the coordination and management of its functions in a holistic and integrated way. In this respect the biodiversity assessment for the EIAR and the AA for the Proposed

Scheme collectively addresses the key biodiversity elements of the Biosphere designation, and no further discussion is provided in this regard.

12.3.4.3.3 Special Amenity Area Order (SAAO)

The objective of the Special Amenity Area Order is primarily to protect outstanding landscapes, nature and amenities and were originally placed on a statutory footing under the Local Government (Planning and Development) Act 1963, as amended, and re-enacted under section 202 of the Planning and Development Act 2000.

Three such Special Amenity Area Orders have been recognised in Ireland, all of them in the Greater Dublin Area, and can cross local authority administrative boundaries. They include:

- North Bull Island;
- Howth Head; and
- Liffey Valley.

The designations re-enforce the protection for green belts via land plans and objectives contained therein. As such these areas have been considered in the overall EIAR biodiversity assessment and Appropriate Assessment, respectively, by virtue of overlapping nature designations.

12.3.5 Habitats

12.3.5.1 Overview

The results of the habitat surveys along the alignment of the Proposed Scheme are described below by habitat type (Fossitt 2000). The habitats described below relate to habitat areas within or adjacent to the Proposed Scheme, as shown on Figure 12.5 in Volume 3 of this EIAR along with the full habitat survey results.

The habitat types recorded along the footprint of the Proposed Scheme, as discussed in this Section, are as follows:

- Flower beds and borders (BC4);
- Stone walls and other stonework (BL1);
- Buildings and artificial surfaces (BL3);
- Exposed sand, gravel or till (ED1);
- Spoil and bare ground (ED2);
- Depositing / lowland rivers (FW2);
- Canals (FW3);
- Amenity Grassland (Improved) (GA2);
- Dry meadows and grassy verges (GS2);
- Wet grassland (GS4);
- Residential;
- (Mixed) broadleaved woodland (WD1);
- Scattered trees and parkland (WD5);
- Hedgerows (WL1);
- Treelines (WL2);
- Scrub (WS1); and,
- Ornamental / non-native shrub (WS3).

None of these habitats corresponds to Annex I or Qualifying Interest habitats. This includes Dry meadows and grassy verges habitat (GS2), which in certain situation corresponds to Lowland hay meadows (*Alopecurus*

*pratensis, Sanguisorba officinali*s) (6510). The species and management of the habitat along the Proposed Scheme is not analogous to the Annex I hay meadow habitat.

12.3.5.2 Flower beds and borders (BC4)

This habitat includes ornamental planting associated with commercial developments or industrial complexes, and planting at roundabouts and along roadsides in suburban areas. This habitat type was identified in one location across the Proposed Scheme, at St. Mary's Boys National School Rathfarnham as planted beds lining the car park.

Ornamental species present at this habitat include New Zealand broadleaf *Griselinia littoralis,* pampas grass *Cortaderia selloana*, montbretia *Crocosmia x crocosmiiflora,* fuschsia species *Fuchsia magellanica*, hebe species *Hebe* spp.*,* cotoneaster species *Cotoneaster* spp.*,* geranium species *Pelargonium* spp.*,* and various bedding plants. Native species recorded include lavender species *Lavandula* spp.*,* rose species *Rosa* spp.*,* snowberry *Symphoricarpos albus* and common valerian *Valeriana officinalis.*

This habitat type was also found in mosaics with the following habitat; ornamental / non-native shrub (WS3)

This habitat type is of Local Importance (Lower Value) due to its low species diversity and the presence and dominance of non-native species.

12.3.5.3 Stone walls and other stonework (BL1)

Stone walls were present in 20 locations across the Proposed Scheme, comprising either property boundaries or roadside boundaries. The largest area of this habitat was located along Templeogue Road from Our Lady's School to Rathdown Park, Templeogue Wood, Rathfarnham Castle, Rathfarnham Wood and Christ Church Rathgar. Additional discrete areas were located at Moto4U Main Street Rathfarnham, Mitsubishi Motors Terenure, Military Road Rathmines, and at several property's along Rathfarnham Road and Rathgar Road.

The majority of the stone walls recorded along the proposed scheme were well maintained and free from vegetation. This habitat category was also used to describe stone bridges, steps and stone buildings. Where vegetation was present it included common ivy *Hedera helix* and ivy-leaved toadflax *Cymbalaria muralis*.

This habitat type is of Local Importance (Lower Value) due to most areas being devoid of vegetation.

12.3.5.4 Buildings and artificial surfaces (BL3)

This habitat type includes all buildings (i.e., domestic, commercial and industrial), roads, car parks, artificial recreation surfaces and other concrete/hard standing areas. This habitat type was the most commonly encountered habitat and was present across the entire length of the Proposed Scheme, owing to the largely urban and suburban nature of the study area.

This habitat type was also found in mosaics with the following habitat types; amenity grassland (GA2) and ornamental/non-native shrub (WS3).

This habitat type is of Local Importance (Lower Value), due to being characterised by built or artificial surfaces and being devoid of vegetation.

12.3.5.5 Exposed sand, gravel or till (ED1)

This habitat type was assigned to habitats which consisted of till or boulder clay. An area of exposed sand, gravel or till was identified at three locations across the Proposed Scheme; the largest area of this habitat was located on improved amenity grassland (GA2) east of Woodview Cottages, along Dodder View Road and in the carpark of Kennedys Field adjacent to Spawell Service Station at M50 Junction. This habitat consists of spoil heaps containing railway ballast and rubble. This habitat was also recorded at the proposed location of Construction Compound TR6 along the Spawell Link Road. This site is currently being used as a Construction Compound for nearby works associated with a different project and comprises an exposed gravel surface where construction equipment is stored.

This habitat type is of Local Importance (Lower Value) due to most areas being devoid of vegetation.

12.3.5.6 Spoil and bare ground (ED2)

This habitat type was present at two locations, at the time of survey across the proposed scheme; adjacent to The Butlers Pantry Rathgar Road and in a laneway at 315 Templeogue Road, in small areas of bare ground, often associated with access ways, such as gravel driveways. Areas of bare ground, which have recently been sown with grass but are not yet adequately vegetated were also classified as being spoil and bare ground habitat.

Plant species recorded within this habitat include common ivy.

This habitat type is of Local Importance (Lower Value) due to the low species diversity of this disturbed habitat type.

12.3.5.7 Depositing / lowland rivers (FW2)

This habitat type refers to the River Dodder and the Owenadoher River. This habitat type is present at a number of locations across the Proposed Scheme as discussed below.

The Proposed Scheme crosses the River Dodder at Pearse Bridge Rathfarnham (illustrated in Figure 12.2 in Volume 3 of this EIAR). The River Dodder at this location is classified as 'Moderate' status for the period of 2016-2021 and is deemed 'At Risk' of failing to meet its requirements under the Water Framework Directive (i.e. 'Good Status' by 2027). Biological water quality, based on Q-sampling undertaken by Triturus Environmental Ltd., was calculated as Q3 (poor status) (Triturus Environmental Ltd., 2020).

The River Dodder at Rathdown Park (CBC1012AR001) survey location in 2020 averaged 10-12m wide and 0.3-0.6m deep, with locally deeper glide and pools to >1m. The site was dominated by swift flowing shallow glide (i.e.,70%) with occasional riffle areas and very localised pool (small, where present). The habitat was generally homogenous upstream and downstream of the survey site. The river had been straightened historically with 3-4m high embankments on both banks but good natural recovery was evident. The substrata was dominated by cobble (i.e., 30%) and well-sorted gravels (30%), with occasional larger boulder (20%). Sand was frequent locally. Overall levels of siltation were low and accumulations were sand-dominated, where present. The substrata were mobile and largely free from silt (Triturus Environmental Ltd, 2020).

Given the loose substrata and mature tree canopy, macrophyte growth was not present at the survey site. However, some localised long-beaked water feathermoss *Platyhypnidium riparoides* and smaller lattice-moss *Cinclidotus fontinaloides* was present locally on larger boulder. Great scented liverwort *Conocephalum conicum* and Pellia *Pellia* spp. liverworts were abundant on exposed muddy banks (Triturus Environmental Ltd. 2020).

Tree species identified along the bankside include beech, *Fagus sylvatica*, elder *Sambucus nigra*, alder *Alnus glutinosa*, sycamore *Acer pseudoplatanus*, cherry laurel *Prunus laurocerasus* and crack willow *Salix euxina.*

Riparian vegetation identified along the River Dodder banks include ivy, wild angelica *Angelica sylvestris*, cow parsley *Anthriscus sylvestris*, orache species *Atriplex* spp., hedge bindweed *Calystegia sepium*, pendulus sedge *Carex pendula*, alexanders *Smyrnium olusatrum*, wood avens *Geum urbanum*, common hogweed *Heracleum sphondylium*, winter heliotrope *Petasites pyrenaicus*, common reed *Phragmites australis*, flag iris *Iris pseudacorus*, bramble Rubus *fruticosus* agg and cotoneaster species. The Third Schedule Himalayan balsam *Impatiens glandulifera* was also identified along the banks of the River Dodder during the multi-disciplinary studies but later surveys identified other species (see Section 12.3.7).

The Owenadoher River (which is not monitored for fish or invertebrate potential), which discharges to the River Dodder at Rathfarnham Mill, was assigned an Ecological fish and invertebrate and Phytobenthos status of 'Moderate' for the period 2016-2021 and the Owenadoher River Risk assessment is under review its WFD objectives (EPA 2023).

This habitat type was also found in mosaics with the following habitat types; buildings and artificial surfaces (BL3).

This habitat type is of Local Importance (Higher Value) as it is not common in the surrounding area.

12.3.5.8 Canals (FW3)

The Proposed Scheme traverses the Grand Canal at La Touche Bridge Portobello (illustrated in Figure 12.2 in Volume 3 of this EIAR).

Vegetation recorded along the canal banks include grass species cock's-foot *Dactylis glomerata*, Yorkshire-fog *Holcus lanatus*, wall barley *Hordeum murinum*, perennial ryegrass *Lolium perenne* and annual meadow-grass *Poa annua*. Forb species comprise wild angelica, hoary willowherb *Epilobium parviflorum*, meadowsweet *Filipendula ulmaria*, flag iris, common reed, ribwort plantain *Plantago lanceolata*, greater plantain *Plantago major*, winter heliotrope, creeping buttercup *Ranunculus repens*, broad-leaved dock *Rumex obtusifolius*, common ragwort *Jacobaea vulgaris*, bittersweet *Solanum dulcamara*, common dandelion *Taraxacum officinale* agg., red clover *Trifolium pratense*, common nettle *Urtica dioica* and vetch species *Vicia* spp.

The legally-protected Flora Protection Order species opposite-leaved pondweed is known to be present in several areas throughout the Grand Canal, the desk study returned records for this species within the 2km grid square O13R adjacent to the Proposed Scheme (NBDC online database 2022).

This habitat type is of National Importance due to the Grand Canal designated as a pNHA.

12.3.5.9 Amenity grassland (Improved) (GA2)

Amenity grassland was commonly recorded habitat across the Proposed Scheme. It is present in small areas located across the entirety of the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat included the roadside boundaries and medians along the Tallaght Road R137 from the M50 Junction through to Cypress Grove Road, along Templeogue Road from Fortfield Road to Rathdown Drive, at the Bring Centre on Grange Road and at two locations along Dodder View Road; at Woodview Cottages (proposed location of Construction Compound TR3) and at Rathfarnham Road.

Amenity grassland was dominated by perennial ryegrass Yorkshire-fog, cock's-foot, fescue species *Festuca spp*., barren brome grass *Bromus sterilis*, wall barley and annual meadow-grass, while forb species present included daisy *Bellis perennis*, yarrow *Achillea millefolium*, cow parsley, black medick *Medicago lupulina*, silverweed *Argentina anserina*, ribwort plantain, greater plantain, cleavers *Galium aparine*, field bindweed *Convolvulus arvensis*, hawksbeard *crepis* spp., creeping cinquefoil, *Potentilla reptans*, meadow buttercup *Ranunculus acris*, creeping buttercup, broad-leaved dock, smooth sow thistle *Sonchus oleraceus*, chickweed *Stellaria media*, common dandelion, red clover, white clover *Trifolium repens*, common poppy *Papaver rhoeas*, winter heliotrope, wood avens, alexanders, common comfrey *Symphytum officinale*, coltsfoot *Tussilago farfara*, common nettle tufted vetch *Vicia cracca*, bush vetch *Vicia sepium*, common ragwort, horsetail species *Equisetum* spp., common valerian and bramble.

This habitat type was also found in mosaics with the following habitat types; buildings and artificial surfaces (BL3), dry meadows and grassy verges (GS2) and ornamental/non-native shrub (WS3)

This habitat type is of Local Importance (Lower Value) due to the low species diversity, which reflects regular management.

12.3.5.10 Dry meadows and grassy verges (GS2)

This habitat type is comprised of unmanaged freely draining grassland areas including areas of parkland which are less intensively managed and can include some roadside verges. This habitat type was recorded in three areas of varying sizes located across the Proposed Scheme. Prominent areas of this habitat were identified on Nutgrove Avenue at Grange Road, additional areas include on sports grounds adjacent to Spawell House and on Templeogue Road opposite Corrybeg (illustrated in Figure 12.5 in Volume 3 of this EIAR).

Grass species present included Yorkshire-fog, wall barley, perennial ryegrass, cock's-foot, fescue species and barren brome grass. While forb species present included yarrow, broad-leaved dock, rosebay willowherb *Chamaenerion angustifolium*, creeping buttercup, wood avens, common dandelion, winter heliotrope, hawksbeard, creeping thistle *Cirsium arvense*, common thistle *Cirsium vulgare*, smooth sow thistle, common nettle, ribwort plantain, common ragwort, alexanders, common valerian, ivy, butterfly-bush *Buddleja davidii*, rose

species and bramble. Given the low species diversity present in this habitat type, areas of dry meadows and grassy verges (GS2) habitat recorded in the vicinity of the Proposed Scheme were not deemed to align with the Annex I habitat Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510].

This habitat type is of Local Importance (Lower Value) due to being highly fragmented and low species diversity.

12.3.5.11 Wet Grassland (GS4)

This habitat type is comprised of unmanaged damp grassland areas including areas of parkland which are less intensively managed and also includes riparian edges. This habitat type was recorded in two areas of relatively small size, one of which is located along the Grand Canal, while the other is located on the opposite end of the scheme in an under managed corner of Kennedy's Field of the R137 (illustrated in Figure 12.5 in Volume 3 of this EIAR).

Grass species present included Yorkshire-fog, perennial ryegrass, cock's-foot, *fescue* species and *Agrostis* species. While forb species present include soft rush *Juncus effusus*, common nettle, ribwort plantain, common ragwort, alexanders, common valerian, ivy, rosebay willowherb, creeping buttercup and bramble. Given the low species diversity present in this habitat type, areas of wet grassland (GS4) habitat recorded in the vicinity of the Proposed Scheme were not deemed to align with the Annex I habitat '*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) (6410)'.

This habitat type is of Local Importance (Lower Value) due to being highly fragmented and low species diversity.

12.3.5.12 Residential

This non-Fossitt classification is used to represent residential properties along the Proposed Scheme corridor and generally consists of a mosaic of buildings and artificial surfaces (BL3), amenity grassland (GA2), flower beds and borders (BC4), ornamental shrubs (WS3) and hedgerows (WL1). By virtue of the abundance of urban landscape through which the Proposed Scheme is located, this habitat type was commonly encountered across the entire scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR).

This habitat type is of Local Importance (Lower Value) due to general lack of species diversity which reflects the nature of paved and artificial surfaces.

12.3.5.13 (Mixed) broadleaved woodland (WD1)

Areas of mixed broadleaved woodland included the following locations along the Proposed Scheme; The largest areas of this habitat type are at Rathfarnham Castle and along Dodder View Road and Bushy Park. Additional areas of this habitat type were recorded along the Templeogue Road at Bushy Park and Terenure College, Beaufort Downs, Pearse Bridge, Dodder Park Road, Tymon Park and Our Lady's School.

Tree species recorded at these locations include maple species *Acer* sp., birch species *Betula* spp., alder, horse chestnut *Aesculus hippocastanum*, hazel *Corylus avellana*, hawthorn *Crataegus monogyna*, cypress species *Cupressus spp*., beech, copper beech *Fagus sylvatica f. purpurea*, ash *Fraxinus excelsior*, holly *Ilex aquifolium*, mallow *Malva sylvestris*, sycamore, aspen *Populus tremula*, cherry laurel, holm oak *Quercus ilex*, oak species *Quercus* spp., willow species *Salix* spp., Wilson's honeysuckle *Lonicera nitida,* elder, rowan *Sorbus aucuparia*, small-leaved lime *Tilia cordata*, elm species *Ulmus* spp., and cotoneaster species.

Where present understories and ground flora species include ivy, bramble, cleavers, soft shield fern *Polystichum setiferum*, pendulous sedge *Carex* pendula, lords and ladies *Arum maculatum*, orache species, euphorbia species *Euphorbia* spp., seed rape *Brassica napus*, cow parsley, yarrow, pendulus sedge, hawksbeard, Hart's-tongue fern Asplenium *Asplenium scolopendrium* ,common hogweed, red dead-nettle *Lamium purpureum*, winter heliotrope, ribwort plantain, broad-leaved dock, wood dock *Rumex sanguineus*, common groundsel *Senecio vulgaris*, common dandelion, common nettle, speedwell species *Veronica spp*, alexanders, herb Robert *Geranium robertianum*, wood avens, birdsfoot trefoil *Lotus corniculatus*, cowslip *Primula veris*, milk thistle *Silybum marianum* and some garden escape species. Grass species comprise annual meadow-grass, fescue species, Yorkshire-fog and perennial ryegrass.

The section next to Pearse Bridge had similar species within the understory but a high abundance of the non-native arrow bamboo *Pseudosasa japonica*.

This habitat type was also found in mosaics with the following habitat types; amenity grassland (GA2) and scrub (WS1).

This habitat type is of Local Importance (Higher Value) as it is not common in the surrounding area and is relatively species-rich in the context of existing road corridor and surrounding built environment/habitats.

12.3.5.14 Scattered trees and parkland (WD5)

This habitat classification describes areas of scattered trees, standing alone or in small clusters, which are a prominent structural or visual feature of the habitat. This habitat type was identified at approximately ten locations across the Proposed Scheme, most of which were associated with parks, green space and schools (illustrated in Figure 12.5 in Volume 3 of this EIAR).

The most significant areas of this habitat type were present at Bushy Park, Tymon Park and Our Lady's School. Tree species identified at these locations include maple species, birch species, hornbeam *Carpinus Fastigiata Lucas*, sycamore, holm oak, oak species, yew *Taxus baccata*, small-leaved lime, Scots pine *Pinus sylvestrus*, cherry laurel, bird cherry *Prunus padus* and cherry species.

This habitat type was also found in mosaics with the following habitat types; amenity grassland (improved) (GA2) and buildings and artificial surfaces (BL3).

This habitat type is of Local Importance (Higher Value) as it is not common in the surrounding area and is relatively species-rich in the context of surrounding habitats.

12.3.5.15 Hedgerows (WL1)

Hedgerows were present at several areas within the footprint Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). These consisted of linear strips of shrubby vegetation, often containing trees, which frequently demarcated property/field boundaries. Most of the hedgerows which were recorded along the Proposed Scheme consisted of screening vegetation at residential properties, along roadsides and within the vegetated median of larger roads. Substantial areas of this habitat are present along the central road median and roadside boundary of the Tallaght Road R137 from the M50 Junction through to Corrybeg on the Templeogue Road, at St. Joseph's Church, and in Bushy Park at Pearse Bridge.

The species composition varied greatly within this habitat type. Tree and shrub species consist of field maple *Acer campestre*, purple maple *Acer palmatum 'Atropurpureum*, hornbeam, alder, red birch *Betula occidentalis*, silver birch *Betula pendula*, birch species, hawthorn, hazel, eucalyptus *Eucalyptus gunnii*, beech, ash, holly, bay laurel, sycamore, cherry *Prunus Kanzan*, cherry laurel, willow species, cypress species, elder, whitebeam *Sorbus aria*, rowan, yew. Fuchsia species *Fuchsia* sp., cotoneaster species, cabbage palm, New Zealand broadleaf, garden privet *Ligustrum ovalifolium*, lavender species, snowberry and butterfly-bush. The understory comprised of species including bramble, hedge bindweed *Calystegia sepium*, cleavers, ivy. Ground flora and forb species consist of common valerian, ribwort plantain, creeping cinquefoil, creeping buttercup, broad-leaved dock, creeping thistle, common thistle, common ragwort, alexanders, hoary willowherb, horsetail species, yarrow, common dandelion, sedge species *Carex* spp., common nettle, wood avens, bush vetch, common hogweed, with grass species including Yorkshire-fog, perennial ryegrass and barren brome grass.

This habitat type also occurred in mosaics with the following habitats: amenity grassland (GA2), scrub (WS1), treelines (WL2) and buildings and artificial surfaces (BL3).

This habitat type is of Local Importance (Higher Value) as it is not common in the surrounding area.

12.3.5.16 Treelines (WL2)

This habitat is comprised of narrow rows or single lines of trees, which are greater than 5m in height. This habitat type was occasionally recorded across the study area of the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). In the context of the Proposed Scheme, treeline habitat is typically urban street planting along footpaths / strips of amenity grassland and road edges. Substantial areas of this habitat are present along the roadside boundary of the Tallaght Road / R137 from the M50 Junction through to Corrybeg and intermittently along Templeogue Road, along road medians and boundaries around Rathfarnham Castle, at Wasdale Pak and Wasdale Grove, Military Road and the adjacent sports ground, intermittently along Lower Rathmines Road and at Redmonds Hill.

Tree species frequently recorded in urban treelines (i.e., street planting) included sycamore, maple species, horse chestnut, alder, silver birch, birch species, hornbeam, hazel, hawthorn, leyland cypress *Cupressus* × *leylandii*, cypress species, beech, copper beech, ash, holly, pine species *Pinus sp*., poplar species *Populus* spp., Japanese cherry *Prunus japonica*, cherry, cherry laurel, bird cherry, oak species, weeping willow, willow species, elder, Turkey oak *Quercus cerris*, whitebeam, rowan, common lime *Tilia* × *europaea*, small-leaved lime, yew, elm species, monkey puzzle *Araucaria araucana*, laburnum species *Laburnum* spp. and Japanese mahonia *Mahonia japonica*. The understory, where present consists of a variety of species including butterfly-bush, ivy, bramble, snowberry, common nettle, common hogweed, alexanders, common dandelion, red clover, white clover and cow parsley.

This habitat type also occurred in mosaics with the following habitats: dry meadows and grassy verges (GS2), amenity grassland (GA2), buildings and artificial surfaces (BL3), hedgerows (WL1) and ornamental / non-native shrub (WS3).

This habitat type, although in places characterised by non-native or landscape planting, is of Local Importance (Higher Value) as it is not common in the surrounding area and is relatively species-rich in the context of surrounding habitats.

12.3.5.17 Scrub (WS1)

Scrub was identified at various locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat were located at the Spawell Roundabout, Spawell Link Road and at Along the Templeogue Road at Hillcrest. Additional areas include Templeogue Road at St. Michael's House, the carpark of Kennedys Field adjacent to Spawell Service Station, along the River Dodder downstream of Pearse Bridge, along the Owenadoher at Rathfarnham Mill and downstream of Butterfield Avenue.

Species recorded consisted of goat willow *Salix caprea*, willow sp., maple species, Norway maple *Acer platanoides,* curly birch *Betula pendula var. carelica*, alder, hawthorn, cherry laurel, butterfly-bush, cotoneaster species, bramble, gorse species *Ulex* spp., St. John's wort species *Hypericum* spp., tutsan *Hypericum androsaemum*, common knapweed *Centaurea nigra*, creeping thistle, common thistle, seed rape, common nettle, rosebay willowherb, hoary willowherb, meadowsweet, meadow buttercup, creeping buttercup, winter heliotrope, tormentil *Potentilla erecta*, broad-leaved dock, comfrey, water figwort *Scrophularia auriculata,* Harts-tongue fern Yorkshire-fog and cock's-foot.

An area of scrub next to Pearse Bridge had four stems of the green flowered helleborine *Epipactis phyllanthes*, growing along the southern bank of the River Dodder next to bramble, which is listed as 'Endangered' on Irelands Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al*., 2016). This is outside the Proposed Scheme red line boundary.

This habitat type also occurred in mosaics with buildings and artificial surfaces (BL3), dry meadows and grassy verges (GS2), recolonising bare ground (ED3), treelines (WL2) and ornamental/ non-native shrub (WS3).

This habitat type is of Local Importance (Lower Value) due to single shrub species dominance and the relative lack of overall floristic diversity, however the recording of the 'Endangered' green flowered Helleborine *Epipactis phyllanthes* is noteworthy and would be considered of County Importance.

12.3.5.18 Ornamental / non-native shrub (WS3)

Areas of ornamental / non-native shrub were generally associated with amenity and landscape planting at commercial properties. Substantial areas of this habitat type bordered areas at the Spawell Service Station, Rathfarnham Castle, St. Joseph's Church, St. Mary's Community Centre Richmond Hill and Church of Mary Immaculate Refuge of Sinners. Additional areas of this habitat type were recorded at Spawell Roundabout, and as roadside planting along Bushy Park House, Butterfield Avenue, Dodder Park Road, Cormac Terrace and Lissenfield

Non-native Species identified include copper maple *Acer platanoides schwedleri*, maple species, purple maple, palm species *Arecaceae* spp., cypress, dwarf conifers, bay laurel, cherry laurel, cabbage palm *Cordyline* spp., pampas grass, cotoneaster species, fuchsia species, garden privet, geranium species, bird of paradise *Strelitzia*, hebe species, hydrangea species *Hydrangea* spp.

Native species recorded at these locations include birch species, hornbeam, ash, holly, lavender species, oxeye daisy *Leucanthemum vulgare* and St. John's wort species.

This habitat type was recorded in mosaics with the following other habitat types; flower beds and borders (BC4).

This habitat type is of Local Importance (Lower Value) due to its due to its anthropogenic nature and relative low species diversity.

12.3.6 Rare and Protected Plant Species

There were no protected plant species listed on the Flora Protection Order (2022), identified within the footprint of the Proposed Scheme during field surveys. One Red List species was identified within close proximity of the Proposed Scheme during field surveys next to Pearse Bridge beside the River Dodder, green flowered Helleborine *Epipactis phyllanthes* which is listed as 'Endangered' on Irelands Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al.,*2016).

The desk study returned 12 species listed on the Flora Protection Order across the wider study area (i.e., grid squares O12 and O13) these are listed in Appendix 12.1 in Volume 4 of this EIAR. Records of Flora Protection Order species included multiple records of opposite-leaved pondweed in the Grand Canal (grid square O13L) (NBDC Online Database 2022) including three records within close proximity to the Proposed Scheme at La Touche Bridge Portobello (NPWS consultation 2021). Opposite-leaved pondweed is listed as 'Near threatened' on Irelands Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al.,* 2016).

Records from the desk study showed wood bitter-vetch *Vicia orobus* recorded at Dodder Park, Firhouse, within 1km south-west of the Proposed Scheme (grid squareO1027) (NBDC Online Database 2022). Wood bitter-vetch is listed as 'Vulnerable' on Irelands Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al.,*2016).

Populations of flora species listed on the Flora Protection Order are valued as of National Importance. The population of green flowered Helleborine listed as 'Endangered' on Ireland's Red List No. 10 (Wyse Jackson *et al,.* 2016) is considered to be of County Importance, while all other non-Red listed flora are considered to be of Local Importance (Higher Value).

12.3.7 Non-Native Invasive Plant Species

Table 12.7There were three non-native invasive plant species listed on the Third Schedule of the Birds and Habitats Regulations, 2011 which were identified in close proximity of the Proposed Scheme namely; Japanese knotweed *Reynoutria japonica,* Himalayan balsam *Impatiens glandulifera and* Three-cornered garlic *Allium triquetrum.* The locations of this non-native invasive plant species is summarised below in Table 12.7 and shown on Figure 12.6 in Volume 3 of the EIAR.

The desk study returned records of a total of 18 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations across the wider study area (i.e., Grid Squares O12 and O13) and are listed in Appendix A12.1 in Volume 4 of this EIAR. There were 10 listed species recorded within 1km of the

Proposed Scheme (NBDC Online Database 2022); include several records of Himalayan balsam *Impatiens glandulifera*, Japanese knotweed and Nuttall's waterweed *Elodea nuttallii* along the Grand Canal within the 2km grid square O13R, and water fern *Azolla filiculoides* by Grand Canal adjacent to Leeson street (grid square O1632). Bohemian knotweed *Reynoutria japonica x sachalinensis = R. x bohemica* (grid sqaureO142294) along the Dodder at Springfield avenue, Rathfarnham. There are also records for three-cornered garlic throughout the wider survey area, giant-rhubarb *Gunnera tinctoria* along the River Dodder at Milltown, American skunk-cabbage *Lysichiton americanus* along the River Dodder at Sean Moore Park Tallaght and giant hogweed *Heracleum mantegazzianum* along the River Dodder at Milltown and at Dodder Park, Firhouse, and Himalayan knotweed *Persicaria wallichii* within the 2km grid square O12J at Bushy Park.

Canadian waterweed *Elodea canadensis*, which was also documented from along the Grand Canal, was delisted as a Third Schedule species, with the introduction of the European Communities (Birds and Natural Habitats) (Amendment) Regulations 2015, S.I. No. 355 of 2015.

Table 12.7: Summary of Non-native Invasive Plant Species Listed in the Third Schedule of the Birds and Habitats Regulations Recorded along or adjacent to the Proposed Scheme

Reference	Species	Description
CBC1012IAPS001	Japanese knotweed *Reynoutria japonica*	Small stand on northern bank of River Dodder
CBC1012IAPS002	Japanese knotweed *Reynoutria japonica*	Small stand on northern bank of Owenadoher River
CBC1012IAPS003	Himalayan balsam *Impatiens glandulifera*	Along River Dodder edge at Austin Clarke Bridge
CBC1012IAPS004	Three-cornered leek *Allium triquetrum*	Aquatic specialist survey 2020 “was present locally” along the banks of the Owenadoher River
CBC1012IAPS005	Japanese knotweed *Reynoutria japonica*	Aquatic specialist survey 2020 “was common throughout the site” along the banks of the Owenadoher River
CBC1012IAPS006	Japanese knotweed *Reynoutria japonica*	Aquatic specialist survey 2020 “was scattered throughout the site (but more prevalent upstream)” along the banks of the Owenadoher River
CBC1012IAPS007	Japanese knotweed *Reynoutria japonica*	Along the River Dodder beside Bushy Park pond
CBC1012IAPS008	Himalayan balsam *Impatiens glandulifera*	Four stands on southern bank of River Dodder, adjacent western side of Pearse Bridge
CBC1012IAPS009	Himalayan balsam *Impatiens glandulifera*	Large strand with extensive cover on southern bank of River Dodder, adjacent eastern side of Pearse Bridge
CBC1012IAPS0**10**	Himalayan balsam *Impatiens glandulifera*	Sparse single strands on northern and southern banks of River Dodder

12.3.8 Mammals

12.3.8.1 Bats

Bats, including their breeding and resting places, are protected under the Wildlife Acts. All bat species are listed on Annex IV of the Habitats Directive, with the lesser horseshoe bat being also listed on Annex II. Bats are also afforded strict protection under the Habitats Directive and the (Birds and Natural Habitats) Regulations.

Bat surveys were carried out across four bat survey seasons between 2018 and 2020 (as described in Section 12.2.3.6). Seven transects were surveyed within the footprint of the Proposed Scheme: CBC1012BT001 (La Touche Bridge), CBC1012BT002 (Pearse Bridge), CBC1012BT003 (Bushy Park), CBC1012BT004 (Rathfarnham Castle), CBC1012BT005 (Owendore Crescent), CBC1012BT006 (Terenure College) and CBC1012BT007 (Dodder Valley Park). Transect routes CBC1012BT005 (Owendore Crescent) and CBC1012BT007 (Dodder Valley Park) were subject to a single survey season (2020) to accommodate scheme changes. The results of

these are described below in Sections 12.3.8.1.1 to Section12.3.8.1.6 and are also presented in Figure 12.7.1.in Volume 3 of this EIAR. The structure of this Section is such that each bat species is described in turn. The results of the various surveys are presented to allow an understanding of each species in terms of its distribution across the Proposed Scheme.

All bat species' populations in County Dublin are valued as being of Local Importance (Higher Value) given the legal protection afforded to them, and due to their common presence throughout the Greater Dublin Area (GDA). In an Irish context, the conservation status of these species in Ireland is designated as 'Least Concern' (Marnell *et al*., 2019).

12.3.8.1.1 Leisler's bat *Nyctalus leisleri*

Leisler's bat was recorded in six of the seven transects surveyed between 2018 and 2020; CBC1012BT001 (La Touche Bridge), CBC1012BT002 (Pearse Bridge), CBC1012BT004 (Rathfarnham Castle), CBC1012BT005 (Owendore Crescent), CBC1012BT006 (Terenure College) and CBC1012BT007 (Dodder Valley Park). A total of 32 bat passes, attributed to Leisler's bat, were recorded in these locations between 2018 and 2020.

Leisler's bat activity was highest at CBC1012BT002 (Pearse Bridge). Sixteen bat passes, attributed to this species, occurred here; thirteen bat passes in the 2020 spring survey and three in the 2018 summer survey. During 2018 there were a total of three recordings of Leisler's bats, all captured along CBC1012BT002 (Pearse Bridge). A total of 20 recordings attributed to Leisler's bat were made during the spring 2020 survey; one along CBC1012BT001 (La Touche Bridge), thirteen along CBC1012BT002 (Pearse Bridge), five along CBC1012BT006 (Terenure College) and one along CBC1012BT007 (Dodder Valley Park. A total of nine recordings attributed to Leisler's bats were captured during summer 2020 surveys; two along CBC1012BT004 (Rathfarnham Castle), two along CBC1012BT005 (Owendore Crescent), and five along CBC1012BT007 (Dodder Valley Park).

No roost sites for Leisler's bat were recorded during any of the surveys for the Proposed Scheme.

The desk study found that Leisler's bat are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes 15 records of live sightings within 1km of the Proposed Scheme, including records at the following locations: St. Stephens Green, Iveagh Gardens, Castle Golf Club, the River Dodder in proximity to Bushy Park, Bushy Park and the M50 / N81 interchange (NBDC Online Database 2022).

12.3.8.1.2 Common Pipistrelle bat *Pipistrellus*

Common pipistrelle was recorded in all of seven transects surveyed between 2018 and 2020. A total of 134 bat passes, attributed to common pipistrelle bat, were recorded in these locations between 2018 and 2020.

Common pipistrelle bat activity was highest at CBC1012BT002 (Pearse Bridge). 91 bat passes, attributed to this species, occurred here: 71 bat passes in the spring survey of 2020 and 20 in summer of 2018. A total of 46 recordings attributed to common pipistrelle bats were recorded during summer 2018 surveys, 24 along CBC1012BT001 (La Touche Bridge), 20 along CBC1012BT002 (Pearse Bridge), one along CBC1012BT004 (Rathfarnham Castle) and one along CBC1012BT006 (Terenure College). A total of 78 recordings of common pipistrelle bats were made during spring 2020 surveys; 71 along CBC1012BT002 (Pearse Bridge), five along CBC1012BT003 (Bushy Park), one along CBC1012BT004 (Rathfarnham Castle) and one along CBC1012BT007 (Dodder Valley Park). A total of eight recordings of common pipistrelle bats were captured during summer 2020 surveys; one along CBC1012BT001 (La Touche Bridge), six along CBC1012BT005 (Owendore Crescent) and one along CBC1012BT006 (Terenure College).

No roost sites for common pipistrelle bat were recorded during any of the surveys for the Proposed Scheme.

The desk study found that common pipistrelle bat are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes thirteen records of live sightings within 1km of the Proposed Scheme, including records in the following locations: St. Stephens Green, Iveagh Gardens, Castle Golf Club, the River Dodder in proximity to Bushy Park, Bushy Park and the M50 / N81 interchange (NBDC Online Database 2022).

12.3.8.1.3 Nathusius' pipistrelle bat *Pipistrellus nathusii*

Nathusius' pipistrelle bat was not recorded across the study area of the Proposed Scheme during the walked transect surveys.

No roost sites for Nathusius' pipistrelle bat were recorded during any of the surveys for the Proposed Scheme.

The desk study found that Nathusius' pipistrelle bat are sporadically recorded across Dublin with 1 record within 1km of the Proposed Scheme, located along the Grand Canal at Charlemont (see Appendix A12.1 in Volume 4 of this EIAR for further details) (NBDC Online Database 2022).

12.3.8.1.4 Soprano pipistrelle bat *Pipistrellus pygmaeus*

Soprano pipistrelle bat was recorded at five of the seven transects surveyed between 2018 and 2020; CBC1012BT002 (Pearse Bridge), CBC1012BT003 (Bushy Park), CBC1012BT005 (Owendoher Crescent), CBC1012BT006 (Terenure College) and CBC1012BT007 (Dodder Valley Park). A total of 248 bat passes, attributed to soprano pipistrelle bat, were recorded in these locations between 2018 and 2020.

Soprano pipistrelle bat activity was highest at CBC1012BT0002 (Pearse Bridge). 208 bat passes, attributed to this species, occurred here; 146 bat passes in the spring survey of 2020, two in summer 2020 and 60 in summer 2018. A total of 75 recordings attributed to soprano pipistrelle bats were recorded during summer 2018 surveys, 60 along CBC1012BT002 (Pearse Bridge), 11 along CBC1012BT003 (Bushy Park) and four along CBC1012BT006 (Terenure College). A total of 163 recordings of common pipistrelle bats were made during spring 2020 surveys; 146 along CBC1012BT002 (Pearse Bridge), five along CBC1012BT003 (Bushy Park), one along CBC1012BT005 (Owendoher Crescent) and 11 along CBC1012BT006 (Terenure College). A total of ten recordings of soprano pipistrelle bats were captured during summer 2020 surveys; two along CBC1012BT0002 (Pearse Bridge), four along CBC1012BT005 (Owendore Crescent), one along CBC1012BT006 (Terenure College) and three along CBC1012BT007 (Dodder Valley Park).

No roost sites for soprano pipistrelle bat were recorded during any of the surveys for the Proposed Scheme.

The desk study found that soprano pipistrelle bat are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes 21 records of live sightings within 1km of the Proposed Scheme, including records at the following locations; St. Stephens Green, Iveagh Gardens, Castle Golf Club, the River Dodder in proximity to Bushy Park, Bushy Park and the M50 / N81 interchange (NBDC Online Database 2022).

12.3.8.1.5 Unidentified Pipistrelle Species

Pipistrelle species bat calls that could not be classified as either characteristic of common or soprano pipistrelle bats are referred to as 'unidentified' pipistrelle species. Common pipistrelle bats have their peak echolocation call strength at 45kHz and soprano pipistrelle bats at 55kHz. As such, pipistrelle bat species that echolocate between 48 and 52kHz cannot be accurately identified by their calls and are described as 'unidentified' pipistrelle bat species.

Unidentified pipistrelle bat passes were recorded in three locations surveyed between 2018 and 2020; CBC1012BT002 (Pearse Bridge), CBC1012BT003 (Bushy Park) and CBC1012BT006 (Terenure College). A total of 34 unidentified bat passes were recorded in these locations between 2018 and 2020. There were 28 unidentified pipistrelle bat passes along CBC1012BT002 (Pearse Bridge) in summer 2018 surveys and four in the same location in spring 2020 surveys. A single unidentified pipistrelle bat pass was recorded along CBC1012BT003 (Bushy Park) during summer 2018 surveys and a single unidentified pipistrelle bat pass was also recorded along CBC1012BT006 (Terenure College) during summer 2020 surveys.

12.3.8.1.6 Brown Long-Eared Bat *Plecotus 37aubent*

Brown long-eared bat was not recorded across the study area of the Proposed Scheme during the walked transect surveys.

No roost sites for brown long-eared bat were recorded during any of the surveys for the Proposed Scheme.

The desk study found that brown long-eared bat are known to occur within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes a record of one live sighting on Templeville Drive off the Templeogue Road in 2007 (NBDC Online Database 2022).

12.3.8.1.7 *Myotis* bat species

Myotis bat species were identified in two of the seven transects surveyed between 2018 and 2020; CBC1012BT002 (Pearse Bridge) and CBC1012BT003 (Bushy Park), both of which lie adjacent to the River Dodder. A total of 335 recordings of *Myotis* species were identified in these locations between 2018 and 2020. 298 were captured along CBC1012BT002 (Pearse Bridge) and 37 along CBC1012BT003 (Bushy Park). Of these, 181 recordings were *Myotis* bats with characteristics of Daubenton's bat *Myotis daubentonii.* During 2018 there was a total of 132 recordings captured, 116 recordings were captured along CBC1012BT002 (Pearse Bridge) and 16 along CBC1012BT003 (Bushy Park). 67 of these had characteristics of Daubenton's bats. During Spring 2020 a total of 49 recordings were captured, all of which occurred along CBC1012BT002 (Pearse Bridge). 13 of these had characteristics of Daubenton's bats. During Summer 2020 a total of 154 recordings were captured, 133 occurred along CBC1012BT002 (Pearse Bridge) and 21 along CBC1012BT003 (Bushy Park). 101 of these had characteristics of Daubenton's bats.

Bat re-entry surveys were conducted at Pearse Bridge Rathfarnham, referred to as CBC1012RI001 between 2018 and 2020. In 2018 A total of 67 recordings of *Myotis* species with characteristics of Daubenton's bats were made here and bats were observed foraging along the water's surface during the survey. No bats were observed entering the bridge. In autumn 2019 a total of two recordings of *Myotis* species with characteristics of Daubenton's bats were recorded here, as well as a single soprano pipistrelle, none of which were observed. In spring 2020 activity was highly localized around the bridge. A total of 13 recordings of *Myotis* species with characteristics of Daubenton's bats were captured and individuals were observed foraging along the water surface and flying in 'figure 8's', behaviour which is characteristic of Daubenton's bats. Other species observed included common pipistrelle, soprano pipistrelle and Leislers bats. No bats were observed entering Pearse bridge. In Summer 2020 there was a total of 101 recordings captured of *Myotis* species with characteristics of Daubenton's bats and individuals were observed foraging along the surface of the water. Other species observed included common pipistrelle and soprano pipistrelle bats. Again, no bats were observed entering the bridge. Over the four dawn re-entry surveys conducted at Pearse Bridge Rathfarnham, referred to as CBC1012RI001 between 2018 and 2020, no bats were observed re-entering the bridge.

No roost sites for any *Myotis* bat species were recorded during any of the surveys for the Proposed Scheme.

The desk study found that Daubenton's bat *Myotis daubentoniid* was the only *Myotis* bat species known to occur within 1km of the Proposed Scheme, (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes records of live sightings of Daubenton's bat at the following locations: Castle Golf Club in Rathfarnham, the River Dodder in proximity to Bushy Park, Bushy Park and the M50 / N81 interchange. There were no records of other *Myotis* bat species, including Natterer's bat *M. Nattereri,* Whiskered bat *M. mystacinus* and Brandt's bat *M. brandtii,* within 1km of the Proposed Scheme (NBDC Online Database 2022).

12.3.8.1.8 Potential Roost Features

The trees identified as having potential to support roosting bats, i.e., trees containing PRFs, are listed in Table 12.8 and shown on Figure 12.7.2 in Volume 3 of this EIAR. Each tree, or grouping of homogenous trees, was identified with regard to their potential to support roosting bats after Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2016). Trees with negligible suitability for roosting bats are not described or mapped as they are assessed as not having potential to support roosting bats.

Four of the trees containing PRFs will be removed as part of the Proposed Scheme, as indicated on the Landscaping General Arrangement (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-0001 to 0037) for the Proposed Scheme.

Table 12.8: Summary of Potential Roost Features (PRFs) recorded within the footprint of the Proposed Scheme

Reference	Species	Description
CBC1012PRF001	Lime species *Tilia x europaea*	Bat box
CBC1012PRF002	Horse chestnut *Aesculus hippocastanum*	Knotholes
CBC1012PRF003	Oak species *Quercus* sp.	Wound
CBC1012PRF004	Sycamore *Acer pseudoplantus*	Knotholes
CBC1012PRF005	Sycamore *Acer pseudoplantus*	Knotholes
CBC1012PRF006	Lime species *Tilia x europaea*	Knotholes
CBC1012PRF007	Yew *Taxus baccata*	Multiple fluting features in main trunk. Subsidence- crack
CBC1012PRF008	Sycamore *Acer pseudoplantus*	Multiple knotholes and one tear-out
CBC1012PRF009	Ash *Fraxinus excelsior*	Cankers and knothole
CBC1012PRF010	Sycamore *Acer pseudoplantus*	Dense ivy
CBC1012PRF011	Sycamore *Acer pseudoplantus*	Dense ivy
CBC1012PRF012	Sycamore *Acer pseudoplantus*	Dense ivy

Note: A description of each different type of PRF, as referred to in Table 12.8 is described in Andrews (2018).

12.3.8.2 Badger

Badger, and their breeding and resting places, are legally protected under the Wildlife Acts. No evidence of badger (e.g., setts or evidence of badger activity) were recorded within the footprint of the Proposed Scheme, during the multi-disciplinary surveys undertaken. Evidence of badger was however recorded at two locations within the vicinity of the Proposed Scheme; potential burrows were identified within approximately 50m of Pearse Bridge and trails were recorded within approximately 120m of the Proposed Scheme near Owendore Crescent.

Badger are widely distributed throughout the Greater Dublin Area (GDA), often utilising public parks and residential gardens. The River Dodder, Bushy Park, and associated green spaces / residential gardens are also known to support a number of badger populations. Badger and their young have been observed foraging within the vicinity of Bushy Park (authors personal recording). The desk study returned 18 records of badger, including several live sightings, within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). Records from within close proximity to the Proposed Scheme include those from areas such as Rathfarnham, Templeogue, Milltown, and Rathgar. As such, it has been assumed that badger may occur in vegetated areas adjacent to the Proposed Scheme.

The local badger population is deemed to be of Local Importance (Higher Value) due to the known presence of resident populations within the wider environment of the Proposed Scheme, which are valued as being of local importance as they are a Wildlife Acts protected species.

12.3.8.3 Otter

Otter, and their breeding and resting places, are legally protected under the Wildlife Acts. Otter are also listed on Annex II and Annex IV of the Habitats Directive.

Evidence of otter was identified at two river water bodies hydrologically connected to the Proposed Scheme, namely the Dodder_040, and the Owenadoher Stream. Evidence of a holt CBC1012M003 within the roots of a sycamore tree was identified along the Owenadoher River, 145m north-west of the Proposed Scheme, at Butterfield Avenue during multi-disciplinary surveys and during aquatic surveys conducted by Triturus Environmental Ltd., in 2020. This holt site was subsequently monitored using a camera trap for a period of 2 months with no otter activity observed.

Evidence of otter in the form of spraints and potential slides were recorded throughout the Owenadoher and Dodder_040 river water bodies in 2020, 2021 and 2022 field surveys. The Proposed Scheme crosses the Dodder_040 at the existing Pearse Bridge, spraints were observed along prominent abutments of the existing Bridge and on boulders near the river banks, mammal tracks and slides were also recorded. Two otter spraints

were also recorded along the Dodder_040 approximately 75m north of Construction Compound TR6 along the Spawell Link Road. The results of the field surveys as they relate to otter are shown on Figure 12.9 in Volume 3 of this EIAR. Evidence of otter was not recorded at the proposed Grand Canal crossing point.

Desk study records include nine live sightings along the River Dodder including one record at Firhouse in 2012 approximately 1km upstream of the Proposed Scheme, one record at Dodder Valley Park in 2016 adjacent to the Proposed Scheme, one record at Bushy Park in 2017 adjacent to the Proposed Scheme, and four records adjacent to the Proposed Scheme at Rathfarnham; two in 2011 and two in 2017. There was one record returned along the Grand Canal at Charlemont Mall in 2016 approximately 100m from the Proposed Scheme (NBDC online database 2022).

The River Dodder is known to support a large otter population. During the Dublin City Otter Survey three holts were recorded along the River Dodder between M50 and Templeogue. The Proposed Scheme crosses the River Dodder approximately 2km downstream of two holts which were observed at Dodder Valley Park and approximately 1km upstream of a holt at The High School Rathfarnham, during the Dublin City Otter Survey. Otter signs, described as evenly distributed were recorded along the course of the River Dodder between the M50 junction and the Liffey Estuary Lower (Macklin *et al.,* 2019).

The Owenadoher River, is located 90m west of the Proposed Scheme, and 890m upstream of the Proposed Scheme. The river water body discharges into the Dodder_040 at Bushy Park and is known for its high otter activity in the context of Dublin City. The desk study identified 30 signs along its 3.8km path, holts and spraints were recorded within 1km of the Proposed Scheme at Rathfarnham Village. High otter activity was recorded along Whitechurch Stream, a tributary of the Owenadoher River where a holt was recorded within 2km of Rathfarnham Village (Macklin *et al.* 2019). This holt was observed again in 2020 surveys and monitored.

Although not recorded during the field surveys, otter are considered to be present throughout the Grand Canal within Dublin City. Records within 1km of the Proposed Scheme were on the Grand Canal at Dolphins Barn in 2014 and at Portobello in 2016 (NBDC Online Database 2022).

In an Irish context, the conservation concern of otter is 'Least Concern' (Marnell *et al.* 2019) due to population recoveries since 2009. However, otter remains 'Near Threatened' at a European and Global context (Roos *et al.,* 2015) and is listed on Annex II and Annex IV of the Habitats Directive.

Wicklow Mountains SAC, which is located approximately 8.6km upstream of the Proposed Scheme (from the Dodder_040 proposed crossing point), is the closest European site designated for otter. Typically, otter territories are within the range of 7.5km for females and up to 21km for males (Ó'Neill *et al.,* 2009). The Proposed Scheme interacts with the following watercourses: the River Dodder, Owenadoher River, and Liffey Estuary Lower. Whilst these watercourses lie within the typical territorial ranges of otters, none of them share any hydrological connection to the Wicklow Mountains SAC – it is the River Dodder which provides the key hydrological pathway between the Wicklow Mountains SAC and Dublin City. In addition, the Wicklow Mountains SAC lies within the Dodder_SC_010 sub-catchment and the Proposed Scheme lies within the Liffey_SC_090 sub-catchment. Therefore, Wicklow Mountains SAC may fall within the range of SCI otter, and as such, otter populations within the footprint of the Proposed Scheme could potentially be connected to the SAC population.

The national population of adult breeding female otters in the Republic of Ireland was estimated at 7,800 in the National Otter Survey of Ireland 2010 / 12 (Reid *et al.,* 2013), the most recent survey of its type undertaken. The local otter population in the vicinity of the Proposed Scheme is unlikely to comprise 1% of the national population (e.g., 78 breeding female otters).

According to a recent study (Macklin *et al.,* 2019), otters are known to occur across 14 watercourses and the coastal habitat fringe across the Dublin City Council jurisdiction. Rivers which were subject to less human disturbance, and therefore held better quality otter habitat (e.g., Rivers Dodder, Tolka, Owenadoher, Liffey and Whitechurch), accounted for the majority of otter signs. Other watercourses, which are subject to greater anthropogenic pressures, such as the Little Dargle, Camac, Santry, Slang and Poddle appeared to support far fewer otters (Macklin *et al.,* 2019). It is therefore apparent that otters are abundant in the watercourses in and around Dublin City, particularly in areas with healthier fish stocks and which are more removed from anthropogenic pressures.

Therefore, the local otter population is valued as being of County importance.

Despite the fact that otter is of "Least Concern" from an Irish perspective and is known to be abundant in watercourses in and around Dublin City, considering the above, the local otter population is valued as being of County importance given that it cannot be ruled out as being from the Wicklow Mountains SAC population.

12.3.8.4 Marine Mammals

The Proposed Scheme is hydrologically connected to Dublin Bay through the Liffey Estuary Lower via the River Dodder (Dodder_040, Dodder_050), Grand Canal, Owenadoher River and Little Dargle (Dodder_50). There were no protected marine mammals identified along the Proposed Scheme during the multi-disciplinary surveys. There were no dedicated marine mammal surveys carried out as part of the assessment.

Harbour seal, grey seal, and Harbour porpoise are known from Dublin Bay and these species are all protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive, while all cetacean species are listed on Annex IV of the Habitats Directive. Harbour porpoise is a QI species designated as part of Rockabill to Dalkey Island SAC which is located approximately 10.5km east of the Proposed Scheme. Harbour seal and grey seal are also listed on Annex II of the Habitats Directive and are listed QI species designated as part of Lambay Island SAC which is located approximately 22.1km north-east of the Proposed Scheme.

Harbour porpoise, harbour seal, and grey seal are valued as being of International Importance as they are listed on Annex II of the Habitats Directive and are QI species designated as part of Rockabill to Dalkey Island SAC, and Lambay Island SAC. As such, all are considered to be species of high conservation concern.

A number of protected other marine mammals are known to occur within Dublin Bay and off the Dublin coast downstream of the Proposed Scheme, including:

- Common Dolphin *Delphinus delphis;*
- Minke Whale *Balaenoptera acutorostrata;*
- White-beaked Dolphin *Lagenorhynchus albirostris;*
- Pygmy Sperm whale *Kogia breviceps;*
- Bottle-nosed Dolphin *Tursiops truncates;*
- Humpback Whale *Megaptera novaeangliae;*
- Sperm Whale *Physeter macrocephalus;*
- Striped Dolphin *Stenella coeruleoalba;*
- Risso's Dolphin *Grampus griseus;* and,
- Northern Bottle-nosed Whale *Hyperoodon ampullatu.*

Common dolphin and bottle-nosed dolphin are common to Irish coastlines, particularly the west coast, throughout the year. There are no SACs designated for Common Dolphin in Ireland, while there are two SACs designated for Bottle-nosed dolphin, The Lower River Shannon SAC and the West Connaught Coast SAC, both located along the western coast. These species are protected under the Wildlife Acts and Annex II; Annex IV of the Habitats Directive, the local population are therefore valued as County Importance.

Risso's dolphin is found in both inshore and offshore coastal waters and are occasionally sighted in Dublin Bay. Minke whales, and humpback whale species are migratory and frequent Irish coastlines each year. White-beaked dolphin, sperm whale, striped dolphin, and northern bottle-nosed whale are pelagic species and are rarely sighted in Dublin Bay, favouring the offshore waters of the continental shelf. Pygmy Sperm whales are rare to the Irish coastline, with only one record identified in Dublin Bay. These species are protected under the Wildlife Act and Annex IV of the Habitats Directive and are therefore valued as County Importance.

12.3.8.5 Other Mammal Species

No other protected mammal species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme. The desk study returned records for the following terrestrial mammal species, protected under the Wildlife Acts, and which are known to occur within approximately 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details):

- Irish Hare;
- Pygmy Shrew;
- Red Squirrel *Sciurus vulgaris;* and,
- Hedgehog.

The local populations of these species are deemed to be of Local Importance (Higher Value) due to the known presence of resident populations within the wider environment of the Proposed Scheme, and the fact that they are Wildlife Acts protected species.

Evidence of fox *Vulpes vulpes* and rabbit *Oryctolagus cuniculus* were also recorded across the study area within areas of suitable habitat. Although these species are not afforded legal protection under the Wildlife Acts, they form part of the local biodiversity resource and are noted here in that context.

12.3.9 Birds

12.3.9.1 Breeding Birds

All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the Birds Directive, and / or as SCIs within designated European sites.

The full results of the desk study, including records of breeding bird species considered to be of conservation concern, are presented in Appendix A12.1 in Volume 4 of this EIAR. These species are considered to be KERs of the Proposed Scheme and include the following:

- SCIs, for a breeding population, of SPAs;
- Species listed under Annex I of the Birds Directive; and,
- Red and Amber Birds of Conservation Concern in Ireland (BoCCI) species listed for their breeding populations (Gilbert *et al*., 2021).

The results of the breeding bird desk review carried out to inform this assessment are summarised below.

The desk study returned records of a total of 75 breeding bird species across the study area (i.e., grid squares O03 and O13). Records included 18 species listed under Annex I of the Birds Directive, 40[1] SCI species, and an additional 15 Red listed and 16 Amber listed species. This includes 30 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme.

Several bird species for which records were returned in the desk study are those typically found in coastal, estuarine and intertidal habitats, such as the Liffey Estuary and Dublin Bay. Many gull, auk, shearwater and tern species breed in steep inaccessible cliffs i.e., Howth Head, offshore islands and Dublin Port. Seabirds such as terns, guillemots and kittiwakes *Rissa tridactyla* nest on the cliffs and crevices of Rockabill Island SPA (Birdwatch Ireland 2020). Fulmar *Fulmarus glacialis*, shag *Phalacrocorax aristotelis*, razorbill *Alca torda* and gannet *Morus bassanus* nest in the cliffs of Irelands Eye SPA, which also has numbers of large gulls, cormorant *Phalacrocorax carbo* and puffin *Fratercula arctica* (Merne and Madden 2000). Gulls favour nesting along coasts on shingle and cliffs but may utilise inland public areas for scavenging and buildings for roof nesting (Birdwatch Ireland 2020).

The majority of records along the Proposed Scheme comprise bird species common to suburban habitats (including residential and parkland areas), such as gull and garden bird species. Residential habitats and scattered trees and parkland, hedgerows, treelines, broadleaved woodland and amenity grassland habitats were observed in several locations across the Proposed Scheme including Bushy Park, Dodder Riverbank Park, Castle Golf Course, Terenure College RFC, Kenilworth Square, Harold's Cross Park, Leinster Cricket Club, Mount Pleasant Square, Iveagh Gardens and St. Stephens Green. These species therefore are likely to use lands within the footprint of the Proposed Scheme for breeding and foraging.

[1] Note that some species listed on Annex I of the Birds Directive are also SCI species.

Breeding species which are associated with buildings were returned from the desk study including swallows *Hirundo rustica*, starlings *Sturnus vulgaris*, swift *Apus apus*, house martins *Delichon urbicum* and raptors (Birdwatch Ireland 2020), which occurred across the larger study area (i.e., grid squares O13 and O12). These species may therefore utilise suitable buildings adjacent to the Proposed Scheme. Records of kestrel *Falco tinnunculus* exist at Dodder Riverbank Park and St. Stephen's Green, sparrowhawk *Accipiter nisus* at Dodder Riverbank Park, Bushy Park, Castle Golf Course, Terenure Sports Club and St. Stephen's Green, and Peregrine falcon *Falco peregrinus* at Dodder Riverbank Park and St. Stephen's Green. These raptor species may therefore utilise open green spaces and trees adjacent to the Proposed Scheme. No suitable habitat was identified for merlin *Falco columbarius* within the footprint of the Proposed Scheme and desk study records were confined to coastal areas (i.e., grid square O13) and therefore this species is not deemed likely to breed within the footprint of the Proposed Scheme.

Several species of warblers and raptors which favour woodlands, agricultural lands and upland heathland areas were identified during the desk study (Appendix A12.1. in Volume 4 of this EIAR). Agricultural lands, uplands and open areas were identified at locations to the south and west of the Proposed Scheme. As such, some of these species may utilise the lands at these locations. Due to the largely urban setting of the Proposed Scheme, these habitat types are not present, or are highly fragmented within the boundary of the Proposed Scheme. As such, these species are not deemed to be present in significant numbers, however they may be present in larger parks and greenspaces in the lands surrounding the Proposed Scheme e.g., Bushy Park, Dodder Riverbank Park, Castle Golf Course, Terenure College RFC, Terenure Sports Club, Kenilworth Square, Harold's Cross Park, Leinster Cricket Club, Mount Pleasant Square, Iveagh Gardens and St. Stephens Green (NPWS 2022).

Wetland and riverine bird species identified during the desk study (Appendix A12.1. in Volume 4 of this EIAR), include gulls, waders, waterfowl, swans, ducks and herons which utilise intertidal zones, freshwater lakes, ponds, canals, and rivers. Suitable habitats within close proximity to the Proposed Scheme include the River Dodder alongside Bushy Park and the Grand Canal which contain known populations of mute swan, wagtails and kingfisher. Rivers are important nesting and foraging sites for species such as kingfisher, mute swan *Cygnus olor*, and coot *Fulica atra* within the Proposed Scheme.

Kingfisher was recorded on a single occasion in 2018 during multi-disciplinary surveys within the footprint of the Proposed Scheme, adjacent to Pearse Bridge flying upstream along the River Dodder.

Records of breeding birds relevant to the Proposed Scheme are listed in Table 12.9.

Table 12.9: Desk Study Records of Breeding Birds of Conservation Concern Adjacent to the Proposed Scheme

Common Name / *Scientific Name* / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA Designated for SCI Species
Barn swallow *Hirundo rustica* (SL)	Across the Proposed Scheme	Amber (B)	-	-
Common coot *Fulica atra* (CO)	Tymon Park Grid O12E Bushy Park Grid O1429 Stephens Green Grid O160335	Amber (B/W)	-	Lough Ennell SPA approximately 72.3km
Common kestrel *Falco tinnunculus* (K.)	Firhouse Grid O12D Tymon Park Grid O12E Stephens Green Grid O158334	Red (B)	-	-
Common kingfisher *Alcedo atthis* (KF)	Bushy Park Grids O139291 and O142293 Grand Canal Grid O13L	Amber (B)	✓	River Boyne and River Blackwater SPA approximately.38.7km
Common linnet *Carduelis cannabina* (L.)	Tymon Park Grid O12E Dublin City Grid O13L	Amber (B)	-	-
Common snipe *Gallinago gallinago* (SN)	Firhouse Grid O12D	Red (B/W)	-	-

Common Name / *Scientific Name* / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA Designated for SCI Species
Common starling *Sturnus vulgaris* (SG)	Across the Proposed Scheme	Amber (B)	-	-
Common swift *Apus apus* (SI)	Tymon Park Grid O12E Terenure Grid O13K Dublin City Grid O13L	Red (B)	-	-
Eurasian teal *Anas crecca* (T.)	Firhouse Park Grid O115277	Amber (B/W)	-	North Bull Island SPA approximately.5.7km
European greenfinch *Carduelis chloris* (GR)	Across the Proposed Scheme	Amber (B)	-	-
Goldcrest *Regulus regulus* (GC)	Across the Proposed Scheme	Amber (B)	-	-
Grey heron *Ardea cinerea* (H.)	Tymon Park Grid O115285 River Dodder Grid O138289 Bushy Park Grid O142293	Green (B)	-	Wexford Harbour and Slobs SPA approximately.90.4km
Grey wagtail *Motacilla cinerea* (GL)	River Dodder Grids O140290 and O113278 Bushy Park Grid O142293 Firhouse Park Grid O113277 Grand Canal O153324	Red (B)	-	-
House martin *Delichon urbicum (*HM)	Firhouse Grid O13D Tymon Park Grid O12E Dublin City Grid O13L	Amber (B)	-	-
House sparrow *Passer domesticus* (HS)	Across the Proposed Scheme	Amber (B)	-	-
Little egret *Egretta garzetta* (ET)	Tymon Park Grid O12E Ranelagh Grid O13R	Green (B)	✓	-
Long-eared Owl *Asio otus* (LE)	Tymon Park Grid O12E	Green (B)	-	-
Mallard *Anas platyrhynchos* (MA)	Tymon Park Grid O115285 Bushy Park Grid O139291 Grand Canal Grid O156324	Green (B)	-	Dundalk Bay SPA approximately.57.5km
Meadow pipit *Anthus pratensis* (MP)	Firhouse Grid O12D	Red (B)	-	-
Mute swan *Cygnus olor* (MS)	Bushy Park Grid O142293 Grand Canal Grids O150324 and O156324	Amber (B/W)	-	-
Peregrine falcon *Falco peregrinus* (PE)	Firhouse Grid O12D Dublin City Grid O13L	Green (B)	✓	Wicklow Mountains SPA approximately 6.2km
Sand martin *Riparia riparia* (SM)	Tymon Park Grid O12E	Amber (B)	-	-
Skylark *Alauda arvensis* (S.)	Tymon Park Grid O12E	Amber (B)	-	-

Common Name / *Scientific Name* / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA Designated for SCI Species
Spotted flycatcher *Musciapa striata* (SF)	Firhouse Grid O12D Rathfarnham Grid O12P	Amber (B)	-	-
Tufted duck *Aythya fuligula* (TU)	Tymon Park Grid O115285 Bushy Park Grid O142293 Grand Canal Grid O156324	Amber (B/W)	-	Lough Ennell SPA approximately.72.3km

Due to the presence of suitable breeding and / or foraging habitat directly adjacent to the Proposed Scheme, the local breeding bird populations are considered to be of International Importance where they belong to SPA populations and / or are listed on the Annex I of the Birds Directive. All other breeding bird populations are considered to be of Local Importance (Higher Value).

12.3.9.2 Wintering Birds

All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the Birds Directive, and / or as SCIs within designated European sites.

Wintering bird surveys were carried out for the Proposed Scheme at three locations:

- CBC1012WB001: Green space located between Church Lane and Dodder View Road, adjacent to Bushy Park Carpark. The area is maintained through regular cutting. Grass cover was low/moderate across the survey period, with a high herbaceous cover during spring months when daffodils come to flower, which covers the entire transect. Disturbance was noted as low, except during the 2020/2021 survey period there was a construction yard present for ongoing works at the River Dodder. Black-headed gulls were observed in this transect area, and an occurrence of grey heron *Ardea cinerea* during the 2019 / 2020 survey period.
- CBC1012WB002: Green space located between River Dodder and Dodder View Road, adjacent to Pearse Bridge. The area is maintained through regular cutting by the local authority. Grass cover was moderate across the survey period. Disturbance was noted as low within the site but is actively used by the public for recreational activities, mainly for walking through into Bushy Park. Black-headed gull was the only wintering bird species recorded on this grassland during the surveys.
- CBC1012WB003: Recreational green space located in Bushy Park, Terenure, adjacent to the Templeogue Road. The area is maintained regularly through cutting by the local authority. Grass cover was low/moderate across the survey period. Disturbance was noted as high within the site including dogs off the leash and public recreational activities (rugby, running, walking, cycling). Treelines within Bushy Park are tall and located between each green field area (i.e., pitches). No birds were recorded using this transect area during the 2020 / 2021 survey period, while only black-headed gull *Chroicocephalus ridibundus* was recorded during the 2021 / 2022 survey season.

CBC1012WB001 and CBC1012WB002 were surveyed over seven consecutive weeks across February and March 2020, and additionally twice a month, between the months of November 2020 and March 2021. While all three transects were surveyed again twice a month, between the months of October 2021 and March 2022. Species identified included herring gull, black-headed gull and grey heron. Table 12.10 provides a summary of the findings of the winter bird surveys with respect to those species which are of highest conservation concern and were recorded within winter bird survey sites. Table 12.11 displays the wintering bird survey results in comparison to the 1% of their International and National populations.

Table 12.10: Wintering Birds of Conservation Concern Recorded during the Winter Bird Transect Surveys

Common Name / Scientific Name / BTO Code	Site: Peak Count and Activity in the Study Area (Date)	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA Designated for SCI Species
Grey Heron *Ardea cinerea* (H.)	CBC1012WB001: Single individual on ground (04/03/2020)	Green (B/W)	-	Wexford Harbour and Slobs SPA approximately.91km
Black-headed gull *Chroicocephalus ridibundus* (BH)	CBC1012WB001: 21 birds feeding within transect (28/02/2020); CBC1012WB002: Two birds feeding within transect (24/11/2020) CBC1012WB003: 21 birds feeding within transect (01/02/2022);	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately2.6km
Herring gull *Larus argentatus* (HG)	CBC1012WB001: Single individual foraging within transect (11/01/2022)	Amber (B/W)		Ireland's Eye SPA approximately 14.5km

Table 12.11: Wintering bird species recorded during wintering bird surveys in comparison to the 1% of its International and National Populations

Common Name/Scientific Name/BTO Code	Site Peak Counts	Associated European sites within the ZoI	1% of International Population	1% of National Population
Black-headed gull *Chroicocephalus ridibundus* (BH)	21	South Dublin Bay and River Tolka Estuary SPA North Bull Island SPA The Murrough SPA	31,000	n/a
Herring Gull *Larus argentatus* (HG)	1	Ireland's Eye SPA Lambay Island SPA Skerries Islands SPA	14,400	n/a

A review of a study into light-bellied Brent goose inland feeding sites[2] has identified one known *ex-situ* wintering bird feeding site adjacent to the Proposed Scheme. There are no other known inland wintering bird feeding sites within approximately 300m of the Proposed Scheme i.e., the disturbance ZoI[3]. Droppings attributed to light-bellied Brent goose were not recorded during wintering bird surveys conducted for the Proposed Scheme. This data suggests that light-bellied Brent geese do not utilise these areas for foraging / loafing purposes.

The full results of the desk study, including records of wintering bird species considered to be of conservation concern, are presented in Appendix A12.1. in Volume 4 of this EIAR. These species are considered to be KERs of the Proposed Scheme and include the following:

- SCIs, for a wintering population, of SPAs;
- Species listed under Annex I of the Birds Directive; and,
- Red and Amber BoCCI species listed for their wintering populations.

[2] Scott Cawley Ltd. (2017). *Natura Impact Statement – Information for Stage 2 Appropriate Assessment for the Proposed Residential Development St. Paul's College, Sybill Hill, Raheny, Dublin 5*.
[3] *Major importance site 401+ geese; high importance site 51-400 geese; and, moderate importance site 1-50 geese as defined by Benson's study in 2009.* - Benson (2009). *Use of Inland Feeding Sites by Light-bellied Brent Geese in Dublin 2008-2009: A New Conservation Concern?* Irish Birds 8: 563-570.

The desk study returned records of a total of 47 regularly occurring wintering bird species across the study area (i.e., grid squares O03 and O13). Records included seven species listed under Annex I of the Birds Directive, 34[4] SCI species, and an additional four Red listed and two Amber listed species. This includes 30 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme.

Downstream of the Proposed Scheme, Dublin Bay also supports Internationally Important numbers of bar-tailed godwit *Limosa lapponica* and black-tailed godwit *Limosa limosa* and between June and September (Tierney *et al*., 2017). An additional 20 species occurred in Nationally important numbers across the Bay in 2013 and 2016. These included pintail *Anas acuta*, shelduck *Tadorna tadorna*, shoveler *Anas clypeata*, teal *Anas crecca* and wigeon *Anas penelope*, which favoured Dollymount Strand and North Bull Island, while great crested grebe *Podiceps cristatus* and ringed plover *Charadrius hiaticula* favoured Sandymount Strand. Curlew *Numenius arquata*, dunlin *Calidris alpina*, greenshank *Tringa nebularia*, grey heron, grey plover *Pluvialis squatarola*, knot *Calidris canutus*, little egret *Egretta garzetta*, oystercatcher *Haematopus ostralegus*, red-breasted merganser *Mergus serrator*, red-throated diver *Gavia stellata*, redshank *Tringa totanus*, sanderling *Calidris alba* and turnstone *Arenaria intepres* were recorded across all areas of Dublin Bay. Records for wintering bird species returned in the desk study are those typically found in coastal, estuarine and intertidal habitats, such as the Liffey Estuary and Dublin Bay. These largely include seabirds, waders, waterfowl, ducks, geese, and gulls. With the exception of geese, gulls and waders utilising inland feeding sites throughout the winter months, these species are unlikely to utilise lands adjacent to the Proposed Scheme in large numbers.

The wider study area of Dublin Bay, is considered of significant ornithological importance as it supports an Internationally Important population of light-bellied Brent goose. This SCI species may use open parkland and grassland adjacent to the study area for foraging purposes. A review of a study into light-bellied Brent goose inland feeding sites (Scott Cawley Ltd., 2017) has identified one known inland wintering bird feeding site within 300m of the Proposed Scheme;

- Tymon Park adjacent to the Proposed Scheme (major importance).

However, there are large areas of suitable foraging and/or roosting habitat available for wintering bird species both adjacent to, and in the wider locality of the Proposed Scheme (i.e., beyond the 300m study area the footprint of the Proposed Scheme) including:

- A single site adjacent to the Proposed Scheme; Tymon Park, located to the north of the southern portion of the Proposed Scheme along the M50 Corridor;
- Parks and greenspaces such as Eamonn Ceannt Park, St. Mary's College RFC, Templeogue College; and,
- Wetland habitat associated with South Dublin Bay and River Tolka Estuary SPA, and North Dublin Bay SPA.

Desk study records of wintering bird species utilising lands adjacent to the Proposed Scheme are provided in Table 12.12.

Table 12.12: Desk Study Records of Wintering Birds of Conservation Concern Adjacent to the Proposed Scheme

Common Name / Scientific Name / BTO Code	Activity and Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA designated for SCI species
Black-headed gull *Chroicocephalus ridibundus* (BH)	Bushy Park Grid O142293 Tymon Park Grid O12E	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately.2.7km
Light-bellied brent goose	Tymon Park	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 2.7km

[4] Note that some species listed on the Annex I of the Birds Directive are also SCI species.

Common Name / Scientific Name / BTO Code	Activity and Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA designated for SCI species
Branta bernicla (BG)				
Common coot *Fulica atra* (CO)	Tymon Park Grid O12E Bushy Park Grid O1429 Stephens Green Grid O160335	Amber (B/W)	-	Lough Ennell SPA approximately 72.3km
Common pochard *Aythya ferina* (PO)	Tymon Park Grid O12E	Red (B/W)	-	Lough Ennell SPA approximately 72.3km
Common redshank *Tringa totanus* (RK)	Tymon Park Grid O112286	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately.2.8km
Common snipe *Gallinago gallinago* (SN)	Firhouse Grid O12D	Red (B/W)	-	-
Eurasian teal *Anas crecca* (T.)	Firhouse Park Grid O115277	Amber (B/W)	-	North Bull Island SPA approximately.5.7km
European golden plover *Pluvialis apricaria* (GP)	River Liffey Grid O135343	Amber (B/W)		North Bull Island SPA approximately.5.7km
Great black-backed *gull Larus marinus* (GB)	Liffey Valley Park Grid O083357	Amber (B/W)		North Bull Island SPA approximately.5.7km
Greater scaup *Aythya marila* (SP)	Stephens Green Grids O159334 and O160334	Red (W)	-	Wexford Harbour and Slobs SPA approximately.90.4km
Herring gull *Larus argentatus* (HG)	Bushy Park Grid O142293 Tymon Park Grid O12E Across the Proposed Scheme	Amber (B/W)	-	Ireland's Eye SPA approximately.14.4km
Lesser black-backed gull *Larus fuscus* (LB)	Tymon Park Grid O12E	Amber (B/W)	-	Poulaphouca Reservoir SPA approximately.16.1km
Little egret *Egretta garzetta* (ET)	Tymon Park Grid O12E Ranelagh Grid O13R	Green (B)	✓	-
Little grebe *Tachybaptus ruficollis* (LG)	Bushy Park Grid O142293 Tymon Park Grid O12E Grand Canal Grid O13L	Amber (B/W)	-	Wexford Harbour and Slobs SPA approximately.90.4km
Mew gull *Larus canus* (CM)	Bushy Park Grid O142293 Tymon Park Grid O12E	Amber (B/W)	-	Dundalk Bay SPA approximately.57.5km
Mute swan *Cygnus olor* (MS)	Bushy Park Grid O142293 Grand Canal Grids O150324 and O156324	Amber (B/W)	-	-
Oystercatcher *Haematopus ostralegus* (OC)	Tymon Park Grid O12E	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately.2.8km
Tufted duck *Aythya fuligula* (TU)	Tymon Park Grid O115285 Bushy Park Grid O142293 Grand Canal Grid O156324	Amber (B/W)	-	Lough Ennell SPA approximately.72.3km

Due to the presence of suitable foraging and / or roosting habitat directly adjacent to the Proposed Scheme, the local wintering bird populations are considered to be of International Importance where they belong to SPA populations and / or are listed on the Annex I of the Birds Directive. All other wintering bird populations are considered to be of Local Importance (Higher Value).

12.3.10 Reptiles

Common lizard are legally protected under the Wildlife Acts. No reptile species were recorded during the multi-disciplinary surveys and no suitable habitat was confirmed within the footprint of the Proposed Scheme.

The desktop study returned one record of common lizard at Terenure College in 2020, adjacent to the Proposed Scheme. This species is strongly associated with heathland and coastal dune habitats; neither habitat types were identified within the Proposed Scheme boundary (Marnell 2002; Farren *et al.,* 2010). In light of the protection afforded to common lizard and the presence of a desktop record from the local area, reptiles cannot be excluded from the assessment and may be present in small numbers. Common lizard are deemed to be of Local Importance (Higher Value)

12.3.11 Amphibians

The common frog and the smooth newt are legally protected under the Wildlife Acts. The common frog is also listed under Annex V of the Habitats Directive. No evidence of common frogs or smooth newt were identified along the Proposed Scheme during the multi-disciplinary surveys.

Suitable amphibian habitat (i.e., vegetated riverbanks, surface water / drainage features with stagnant, relatively unpolluted water) was identified within the footprint of, or adjacent to, the Proposed Scheme. This includes scattered areas of vegetated riverbank along the Owenadoher River, River Dodder, Terenure College Stream, the Grand Canal, and ponds within Tymon Park, Terenure College and Bushy Park.

The desktop study returned records for common frog and smooth newt within 1km of the Proposed Scheme. This includes records of common frog across the length of the Proposed Scheme and a total of four records of smooth newt. There were three records returned at Terenure College; two records in 2020 and one record in 2019; there was one record returned at Rathfarnham in 2017 (NPWS 2019b).

Amphibians are deemed to be of Local Importance (Higher Value).

12.3.12 Fish

Fish species are protected under the Fisheries Acts and by fishing by-laws. Atlantic salmon, river lamprey and the brook lamprey are listed on Annex II of the EU Habitats Directive.

The Proposed Scheme lies within the Dodder_SC_010 WFD sub-catchment. The River Dodder flows in a north-easterly direction through south Co. Dublin, discharging to the River Liffey at Grand Canal Dock in Dublin city (Matson *et al*., 2019). The WFD sub-catchment Dodder_SC_010 was assigned an Ecological status of 'Good' for the period 2016-2021 in the upper reaches and deemed 'Not at Risk' of failing to meet the WFD objectives. At Dodder Valley Park, the River Dodder [Dodder_40] was assigned an ecological status of 'Moderate' for the period 2016-2021 and deemed to be 'At Risk' of failing to meet its WFD objectives (EPA, 2023). At Bushy Park the River Dodder [Dodder_50] was assigned an ecological status of 'Moderate' for the period 2016-2021and deemed to be 'At Risk' of failing to meet its WFD objectives (EPA 2023).

Terenure College Stream [Dodder_50], which discharges to the River Dodder at Bushy Park, was assigned an ecological status of 'Moderate' for the period 2016-2021and deemed to be 'At Risk' of failing to meet its WFD objectives (EPA 2023).

The Owenadoher River, which discharges to the River Dodder at Rathfarnham Mill, was assigned an Ecological status of 'Moderate' for the period 2016-2021 and its WFD risk assessment is "under review" EPA 2023).

The Grand Canal runs from Dublin port on a westerly course via Tullamore to join the River Shannon near Banagher. Due to its nature, it is classed as an artificial water body. The Grand Canal achieved Good Ecological Potential (GEP) in the 2021-2016 period and is deemed "Not at Risk" of meeting its WTD objectives (EPA 2023).

Following on from Inland Fisheries Ireland (IFI) consultation response and the known ecological sensitivity of the River Dodder and (its tributaries), aquatic habitat surveys were carried out in earlier survey phases at a number of locations, namely CBC1012AR001 along the River Dodder at Rathdown Park, along the Owenadoher River at Rathfarnham Mill CBC1012AR002 as well as upstream survey sites on the Owenadoher River at CBC1012AR004 and CBC1012AR003 (Triturus Environmental Ltd., 2020).

No aquatic surveys were undertaken in 2022 in respect of the Proposed Scheme, as no watercourses are being intersected or interfered with, but the results of the 2020 surveys are presented in order to contextualise the receiving environment.

12.3.12.1 Salmonid Species

The results of the aquatic surveys conducted by Triturus Environmental Ltd. along the River Dodder at Rathdown Park CBC1012AR001; indicated excellent salmonid habitat overall, particularly in terms of spawning. Nursery and holding habitat was of good quality. The sampling site was located downstream of Bushy Park pond in a mature woodland setting (Triturus Environmental Ltd., 2020). The River Dodder is exceptional among most urban rivers in the area, having resident salmon and sea trout populations, as such the river is regarded as a very important fishery (IFI Consultation, 2020). The desk study returned records for Atlantic salmon on the River Dodder and Lower Liffey Estuary (Kelly *et al.,* 2012). The River Liffey is a highly significant regional salmonid catchment for species of Atlantic salmon. Four sites were electro-fished in the River Dodder catchment as part of the 2011 WFD surveillance monitoring programme in rivers. The Mount Carmel Hospital sampling site located approximately 1.2km downstream of the Proposed Scheme recorded a total of five fish species: brown trout *Salmo trutta* was the most abundant species, followed by other non-salmonid species three-spined stickleback *Gasterosteus aculeatus*, stone loach *Barbatula barbatula*, eels *Anguilla anguilla* and minnow *Phoxinus phoxinus*. Atlantic salmon were recorded at the Beaver Row sampling site approximately 4.5 downstream of the Proposed Scheme (Kelly *et al.,* 2011). Inland Fisheries Ireland surveyed nine sites along the course of the River Dodder in September 2018. Five fish species were recorded with brown trout the most abundant. Other non-salmonid species recorded comprise: stone loach, three-spined stickleback, minnow and European eel (Matson *et al.,* 2019).

The results of the aquatic surveys conducted by Triturus Environmental Ltd.. in 2020 along the Owenadoher River at Rathfarnham Mill CBC1012AR002 indicated good salmonid habitat, although spawning and holding habitat was superior upstream at sites CBC1012AR004 and CBC1012AR003. Nursery was good overall and brown trout were evidently plentiful (Triturus Environmental Ltd. 2020). Triturus Environmental Ltd. also surveyed the Owenadoher River at Owendore Crescent CBC1012AR003. The results of this survey indicated excellent salmonid habitat, with particularly good spawning opportunities given abundant clean substrata. Whilst limited in extent (site was typically shallow riffle), some very good holding habitat was present in localised small pools. The site was also a good salmonid nursery. Brown trout were plentiful (Triturus Environmental Ltd. 2020). The results of the aquatic surveys conducted by Triturus Environmental Ltd. along the Owenadoher River at Butterfield Avenue CBC1012AR004 indicated excellent salmonid habitat, with particularly good spawning opportunities given abundant clean substrata. Holding habitat was also excellent (particularly underneath the bridge) although the weir was a significant barrier to fish migration (no fish pass present). Brown trout were plentiful. The site was also a good salmonid nursery (likely brown trout only given known migration barriers downstream). In contrast to site CBC1012AR003 upstream, the site was characterised by slower, deeper glide and pool (Triturus Environmental Ltd. 2020). The Owenadoher River was electro-fished as part of the WFD surveillance monitoring programme in rivers in 2011 and only one fish species, brown trout, was recorded at the sampling site at Cruagh Road Bridge approximately 7km upstream of the Proposed Scheme (Kelly *et al.,* 2011).

Atlantic salmon are valued as being of International Importance due to their 'Vulnerable' conservation status and an Annex II and Annex V species covered by the EU Habitats Directive (92 / 43 / EEC).

Brown trout are valued as being of Local Importance (Higher Value).

12.3.12.2 Lamprey Species

The results of the aquatic surveys conducted by Triturus Environmental Ltd., along the River Dodder at Rathdown Park CBC1012AR001 in 2020; indicated that lamprey habitat was limited to spawning substrata, with no suitable silt accumulations for ammocoetes present (Triturus Environmental Ltd., 2020).

In addition, the results of surveys conducted by Triturus Environmental Ltd. along the Owenadoher River indicated that while all sites surveyed offered some good physical suitability for lamprey spawning, the swift flows and general eroding/spate nature precluded fine sediment deposition and larval habitat was largely absent (Triturus Environmental Ltd. 2020).

The desk study returned records for lamprey species on the River Dodder. Inland Fisheries Ireland surveys carried out during 2015 and 2016 found Lamprey species in low numbers along the River Dodder, at the Bushy Park Rathfarnham sampling site adjacent to the Proposed Scheme (Matson *et al,.* 2019). The River Dodder is listed in the Dublin City Biodiversity Action Plan 2021- 2025 as a location for two legally protected lamprey species (brook lamprey *Lampetra planeri* and river lamprey *Lampetra fluviatillis*) in Dublin city (DCC, 2021).

Lamprey populations are valued as being of National Importance, as an Annex II Protected Species covered by the EU Habitats Directive (92/43/EEC).

12.3.12.3 European Eel

The results of the aquatic surveys conducted by Triturus Environmental Ltd. on the River Dodder at Rathdown Park CBC1012AR001 in 2020; and at the three sites along the Owenadoher River indicated that European eel habitat value was 'moderate' suitability overall. The river is likely to support European eel as it offers greater frequency of instream refugia, better prey resources, greater proportion of deeper glide / pools etc (Triturus Environmental Ltd. 202).

The three Owenadoher River sites (CBC1012AR003, CBC1012AR004 and CBC1012AR002) provided some moderate eel habitat given the presence of undercut banks and boulder refugia, although the high-energy nature of the survey sites was better suited to salmonids than eel (Triturus Environmental Ltd., 2020).

The desk study returned records for European eel *Anguilla anguilla* on the River Dodder. Inland Fisheries Ireland surveys carried out during 2016 and 2018 also found Lamprey species in low numbers along the River Dodder. European eel was recorded in 2016 at the Bushy Park Rathfarnham sampling site adjacent to the Proposed Scheme, and at Mount Carmel Hospital sampling site in 2018 located approximately 1.2km downstream of the Proposed Scheme (Matson *et al*., 2019). The Liffey Estuary serves as the natural linkage for European eel migrating between freshwater and marine environments (Central and Regional Fisheries Board 2008).

This species is the most threatened fish in Irish freshwaters (King *et al.,* 2011) and the alarming decline of the species in recent decades has resulted in a classification of "Critically Endangered" (Jacoby and Gollock 2014).

European eel populations are valued as being of National Importance.

12.3.12.4 All Other Fish Species

Results of water sampling undertaken at several locations along the River Dodder during 2018 IFI surveys included minnow *Phoxinus phoxinus*, stone loach *Barbatula barbatula* and three-spined stickleback *Gasterosteus aculeatus* (Matson *et al.,* 2019).

The Grand Canal is known as a major angling destination and species present include common bream, tench, common rudd, common perch *Perca fluviatilis* and pike. It also has a population of non-native invasive roach, a species listed on the of the Third Schedule of the European Communities Birds and Habitats Regulations, 2011 (Waterways Ireland 2017). The section of the Grand Canal from Dolphin's Barn to Portobello holds good stocks of tench, particularly from the Parnell Road stretch to the 7th Lock at Portobello. Pike and roach are also present (Inland Fisheries 2020).

These species are valued as being of Local Importance (Higher Value), although it is recognised that the three-spined stickleback is tolerant of polluted waters and disturbance.

12.3.13 Invertebrates

12.3.13.1 White-clawed Crayfish

White-clawed crayfish *Austropotamobius pallipes* are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive.

White-clawed crayfish were not recorded during the aquatic surveys conducted on the River Dodder (Triturus Environmental Ltd., 2020). The desk study (see Appendix A12.1 in Volume 4 of this EIAR) did not return records for white-clawed crayfish within the footprint of the Proposed Scheme. As such, white-clawed crayfish are not considered further in the assessment.

12.3.13.2 Freshwater Molluscs

No red listed mollusc species were recorded during the aquatic surveys conducted along the River Dodder at the Rathdown Park sampling site in 2020 (Triturus Environmental Ltd., 2020).

The desk study (see Appendix A12.1 in Volume 4 of this EIAR), returned records of glutinous snail *Myxas glutinosa*, iridescent pea mussel *Pisidium pulchellum* and false orb pea mussel *Pisidium pseudosphaerium* along the Grand Canal at Herbert Place in 2003. These species are listed as “Endangered” on the Ireland Red List No. 2 Non-Marine Molluscs (Byrne *et al.* 2009).

Iridescent pea mussel and false orb pea mussel populations are valued as being of National Importance due to being listed on Irelands Red List as ‘Endangered’.

Glutinous snail populations are of International Importance due to being listed on the global IUCN Red list.

12.3.13.3 Marsh Fritillary Butterfly

Marsh fritillary *Euphydryas aurinia* are legally protected under Annex II of the Habitats Directive. Surveys for marsh fritillary were not carried out as part of this assessment. In an Irish context, the conservation status of these species in Ireland is designated as ‘Vulnerable’ (Regan *et al.,* 2010).

The desk study (see Appendix A12.1 in Volume 4 of this EIAR) did not return records for marsh fritillary within the footprint of the Proposed Scheme. Desk study records in the wider area were largely historical (pre-1980s). Recent records for marsh fritillary were identified 3.8km south of the Proposed Scheme at Killakee Rathfarnham (NBDC Online Database 2022).

Marsh fritillary are restricted to habitats containing a low, open sward with abundant devil’s-bit scabious *Succisa pratensis* including sand dunes, calcareous grassland, fens, raised and blanket bogs, upland heaths and grasslands. Neither devil’s-bit scabious nor these habitats were recorded within the footprint of the Proposed Scheme.

As such, marsh fritillary are not considered further in the assessment.

12.3.13.4 Other Invertebrates

The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned records for several invertebrates Red listed on the Ireland Red List No. 2: Ireland Red List No. 4: Butterflies (Regan *et al.,* 2010), Regional Red List of Irish Bees 2006 (Fitzpatrick *et al*., 2006), Ireland Red List No. 6: Damselflies and Dragonflies (Odonata) (Nelson *et al.,* 2011), Ireland Red List No. 7: Mayflies (Ephemeroptera) (Kelly-Quinn *et al.,* 2012) and Red List of Irish Stoneflies (Feeley *et al*. 2020) (NBDC Online Database 2022).

Records were returned for two ‘Regionally Extinct’ listed species; tawny mining bee *Andrena fulva* along the River Dodder at Churchtown in 2019 and the moth August Thorn *Ennomos quercinaria* at St. Columba's College Whitechurch in 1986. The ‘Critically Endangered’ stonefly species, *Protonemura praecox,* was last recorded during 1981 at an unknown location along the River Dodder. The ‘Vulnerable’ listed mayfly species, *Rhithrogena germanica,* was last recorded along the River Dodder during 1996 at an unknown location within the grid square O13.

Butterfly are known to favour nectar-rich flowers which provide larval foodplants. Preferred species include cock's-foot grass, bird's-foot trefoil, common nettle, cuckoo flower *Cardamine pratensis*, garden nasturtium *Tropaeleum majus*, common holly and common ivy (Butterfly Conservation Ireland 2020). Corresponding habitats along the Proposed Scheme are located in parkland with scattered trees (WD5), dry meadows and grassy verges (GS2) and amenity grasslands (GA2); present within Terenure College, Bushy Park and lands adjacent to Spawell Road (R137). These habitats were identified along the route of the Proposed Scheme in fragmented pockets of small and medium size. Species diversity was low in terms of foodplants in these habitats. Butterfly communities that are known to survive in highly fragmented landscapes are mobile species that can feed off a range of plants (Öckinger *et al.,* 2010).

Damselflies and Dragonflies are typically found at slow moving or stagnant water bodies such as wetlands, river mires and flood lands, however they have adapted to artificial habitats such as ponds and canals (Fox and Cham 1994). These species are carnivorous predators throughout their life cycles and are used as bio-indicator species for water quality as they have low tolerances for pollution, with juveniles spending the entirety of their life in aquatic systems (Nelson *et al.,* 2011). Suitable habitats along the Proposed Scheme, which are isolated and fragmented, include; depositing / lowland rivers (FW2), such as the River Dodder in Rathfarnham and Templeogue and canal habitat (FW3), such as the Grand Canal at La Touche Bridge. The preferred foodplants for bees are native species with white, blue or yellow flowers (Fitzpatrick *et al.,* 2006). Additional fragmented sites where suitable floral species were recorded along the Proposed Scheme include ornamental flower beds and borders (BC4) within residential gardens, parkland with scattered trees (WD5), and amenity grasslands (GA2); in parks and along the banks of the River Dodder and Grand Canal.

Bumblebees may have large ranges and require large areas with varied habitats providing long flowering periods to support viable populations. Bees do not cope well with habitat fragmentation which can isolate species, ultimately reducing gene flow and genetic diversity and increasing their vulnerability to other stressors such as disease and internal parasites. Species with specialist foodplants or limited dispersal abilities can be particularly vulnerable to habitat loss and degradation (Biesmeijer *et al*., 2006) leading to increasing dominance by a smaller number of generalist species.

Loss of natural and semi-natural habitats has been a key driver in pollinators who require a balanced diet from a range of plant species throughout their active foraging season which lasts from early spring until late autumn (TCD 2017). These other invertebrate species favour species rich semi-natural grasslands and meadows, upland heathland and sand dunes. Habitats within close proximity to the Proposed Scheme which correspond to species requirements include areas of ornamental planting along roadsides, parkland, canals, and gardens. Such habitats are fragmented and highly disturbed and are therefore deemed unsuitable for significant populations of red-listed invertebrates (Biesmeijer *et al.,* 2006; Öckinger *et al.,* 2010). As such, other invertebrates are not considered further in the assessment.

12.3.14 Summary Ecological Valuation and Identification of KERs

Table 12.13 summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance. KERs are highlighted in blue in Table 12.13 . Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of assessing the impacts on what are determined to be important ecological or biodiversity features, as per the CIEEM Guidelines (CIEEM 2018) and the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009).

All designated areas for nature conservation that lie within the ZoI of the Proposed Scheme are considered to be KERs given that they are sites selected specifically for biodiversity conservation and are potentially at risk of impacts from the Proposed Scheme. Those designated areas for nature conservation that lie beyond the ZoI of the Proposed Scheme are not considered to be at risk of impact and are therefore not considered to be KERs.

In all cases, habitat and species valued as being of Local Importance (Higher Value), or higher, are considered to be KERs as they are important contributors to the local biodiversity resource and are of conservation concern, at least locally.

Habitats valued as being of a Local Importance (Lower Value) are not considered to be KERs in this assessment. This is not to say that they are of no biodiversity value, but that impacts on these habitat types in their local context are not likely to result in a significant effect on biodiversity. It should be noted that this relates to the impact on the habitat itself as distinct from considering the role these habitat types play in supporting KER fauna species. The impacts of the Proposed Scheme in that sense are captured and assessed under the relevant species' headings in Section 12.4.

These lower biodiversity value habitats include built or artificially created habitats, transient habitats as a result of disturbance, or those that have been highly anthropogenically modified (e.g., BL1, BL2, BL3, GA2 and WS3). These habitat types tend to be associated with residential, commercial or industrial development, roads and highly managed amenity areas. It also includes grassland habitats that are relatively species poor and improved.

In some cases, Local Importance (Lower Value) habitat can be associated with, or develop into, higher value habitats and where this is the case it is captured in valuing and considering whether a particular habitat type is a KER for this assessment.

Non-native invasive plant species are not considered as KERs, as they can result in negative effects on biodiversity, and it is in that context they are included within the impact assessment.

Table 12.13: Summary of Ecological Valuation and Identification of KERs

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
North Dublin Bay SAC [000206]	International Importance	Yes
South Dublin Bay SAC [000210]	International Importance	Yes
Rockabill to Dalkey Island SAC [003000]	International Importance	Yes
Lambay Island SAC [000204]	International Importance	Yes
Wicklow Mountains SAC [002122]	International Importance	Yes
South Dublin Bay and River Tolka Estuary SPA [004024]	International Importance	Yes
Baldoyle Bay SPA [004016]	International Importance	Yes
North Bull Island SPA [004006]	International Importance	Yes
Malahide Estuary SPA [004025]	International Importance	Yes
Ireland's Eye SPA [004117]	International Importance	Yes
Howth Head Coast SPA [004113]	International Importance	Yes
Rogerstown Estuary SPA [004015]	International Importance	Yes
Lambay Island SPA [004069]	International Importance	Yes
Dalkey Islands SPA [004172]	International Importance	Yes
Skerries Islands SPA [004122]	International Importance	Yes
The Murrough SPA [004186]	International Importance	Yes
Rockabill SPA [004014]	International Importance	Yes
All other SAC or SPA sites	International Importance	No – beyond ZoI
Skerries Island NHA [001218]	National Importance	Yes
Dodder Valley pNHA [000991]	National Importance	Yes
Grand Canal pNHA [002104]	National Importance	Yes
North Dublin Bay pNHA [000206]	National Importance	Yes
South Dublin Bay pNHA [000210]	National Importance	Yes
Dolphins, Dublin Docks pNHA [000201]	National Importance	Yes
Booterstown Marsh pNHA [001205]	National Importance	Yes

Ecological Receptor	Ecological Valuation	KER?
Baldoyle Bay pNHA [000199]	National Importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	National Importance	Yes
Howth Head pNHA	National Importance	Yes
Ireland's Eye pNHA [000203]	National Importance	Yes
Malahide Estuary pNHA [000205]	National Importance	Yes
Portraine Shore pNHA [001215]	National Importance	Yes
Rogerstown Estuary pNHA [000208]	National Importance	Yes
Lambay Island pNHA [000204]	National Importance	Yes
The Murrough pNHA [000730]	National Importance	Yes
All other NHA or pNHA sites	National Importance	No – beyond ZoI
Habitats		
Flower beds and borders (BC4)	Local Importance (Lower Value)	No
Stone walls and other stonework (BL1);	Local Importance (Lower Value)	No
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	No
Exposed sand, gravel or till (ED1	Local Importance (Lower Value)	No
Spoil and bare ground (ED2)	Local Importance (Lower Value)	No
Depositing / lowland rivers (FW2)	Local Importance (Higher Value)	Yes
Canals (FW3)	National Importance	Yes
Amenity grassland (improved) (GA2)	Local Importance (Lower Value)	No
Dry meadows and grassy verges (GS2)	Local Importance (Lower Value)	No
Wet Grassland (GS4)	Local Importance (Lower Value)	No
Residential	Local Importance (Lower Value)	No
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Yes
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Yes
Hedgerows (WL1)	Local Importance (Higher Value)	Yes
Treelines (WL2)	Local Importance (Higher Value)	Yes
Scrub (WS1)	Local Importance (Lower Value)	No
Ornamental / non-native shrub (WS3)	Local Importance (Lower Value)	No
Flora Species		
Flora species listed on the Flora Protection Order	National Importance	Yes
Flora species on Ireland's Red lists (Vulnerable or of higher concern concern)	County to Local Importance (Higher Value)	Yes
All other non-Red listed flora species	Local Importance (Lower Value)	No
Non-native invasive plant species	N/A	No
Fauna Species		
Bats	Local Importance (Higher Value)	Yes
Badger	Local Importance (Higher Value)	Yes
Otter	County Importance	Yes
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Yes
Marine mammals (all other marine mammals)	County Importance	Yes

Ecological Receptor	Ecological Valuation	KER?
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Yes
SCI / Annex I bird species	International Importance	Yes
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Yes
Reptiles	Local Importance (Higher Value)	Yes
Amphibians	Local Importance (Higher Value)	Yes
Atlantic salmon	International Importance	Yes
Brown trout	Local Importance (Higher Value)	Yes
European eel / Lamprey species	National Importance	Yes
All other fish species	Local Importance (Higher Value)	Yes
Invertebrates - freshwater molluscs	International to National (Higher Value)	Yes
Local Biodiversity Areas (Local Biodiversity Areas not discussed under designated sites, flora and / or fauna – of which overlap in part with national designation as listed previously and / or are intersected by the Proposed Scheme)		
DCC		
Grand Canal	National Importance	Yes but covered by pNHA
River Dodder Corridor	County Importance	Yes but covered by FW2 habitat
Bushy Park, Terenure College and Harold Cross Park	County Importance	No – by virtue of avoidance
SDCC		
Network of streams and rivers e.g. River Dodder	County Importance	Yes but covered by FW2 habitat
Network of Parks e.g Tymon Park, Bushy Park and Bancroft Park	County Importance	No – by virtue of avoidance
DLRCC		
Wildlife Corridors- Dodder Valley corridor and Ticknock to River Dodder corridor	County Importance	Yes but covered by FW2 habitat and pNHA

12.4 Potential Impacts

The following Section presents the assessment of potential impacts on biodiversity within the ZoI of the Proposed Scheme. As outlined in Section 12.2.4, this is focused on the KERs identified in Section 12.3.14. This includes consideration of the "Do Nothing impact" scenario i.e., the existing trends with the potential to affect biodiversity in the absence of the Proposed Scheme.

12.4.1 Characteristics of the Proposed Scheme

A detailed description of the proposed road development and construction activities are provided in Chapter 4 (Proposed Scheme Description), and Chapter 5 (Construction). The main characteristics of the Proposed Scheme of relevance to the ecological assessment are outlined under construction and operation phases in Sections 12.4.1.1 and 12.4.1.5.

12.4.1.1 Construction Phase

The main characteristics of the Construction Phase of the Proposed Scheme that have potential for ecological impact are:

- Site preparation and clearance;
- Removal of existing boundaries, pavements, lighting columns, bus stops, and signage;
- Protection and / or diversion of buried services;
- Road widening, pavement reconstruction, and kerb improvements;
- Reconfiguration of traffic lanes throughout;
- Permanent land take at a number of areas across the Proposed Scheme including:
    - 74 residential properties; and
    - 38 non-residential properties or land, including commercial, healthcare and educational institutes.
- Temporary land take at a number of areas across the Proposed Scheme, in particular
    - Rathfarnham Castle boundary Wall
    - Bushy Park along the Templeogue Road
- Installation of new bus stops and junction / roundabout modification;
- Property boundary reinstatement, signage replacement; relocation of and/or installation of lighting columns; and,
- Landscaping and tree planting, and reinstatement of temporary land acquisitions.

12.4.1.1.1 Structural Works

12.4.1.1.1.1 Retaining Walls

There are no retaining walls greater than 1.5m (classified as principal structures) being impacted. All walls with a height of less than 1.5m are classified as minor retaining walls and as such not predicted to interfere with ecological receptors, as there is only one such wall (structure RW01 adjacent to access / service road at 252 – 256 Templeogue Road, a length of approximately 15m).

12.4.1.1.1.2 Templeogue Archway

The existing free standing stone arch adjacent to the R137 Templeogue Road will be cleared of the overgrown vegetation which currently covers it and conserved in its existing location. The existing fencing around the arch will be removed and the arch opened up to the public realm. It is proposed to install high quality stone paving, decorative lighting and soft landscaping elements around the arch as well as to construct a new footpath running behind the arch.

12.4.1.1.2 Surface Water Drainage Infrastructure

The surface water drainage system for the Proposed Scheme will discharge to 18 catchment areas based on topography to two surface water receptors: Owenadoher River (Owenadoher _010), River Dodder (Dodder _040), Grand Canal, London Bridge Pumping house and Ringsend WwTP, which then discharges to Liffey Estuary Lower, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. For the Proposed Scheme, there will be a net increase of 7435m^2 in the impermeable area ultimately discharging to Dublin Bay. The drainage design principles ensure that all runoff from increases in impermeable areas will be attenuated and there will be no net increase in the surface water flow discharged to these receptors.

Full details of proposed drainage infrastructure are provided in Chapter 13 (Water) and the Proposed Surface Water Drainage Works drawings in Volume 3 of this EIAR.

12.4.1.1.3 Construction Compounds

Five Construction Compounds will be required along the length of the Proposed Scheme to facilitate construction:

- TR1 – located south of the Spawell roundabout, at the Tallaght Road / Spawell Link Road junction;
- TR2 – located north-west of Terenure Road North, between Eaton Road and Eagle Hill Avenue;
- TR3 – located along Dodder View Road, across the road from Bushy Park, in the greenfield area between Dodder View Road, Woodview Cottages and Church Lane;
- TR4 – located on Military Road, perpendicular to Rathmines Road Lower, south of St Marys College;
- TR5 – located on Richmond Street South, on the slip road between Richmond Street South and Harcourt Road; and,
- TR6- Located on Spawell Link Road, between Spawell Roundabout and Firhouse Road.

These Construction Compounds will contain a site office, and welfare facilities for NTA personnel and contractor personnel. Limited car parking will be allowed at the Construction Compounds. Materials such as topsoil, subsoil, concrete, rock etc., will be stored at the Construction Compounds for reuse as necessary. Items of plant and equipment will also be stored within the Construction Compounds. The Construction Compounds will be in place for the duration of the Construction Phase of the Proposed Scheme, estimated at approximately 24 months.

The Construction Compounds will be engineered with appropriate services. Water, wastewater, power, and communications connections will be organised by the appointed contractor. At work areas along the Proposed Scheme, where permanent provisions (for the duration of the construction programme) are not practicable, appropriate temporary provisions will be made including the use of generators if required. Temporary welfare facilities will need to be used, for example, portable toilets in the vicinity of works. Wastewater from temporary welfare facilities will be collected and disposed of to a suitably licenced facility.

Following completion of the Construction Phase, the Construction Compounds will be cleared and reinstated to match pre-existing conditions.

Construction Compound TR1 will be located south of the Spawell roundabout, at the Tallaght Road / Spawell Link Road junction, as shown in Image 12.1 The area of Construction Compound TR1 is approximately 330m^2.

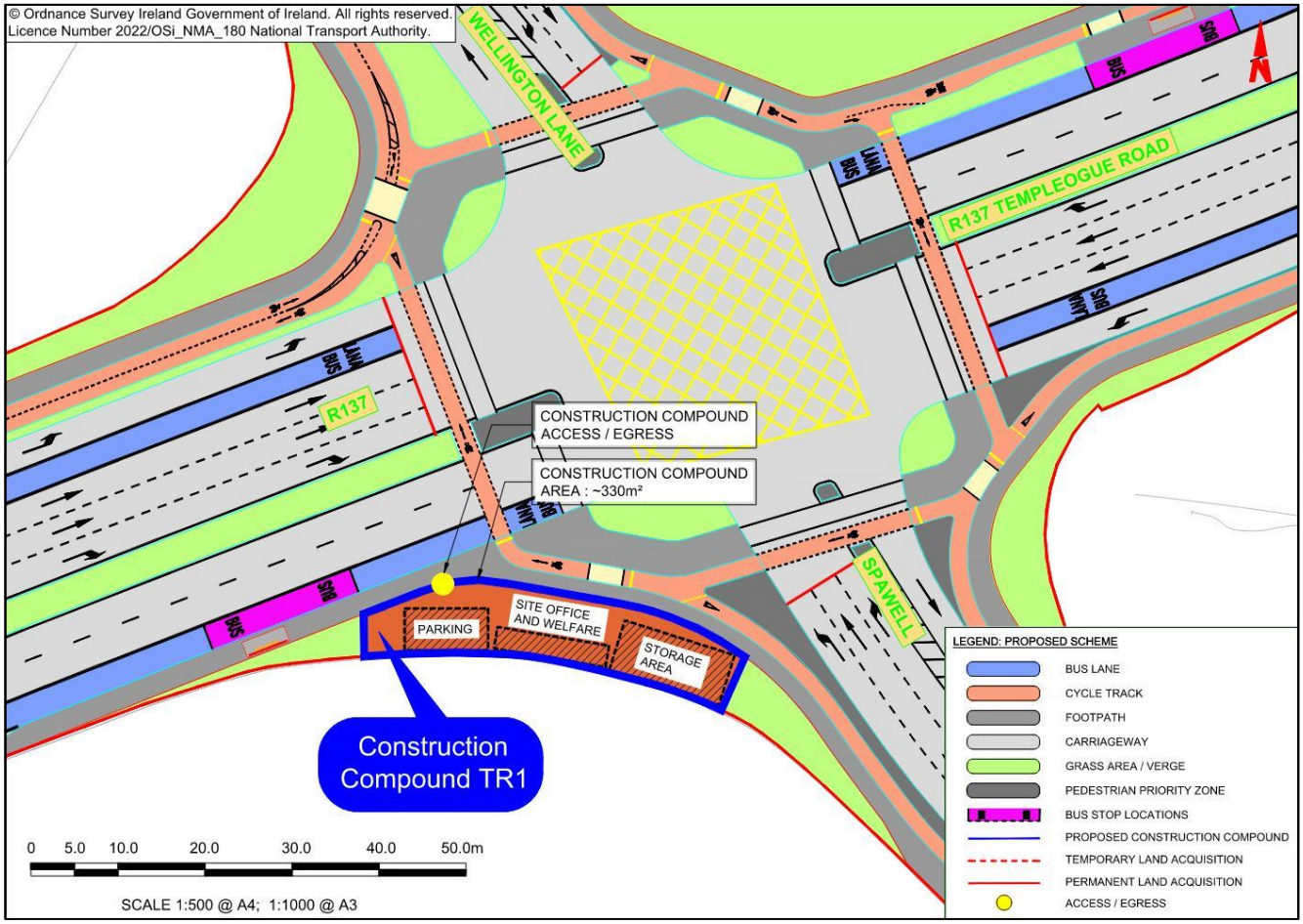

Image 12.1: Location and Extent of Construction Compound TR1

Construction Compound TR2 will be located north-west of Terenure Road North, between Eaton Road and Eagle Hill Avenue, as shown in Image 12.2 The area of Construction Compound TR2 is approximately 110m^2.

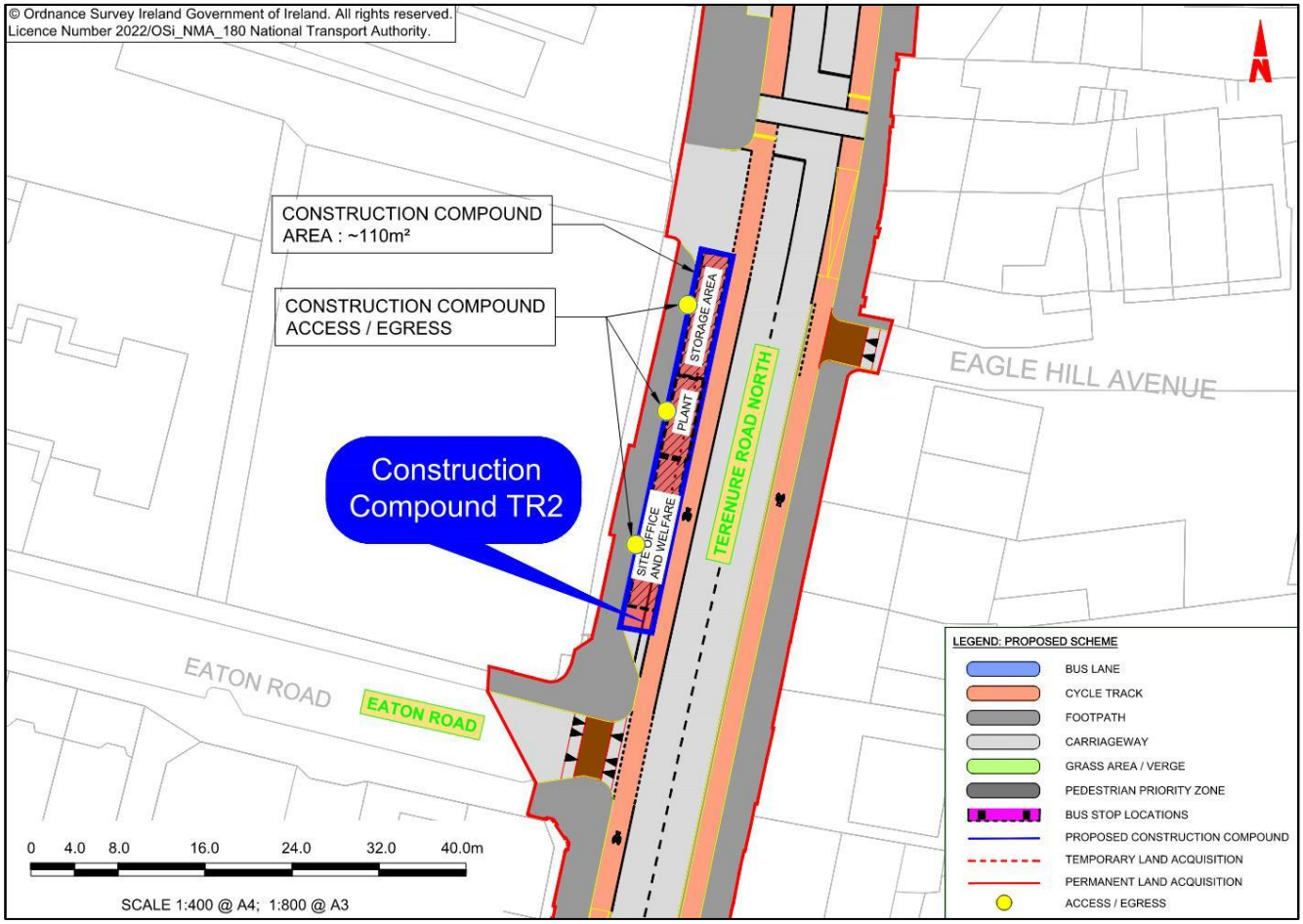

Image 12.2: Location and Extent of Construction Compound TR2

Construction Compound TR3 will be located along Dodder View Road, across the road from Bushy Park, in the greenfield area between Dodder View Road, Woodview Cottages and Church Lane, as shown in Image 12.3. The area of Construction Compound TR3 is approximately 5,120m^2.

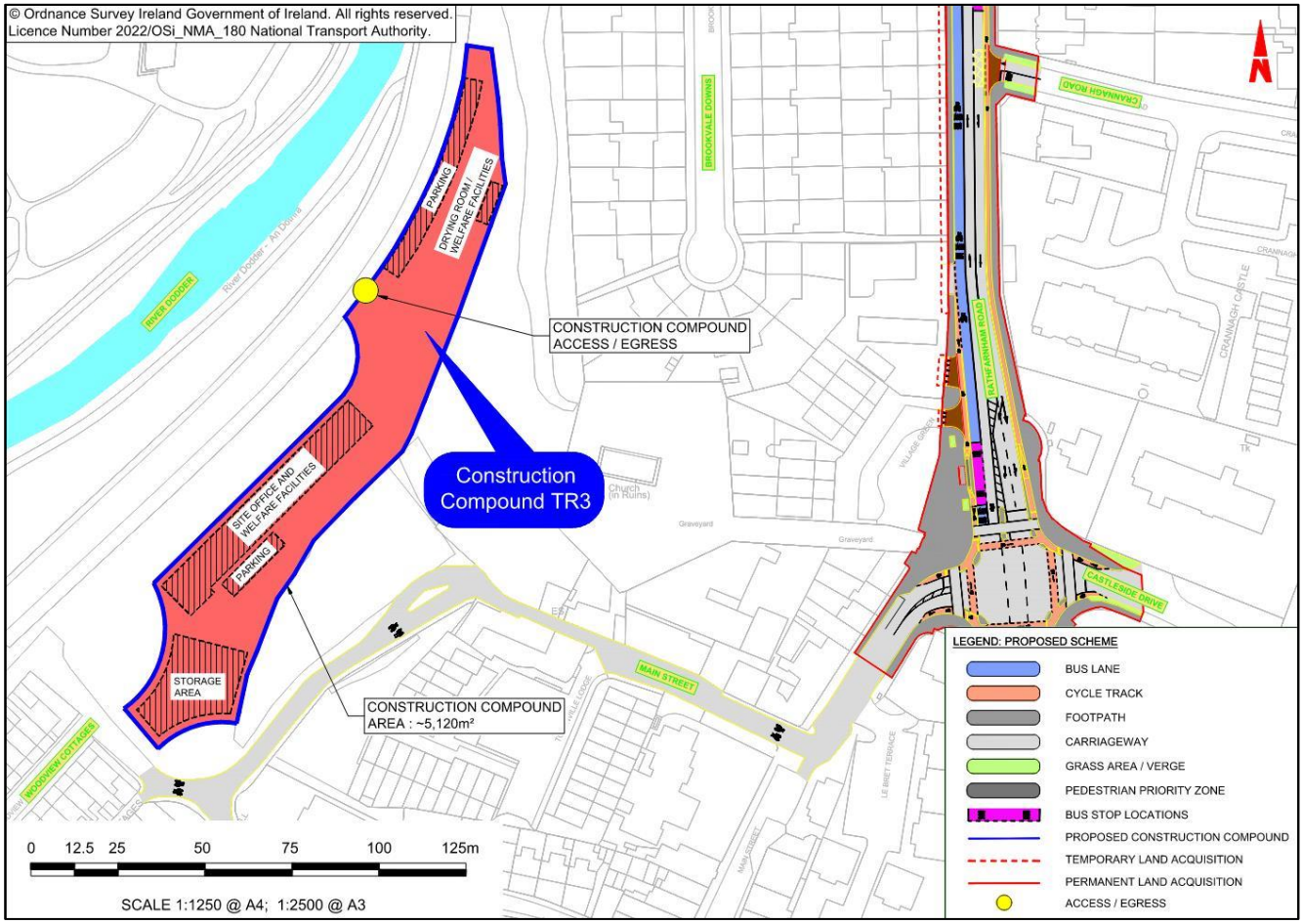

Image 12.3: Location and Extent of Construction Compound TR3

Construction Compound TR4 will be located on Military Road, perpendicular to Rathmines Road Lower, south of St Marys College, as shown in Image 12.4. The area of Construction Compound TR4 is approximately 90m^2.

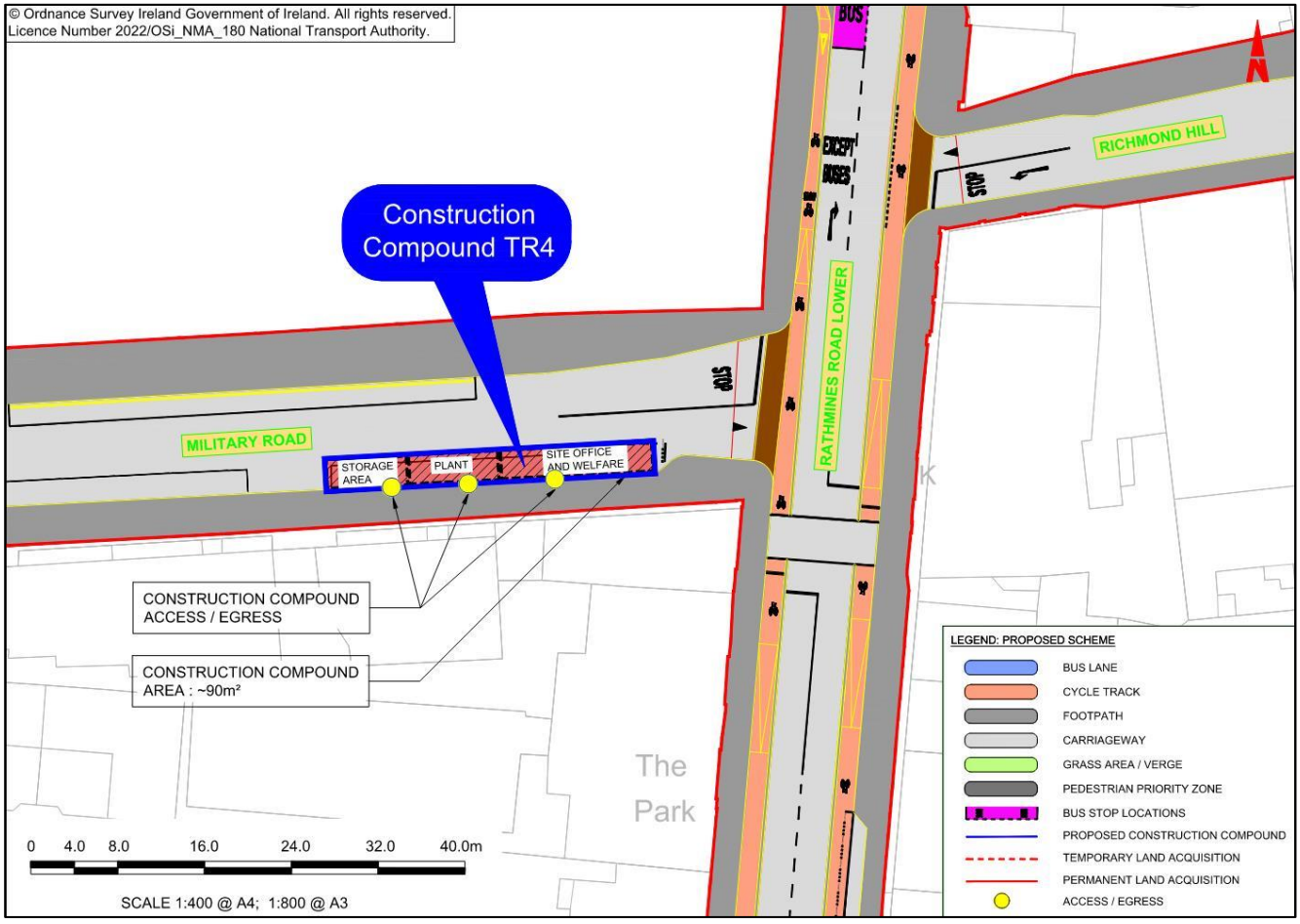

Image12.4: Location and Extent of Construction Compound TR4

Construction Compound TR5 will be located on Richmond Street South, on the slip road between Richmond Street South and Harcourt Road, as shown in Image 12.5 The area of Construction Compound TR5 is approximately 70m^2.

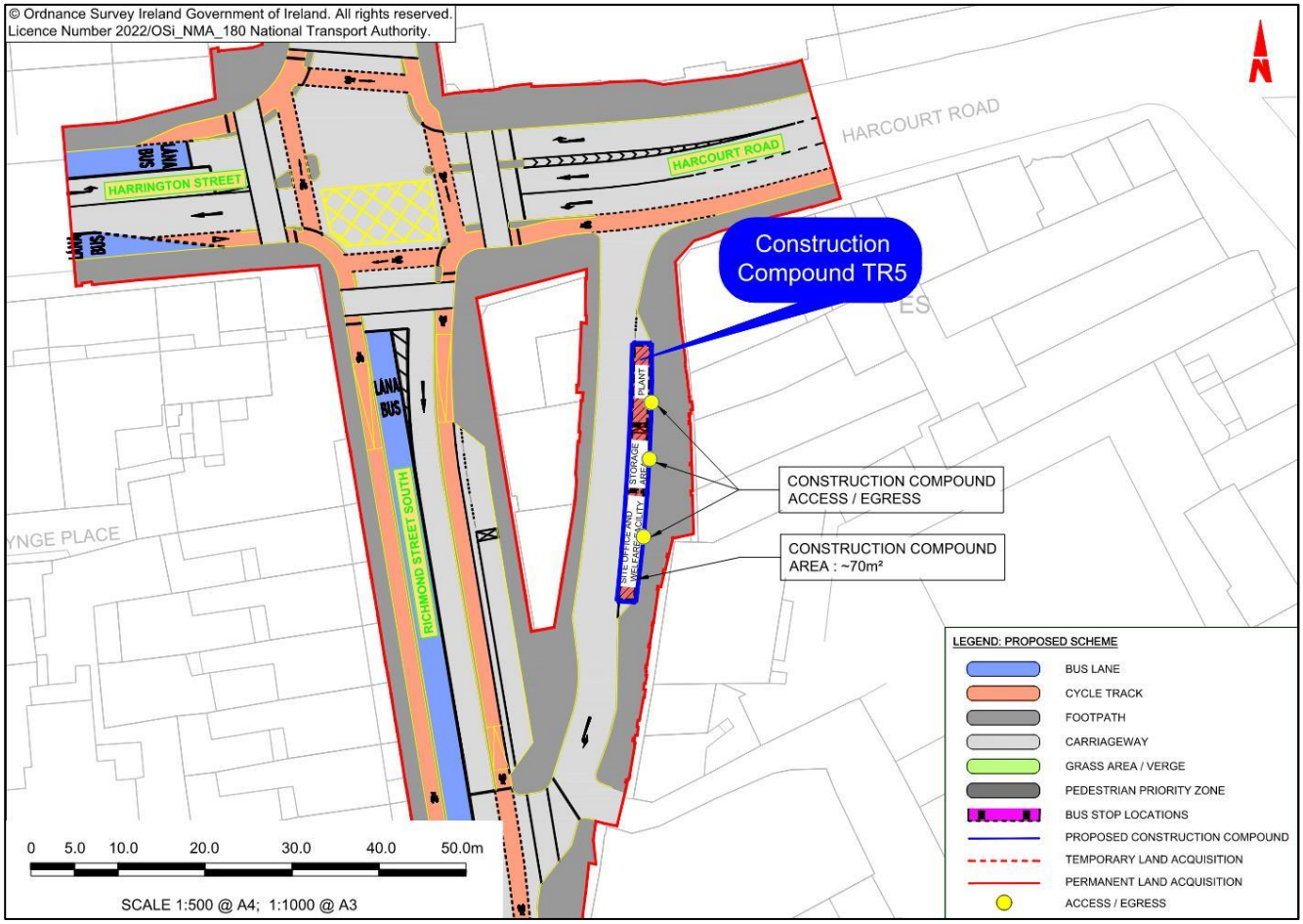

Image12.5: Location and Extent of Construction Compound TR5

Construction Compound TR6 will be located on Spawell Link Road, between Spawell Roundabout and Firhouse Road, as shown in Image 12.6. The area of Construction Compound TR6 is approximately 3,170m^2.

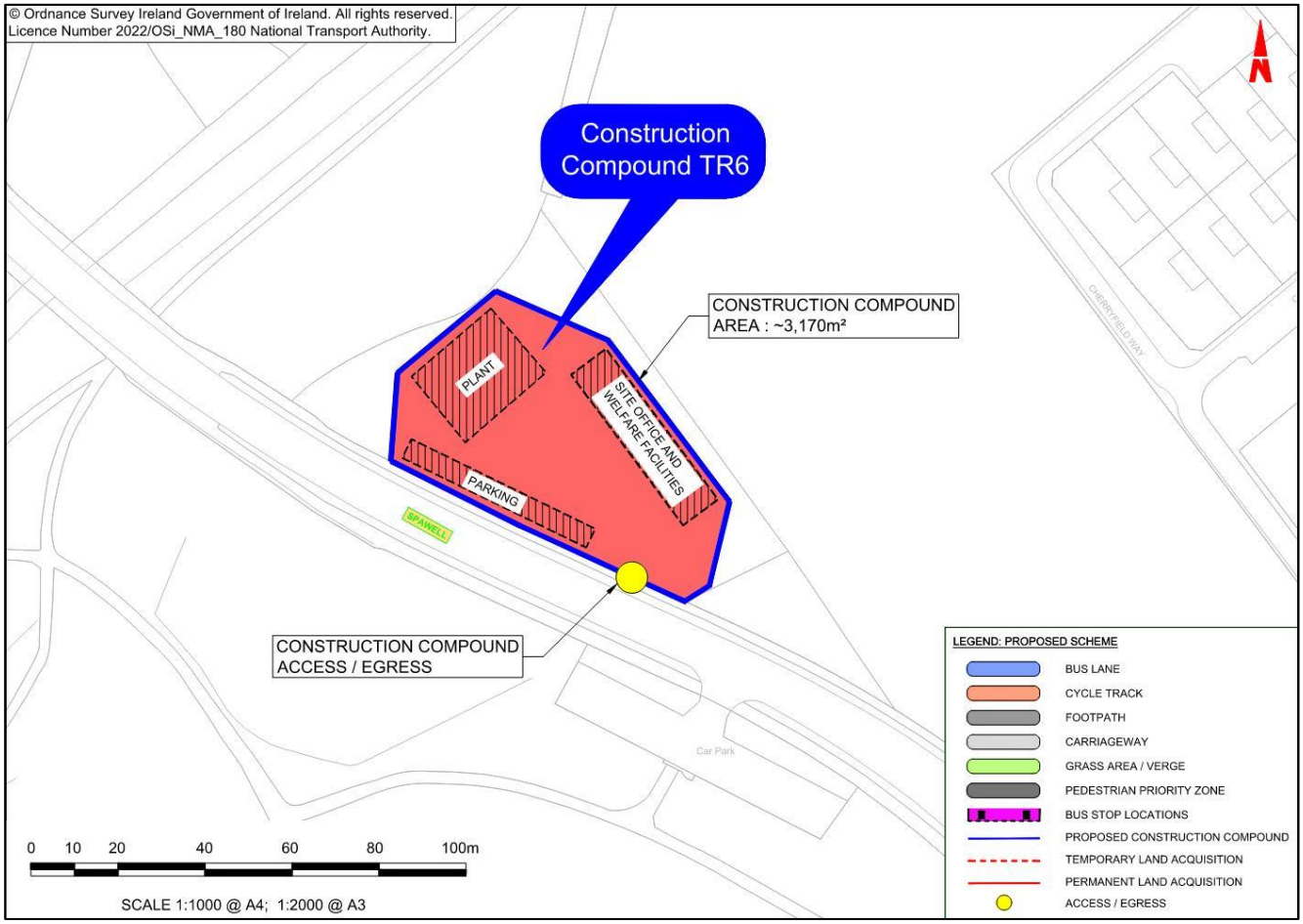

Image12.6: Location and Extent of Construction Compound TR6

12.4.1.1.4 **Estimated Project Duration**

The duration of the Construction Phase is estimated to be 24 months.

12.4.1.2 Operational Phase

The main characteristics of the Operational Phase of the Proposed Scheme that have potential for ecological impact are:

- The presence and operation (traffic) of the road;
- The presence of additional lighting; and,
- Routine maintenance.

12.4.2 'Do Nothing' Scenario

In the Do Nothing scenario, the Proposed Scheme would not be implemented (discussed further in Chapter 6 (Traffic & Transport)). Thus, the existing corridors would remain with no immediate significant changes in the terrestrial, aquatic and marine biodiversity (flora and fauna) of the area, as there would be no significant Construction Phase impacts from the Proposed Scheme beyond roadside management of existing habitats. The impact of no construction is neutral upon biodiversity along and adjacent to the Proposed Scheme.

The Baseline Environment (see Section 12.3) describes the existing land use surrounding the Proposed Scheme. The Greater Dublin Area is highly urbanised with existing trends resulting in added pressure to water resources and habitat losses to ongoing development. As the full extent of the Proposed Scheme passes through lands zoned under the South Dublin County Development Plan 2022-2028 (SDCC 2022) and Dublin City Development Plan 2022-2028 (DCC 2022), the current land use zonings provide the best indication of what the future short to medium-term biodiversity trends might be, as they will influence and direct development in the surrounding area. Lands surrounding the Proposed Scheme are largely zoned for residential, commercial or industrial purposes. Current biodiversity trends are likely to continue in areas zoned for development, adding to pressures on water bodies and habitat fragmentation. It is also likely that traffic numbers will continue to remain high on a road network with variable drainage control or pollution control measures, which may have effects on biodiversity receptors in the receiving environment. However, any effects on biodiversity are likely to be moderated by the environmental protective policies in the South Dublin County Development Plan 2022-2028 (SDCC 2022) and Dublin City Development Plan 2022-2028 (DCC 2022) and overarching pollution control objective in the River Basin Management Plan (RBMP) (DHPLG 2018).

The interaction between the existing trends, future trends, and other plans or projects with the Proposed Scheme are considered and assessed further in Chapter 23 (Summary of Significant Residual Impacts).

12.4.3 Construction Phase

12.4.3.1 Designated Areas for Nature Conservation

This Section describes and assesses the potential for the Proposed Scheme to result in likely significant effects on designated areas for nature conservation at SACs, SPAs, NHAs or pNHAs. In the context of European sites this is focused on the habitats and species for which the sites are selected (i.e., QIs for SACs and SCI species for SPAs, and the conservation objectives supporting their conservation status in each site). This assessment is directly related to the assessment methodology for European sites required under the Habitats Directive, which is presented separately in the Natura Impact Statement (NIS) prepared for the Proposed Scheme (and submitted with the application for approval).

In the case of NHAs and pNHAs the assessment considers whether the integrity of any such site would be affected. For the avoidance of doubt, it should be noted that, if the Proposed Scheme would adversely affect the integrity of a European site, then this would constitute a likely significant effect in the context of the EIA Directive.

12.4.3.1.1 European sites

In the context of assessing whether the Proposed Scheme is likely to result in an impact on the integrity of any European sites, the NIS considers whether the Proposed Scheme will affect the conservation objectives supporting the favourable conservation condition of any European sites' QIs / SCIs and, as a result, presents an assessment of whether the integrity of any European sites would be affected – i.e. if the Proposed Scheme would adversely affect the integrity of a European site, this would constitute a likely significant effect in the context of the EIA Directive.

The nature and scale of the Proposed Scheme, the identified potential impacts and their relationship to European sites were considered in order to determine which European sites were located within the ZoI of the Proposed Scheme, in view of best scientific knowledge and in view of conservation objectives, and therefore potentially at risk of the Proposed Scheme affecting their conservation objectives. The potential impacts associated with the Proposed Scheme are discussed below in relation to those European sites within its ZoI (further information can also be found in Section 6 and Section 7 of the NIS which accompanies the Planning application).

The ZoI is a distance within which the Proposed Scheme could potentially affect the conservation condition of QI habitats or QI / SCI species of a European site.

The mechanism to define the ZoI is summarised as follows:

- Consider the nature, size and location of the Proposed Scheme;
- Consider the sensitivities of the ecological receptors;
- Identify impact sources and pathways; and,

- Determine the ZoI based on the extent of the impact.

Considering the ZoI, in the absence of mitigation measures, the Proposed Scheme was assessed as having the potential to adversely affect the integrity of the following European sites:

- North Dublin Bay SAC [000206];
- South Dublin Bay SAC [000210];
- Rockabill to Dalkey Island SAC [003000];
- Lambay Island SAC [000204];
- Wicklow Mountains SAC [002122];
- South Dublin Bay and River Tolka Estuary SPA [004024];
- North Bull Island SPA [004006];
- Howth Head Coast SPA [004113];
- Dalkey Islands SPA [004172];
- Rockabill SPA [004114];
- Baldoyle Bay SPA [004016];
- Malahide Estuary SPA [004025];
- Rogerstown Estuary SPA [004015];
- Skerries Islands SPA [004122];
- Ireland's Eye SPA [004117];
- Lambay Island SPA [004069]; and
- The Murrough SPA [004186].

The locations of these European sites relative to the Proposed Scheme are shown on Figure 12.3 in Volume 3 of this EIAR.

The following potential effects on European sites have been identified based on the existing ecological environment and the extent and characteristics of the Proposed Scheme (see information provided below for detailed description of each potential impact):

- Habitat loss and fragmentation;
- Habitat degradation/effects on QI / SCI species as a result of hydrological impacts;
- Habitat degradation as a result of introducing / spreading non-native invasive species; and,
- Disturbance and displacement impacts.

Habitat degradation as a result of hydrogeological impacts and air quality impacts were scoped out from further assessment at the Stage 1 AA Screening stage. The nearest European site with groundwater dependent QI habitats / species is the Rye Water Valley Carton SAC which is located approximately 4.3km south, and upstream, from the Proposed Scheme. It is therefore outside the ZoI of hydrogeological impacts. Likewise, all European sites within the vicinity of the Proposed Scheme lie beyond the ZoI for air quality impacts (50m from the Proposed Scheme boundary, and 500m from Construction Compound during the Construction Phase, and up to 200m from the Proposed Scheme boundary during the Operational Phase). Therefore, there is no potential for impacts on European sites as a result of effects on hydrogeology or air quality.

12.4.3.1.1.1 Habitat Loss and Fragmentation

The Proposed Scheme does not overlap with any European sites, and the nearest European site, with a hydrological connection to the Proposed Scheme includes South Dublin Bay and River Tolka Estuary SPA and North Dublin Bay SAC, located approximately 3.2km from the Proposed Scheme. Therefore, there is no potential for direct habitat loss and fragmentation to occur.

Habitat loss may occur indirectly as a consequence of habitat degradation arising from a reduction in water quality and / or a change to the hydrological regime. The nearest European site to the Proposed Scheme is the Rye Water Valley / Carton SAC, which is located 4.3km away. The nearest European site with a hydrological connection to the Proposed Scheme is includes South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC, located approximately 3.2km, downstream of the point at which the Grand Canal is crossed by the Proposed Scheme. This is followed by North Dublin Bay SAC, which is located approximately 7.8km downstream of the proposed crossing point on the River Dodder. Therefore, there is no potential for direct habitat loss and

fragmentation to occur as a result of the Proposed Scheme. Habitat loss may occur indirectly as a consequence of severe habitat degradation arising from a reduction in water quality and / or a change to the hydrological regime, as described in the section below.

Special Conservation Interest (SCI) species for which SPAs in the vicinity of the Proposed Scheme have been designated are known to utilise *ex-situ* feeding sites in the Dublin area (i.e., Malahide Estuary SPA, Baldoyle Bay SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA, Dalkey Islands SPA and potentially The Murrough SPA). While there is one documented wintering bird site at the western end of the Proposed Scheme, namely Tymon Park, a major site (Scott Cawley Ltd., 2017), that is mapped as occupying a corner of Tymon park and adjacent open ground associated with the Spawell complex, no habitat loss will occur as there is no landtake required along the existing N81 Tallaght to Templeogue Road at this section. As the Proposed Scheme will not result in the loss of sites suitable to support breeding gull and wintering bird species.

Therefore, there is potential for impacts on SCI species associated with SPAs to occur as a result of habitat loss / fragmentation. Therefore, there is potential for in combination effects to occur.

Regarding the two raptor species for which Wicklow Mountains SPA is designated, according to the Scottish Natural Heritage Guidance (SNH 2016) during the breeding season the core foraging range for peregrine is estimated at 2km from the nest site, with the maximum recorded distance of 18km in Britain. Likewise, during the breeding season merlin are known to forage within 5km of the next site. Wicklow Mountains SPA lies approximately 11.7km south of the Proposed Scheme, which is well outside the typical foraging ranges for both peregrine and merlin. Therefore, likely significant effects on these two SCI bird species, as a result of ex-situ habitat loss / fragmentation, can be excluded.

A number of potential inland feeding sites within the footprint of the Proposed Scheme were surveyed to inform this assessment, these were located at land in close proximity to Bushy Park, namely CBC1012WB001 which overlaps with proposed Construction Compound TR3 along the R112 Springfield Avenue, CBC1012WB002 which is in amenity grassland to the immediate west of the Rathfarnham Road River Dodder Crossing and CBC1012WB003 which is located in Bushy park alongside the Templeogue Road.

Proposed Scheme will result in the loss of sites suitable to support breeding gull and wintering bird species at CBC1012WB001 for the duration of the Construction Phase. Therefore, there is potential for impacts on SCI species associated with SPAs to occur as a result of habitat loss / fragmentation. Therefore, there is potential for in combination effects to occur.

In respect of otter there were no otter breeding or resting places, holt or couch sites present within the Proposed Scheme boundary. Therefore, there will not be any loss of holt or couch sites as a result of construction works.

There will be no loss of Annex I habitats and or habitat supporting Annex II species for which European sites are designated for within the ZoI of the Proposed Scheme will not result in any direct loss or fragmentation of habitat by virtue of the location of the Proposed Scheme and its construction. In terms of otter, while the Proposed Scheme does cross the River Dodder and the Grand Canal, it does so at existing transport bridges and as such will not be subject to any instream works nor alteration to the territory currently occupied by otter. This includes Construction Compound TR1 which is located at the intersection of Wellington Land / Spawell crossing of the R137 Templeogue Road.

12.4.3.1.1.2 Habitat Degradation / Effects on QI / SCI Species as result of Hydrological Impacts

The Proposed Scheme is hydrologically connected to Dublin Bay via the River Dodder (Dodder _040 and 050), Owenadoher River (Owenadoher_010), Grand Canal and Liffey Estuary Lower as well as a network of interconnecting and established surface or combined sewer / surface water pipes that drain via London Bridge pumping Station to Ringsend WwTP before ultimately discharge into Dublin Bay. The release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during construction, or operation, has the potential to affect water quality in the receiving aquatic environment. It should be noted that a highly substantial event / events would be required to generate such quantities, which is not deemed likely. Such a potential pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and the accidental spillage and/or leaks of contaminants into receiving waters. This occurrence could happen at any time during construction but could potentially be exacerbated by the removal of vegetation. In the absence of mitigation, the associated effects of a reduction of

surface water quality could potentially extend for a considerable distance downstream of the discharge point or location of the accidental pollution event. Such an occurrence, of a sufficient magnitude, either alone or in combination with other pressures on water quality, could undermine the conservation objectives of the European sites downstream in Dublin Bay (i.e., North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA and Dalkey Islands SPA).

The Proposed Scheme is hydrologically connected to the River Dodder, via the drainage network as well as crossing it directly at two locations The R137 Tallaght Templeogue road intersection with Spawell and further downstream at Pierse Bridge along the Rathfarnham Road. The source of the River Dodder is in the Wicklow Mountains SAC which is located approximately 6.2km south (upstream). The proposed Scheme is also hydrologically connected to the Owenadoher River and Grand Canal and it crosses over the Grand Canal. Otter territories are within the range of 7.5km for females and 21km for males (Ó'Neill *et al*., 2009). Therefore, there is potential for otter associated with the Wicklow Mountains SAC to move downstream and to come within the ZoI of the Proposed Scheme. The remaining QIs for the SAC, namely Oligotrophic water containing very few minerals of sandy plains (Littorelletalia); Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and / or Isoteo-Nanojuncetea; Natural dystrophic lakes and ponds; Northern Atlantic wet heaths with *Erica tetralix*; European dry heaths; Alpine and Boreal heaths; Calaminarian grasslands of the Violetalia calaminaria; Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*[5]; Blanket Bogs (*if active bog); Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani); Calcareous rocky slopes with chasmophytic vegetation; and Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles do not occur within the ZoI of the Proposed Scheme. These habitats are located upstream of the Proposed Scheme and will not be subject to any hydrological impacts as a result of the Proposed Scheme.

A reduction in water quality as a result of an accidental pollution event (either alone or in combination with other pressures on water quality) however could result in the degradation of the local aquatic environment, which could in turn negatively affect the otter population through direct contact with pollutants or a decline in fish prey.

In a potential worst case scenario, the release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during construction, or operation, also has the potential to affect SCI bird species and QI mammal species that commute, forage and loaf in Dublin Bay i.e. birds associated with Skerries Islands SPA, Rockabill SPA and Lambay Island SPA, Ireland's Eye SPA, North Dublin Bay SPA, South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SPA, Malahide Estuary SPA, Rogerstown SPA, Dalkey Islands SPA, Murrough SPA, and marine mammals associated with Rockabill to Dalkey Island SAC and Lambay Island SAC. This reduction in water quality (either alone or in combination with other pressures on water quality) could result in the degradation of sensitive habitats present downstream, which in turn could negatively affect the SCI bird species that rely upon these habitats as foraging and / or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI and QI populations. In a worst-case scenario these potential impacts could occur to such a degree that the conservation objectives of the Skerries Islands SPA, Rockabill SPA and Lambay Island SPA, Ireland's Eye SPA, North Dublin Bay SPA, South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SPA, Malahide Estuary SPA, Rogerstown SPA, Dalkey Islands SPA, Murrough SPA, Rockabill to Dalkey Island SAC and Lambay Island SAC are undermined.

As the Proposed Scheme has the potential to result in habitat degradation and effects on the Qualifying Interest mammal (otter) and marine mammals / Special Conservation Interest species of European sites as the result of hydrological impacts, there is the potential for in combination effects to occur.

12.4.3.1.1.3 Habitat Degradation as a Result of Introducing / Spreading Non-Native Invasive Species

Ten areas of Japanese knotweed, Himalayan balsam and three-cornered garlic, species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations 2011, are present in close proximity to the Proposed Scheme (See Section 4.6.1). In the absence of mitigation, there is potential for these species to spread or be introduced, during construction and / or routine maintenance / management works, to terrestrial and habitat areas in European sites downstream in Dublin Bay (i.e., North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA). These in turn may result in the degradation of the

[5] The presence of an asterisk * indicates a Priority Annex I habitat as listed in Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC

existing habitats, in particular those habitats not permanently or regularly inundated by seawater, potentially outcompeting other native species and affecting species composition and physical structure of the habitat. Therefore, it is possible that the spread / introduction of non-native invasive species could undermine the conservation objectives of these European sites.

It is not considered possible that the listed non-native invasive species could spread to European sites that are located a considerable distance from the outfall locations of the Owenadoher River, Little Dargle, River Dodder Grand Canal, and Liffey Estuary Lower and separated by a large marine waterbody (i.e., Howth Head Coast SPA, Rockabill to Dalkey Island SAC, Lambay Island SAC, Ireland's Eye SPA, The Murrough SPA and Dalkey Islands SPA).

As the Proposed Scheme has the potential to result in habitat degradation of the Qualifying / Special Conservation interest species of European sites as the result of the spread of non-native invasive species, there is the potential for in combination effects to occur in association with other activities / plans / projects.

12.4.3.1.1.4 Disturbance and Displacement Impacts

There are no European sites within the immediate footprint of the Proposed Scheme or within the disturbance ZoI. There are a number of QI species known to occur within the vicinity of the Proposed Scheme. Refer to Section 12.4.3.4 for more details with regards to potential construction impacts on QI mammals.

There are a number of coastal SPAs located in relatively close proximity to the Proposed Scheme which are designated for SCI species that are known to forage and / or roost at inland sites, such as amenity grassland playing pitches i.e. Malahide Estuary SPA, Baldoyle Bay SPA, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA and Lambay Island SPA, as well as The Murrough SPA (a distant site outside the typical 20km range but nonetheless supporting light-bellied Brent geese and a number of other SCI species that are recorded from Dublin Bay). Suitable inland foraging / roosting sites, which these bird species utilise, are located within the potential ZoI of the Proposed Scheme (See Section 4.3). Therefore, there is potential for the Proposed Scheme to result in disturbance / displacement impacts on SCI populations associated with European sites.

Regarding the raptor species, for which Wicklow Mountains SPA are designated (i.e., merlin and peregrine), a study by Ruddock and Whitfield (2007), which included a review of previous studies in this area, offers no definitive distance after which disturbance to merlin is not significant but indicates that an upper limit of 300-500m may be sufficient in the case of breeding or nesting merlin. Likewise, a distance of 500-750m is likely to be sufficient for breeding peregrines. Adopting a precautionary approach, based on the available data regarding disturbance distances for merlin and peregrine, it can be concluded that disturbance to these bird species would be most likely to occur within 1km (i.e., the disturbance ZoI is 1km). There are no European sites within the disturbance ZoI; the next nearest European site to the Proposed Scheme is 4.3km away. There are also no habitat areas within the disturbance ZoI of the Proposed Scheme that support populations of the SCI species for which Wicklow Mountains SPA is designated. Considering the above, there is no potential for the Proposed Scheme to result in disturbance / displacement impacts on the SCI species for which Wicklow Mountains SPA is designated.

Although limited signs of kingfisher were recorded during field surveys of the Proposed Scheme, kingfisher, an Annex I bird species, is known to be present in the wider study area, in particular, along the River Dodder and the Grand Canal. Any kingfisher populations which are present in the vicinity of the Proposed Scheme are not considered to be associated with the SCI populations of any European site. Kingfisher territories can extend over approximately 3-5km of a river catchment (RSPB undated). The nearest SPA for which kingfisher has been designated is the River Boyne and Blackwater SPA, which is located approximately 38.7km away. Therefore, kingfisher present in the vicinity of the Proposed Scheme are not associated with an SPA population.

Signs of otter, an Annex II and IV mammal species, were recorded during multi-disciplinary field surveys of the Proposed Scheme, on the River Dodder and the Owenadoher River (where a confirmed holt was identified). Further surveys at likely watercourses supporting otter activity (based on desktop research and assessment of watercourse condition (culverted, supporting habitat, feed potential) returned a number of records for otter activity. The nearest SAC to the Proposed Scheme for which otter has been designated is Wicklow Mountains SAC which is located approximately 6.2km upstream, within the same WFD sub-catchment.

Research carried out by Ó'Néill *et al,.* (2009) on ranging behaviours of otter on river systems in Ireland found that female otter ranges averaged 7.5km while male otter home ranges varied up to 21km.). The Proposed Scheme crosses over the River Dodder at two location and the Grand Canal at one location on existing road bridges and interacts with the following watercourses via the surface water drainage network: Little Dargle, Owenadoher, River Dodder, Grand Canal, and Liffey Estuary Lower. Whilst these watercourses lie within the typical territorial ranges of otters, only the River Dodder and the Owenadoher River as a tributary shares a hydrological connection to the Wicklow Mountains SAC. The Tallaght section of the Proposed Scheme also lies within the same sub-catchment as Wicklow Mountains SAC (Dodder_SC_010 sub-catchment). Notwithstanding the limited interaction between Construction Compound TR1 and the River Dodder, it cannot be excluded that the otter population in the vicinity of the Tallaght section of Proposed Scheme is associated with the Wicklow Mountains SAC population. Therefore, disturbance and displacement impacts on the QI otter population for Wicklow Mountains SAC, as a result of the Proposed Scheme, cannot be excluded.

However, no significant impacts e.g., habitat severance or barrier effects, on otter are predicted as a result of disturbance / displacement from the Proposed Scheme for the following reasons:

- Notwithstanding the fact that the Proposed Scheme crosses two watercourses (The River Dodder and Grand Canal for which otter are known to inhabit, the adjacent Owenadoher River flows into the Dodder and is hydrologically connects to the Proposed Scheme via surface water drainage network. However, the corridor is a pre-existing national road into Dublin City. Otter are known to commute and reside nearby these areas and as such are likely to be tolerant to traffic noise and other human related noise and disturbance.
- The nature of the works proposed in the vicinity of the Dodder crossing and Grand Canal. The main works required in these areas include new road markings and signage, traffic signal installation construction of a bus interchange building, construction of a public realm plaza, carriageway and pavement resurfacing, kerb build outs and traffic island construction / removal, landscaping and utility diversions, all of which should not impede otter along the aquatic corridors running under the existing road bridges.

Although marine mammals associated with European sites may commute and forage within the Liffey Estuary (to which both the River Dodder and the Grand Canal discharge downstream of the Proposed Scheme) and Dublin Bay, it is not considered to be likely that there will be any impacts on these species as a result of the Proposed Scheme as it terminates inland in a highly urbanised environment at Lord Edward Street, which is upstream of Dublin Bay, in a highly urbanised environment. The scale of upstream works proposed are considered to be minor. that there will be no disturbance / displacement impacts on marine mammals as a result of the Proposed Scheme.

Refer to Section 12.4.3.5.2 for more details with regards to potential impacts on wintering bird species, which encompass all relevant SCI bird species.

As the Proposed Scheme has the potential to result in the disturbance / displacement of the Qualifying / Special Conservation Interest species of any European site, there is the potential for in combination effects to occur in association with other activities / plans / projects.

12.4.3.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

In In the case of NHAs and pNHAs the assessment considers whether the integrity of any such site would be affected by the Proposed Scheme with reference to the ecological features for which the site is designated or is proposed for designation.

Considering the ZoI of the Proposed Scheme, in the absence of mitigation measures the Proposed Scheme has the potential to have a likely significant effect upon the following one NHA and 15 pNHAs:

- Skerries Island NHA [001218].
- Grand Canal pNHA [002104];
- Dodder Valley pNHA [000991]
- Booterstown Marsh pNHA [001205];
- North Dublin Bay pNHA [000206];

- South Dublin Bay pNHA [000210];
- Dolphins, Dublin Docks pNHA [000201];
- Dalkey Coastal Zone and Killiney Hill pNHA [001206];
- Howth Head pNHA [000202];
- Baldoyle Bay pNHA [000199];
- Ireland's Eye pNHA [000203];
- Malahide Estuary pNHA [000205];
- Portraine Shore pNHA [001215];
- Rogerstown Estuary pNHA [000208];
- Lambay Island pNHA [000204; and]
- The Murrough pNHA [000730].

The locations of these designated areas for nature conservation relative to the Proposed Scheme are shown on Figure 12.4 in Volume 3 of the EIAR.

The potential effects on European sites arising from the Proposed Scheme, described above in Section 12.4.3.1.1.1, may also negatively affect the pNHA and NHA sites located within the boundaries of these European sites. These pNHAs are primarily designated for similar reasons. The Proposed Scheme also has the potential to affect biodiversity in a broader sense than just the QIs / SCIs of those European sites. Where biodiversity receptors in these pNHAs or NHAs do not form part of the QIs / SCIs in the Natura Impact Statement (NIS) assessment, they are considered under the other individual impact assessment headings for each KER below. Potential impacts arising from the Proposed Scheme on these pNHA sites would result in a likely significant negative effect at a national geographic scale.

The assessment of potential impacts arising from the Proposed Scheme on the Grand Canal pNHA and Dodder Valley pNHA, include habitat loss and fragmentation, habitat degradation as a result of surface water quality effects, habitat degradation as a result of air quality effects and the spread of non-native invasive species (see Section 12.4.3.2), effects on rare and protected plant species (see Section 12.4.3.3), and negative effects on the protected fauna species associated with these sites such as mammals, riparian birds, and fish species (see Section 12.4.3.4, Section 12.4.3.5 and Section 12.4.3.6).

12.4.3.1.2.1 Habitat Loss and Fragmentation

The Proposed Scheme will not result in any direct impacts to the Grand Canal pNHA, although it crosses the Proposed Scheme at La Touche Bridge. The works proposed in this area are very limited, the existing La Touche Bridge structure will be retained in its current form, however the traffic lanes, footpaths and cycle paths will be reconfigured. New kerbs will be installed and pavement resurfacing works will be required over the bridge deck . There will be no land take required from within the pNHA boundary that is not already occupied by the existing transport corridor.

The Proposed Scheme is located approximately 335m south-west of the Dodder Valley pNHA, as such there will be no land late as a result of the Proposed Scheme.

The Proposed Scheme will not result in any habitat loss or fragmentation effects on the Grand Canal pNHA or Dodder Valley pNHA and therefore no significant effects, in that regard, are predicted.

12.4.3.1.2.2 Habitat Degradation – Surface Water Quality

During the Construction Phase, contaminated surface water runoff and / or an accidental spillage or pollution event directly into the Grand Canal, and to a lesser extent, the Dodder Valley pNHA, has the potential to have a significant negative effect on water quality and consequently affect aquatic and wetland habitats in the receiving environment. The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, large extents of the Grand Canal pNHA and Dodder Valley pNHA. It is considered unlikely that a pollution event of such a magnitude would occur during construction, or if it did occur, it would be temporary in nature. Nevertheless, a precautionary approach has been adopted in the assessment of potential risk of impacts on water quality.

Consequently, detailed mitigation measures are required to further minimise the risk of contaminated surface water runoff and / or an accidental spillage or pollution events having any perceptible effect on water quality during construction of the Proposed Scheme.

12.4.3.1.2.3 Habitat Degradation – Groundwater

The potential for hydrogeological impacts are highly variable depending on the nature of the proposed works at specific locations and the receiving environment ground conditions. Any drawdown from excavation associated with the Proposed Scheme is expected to be limited, localised, and temporary, they are not expected to extend to any pNHA site however cannot be excluded.

In the absence of mitigation, there is a risk of pollutants entering the groundwater as a result of spillages or accidents, and in such circumstances, this would constitute a significant effect on the Dodder Valley pNHA. Therefore, mitigation measures, as described in Section 12.5.1.2.3 are required to address this potential impact.

12.4.3.1.2.4 Habitat Degradation as a Result of Introducing / Spreading Non-Native Invasive Species

Three non-native invasive plant species listed on the Third Schedule of the Birds and Habitats Regulations, 2011 were identified adjacent to, but outside of the Proposed Scheme; Japanese knotweed, Himalayan balsam and three-cornered garlic. In the absence of mitigation, there is some potential for this species to spread or be introduced, during the Construction Phase to the Grand Canal pNHA and Dodder Valley pNHA, or in a worst scenario, to downstream pNHA sites in Dublin Bay (i.e., North Dublin Bay pNHA and South Dublin Bay pNHA).These in turn may result in the degradation of the existing habitats, in particular those habitats not permanently or regularly inundated by seawater, in the case of pNHAs located within Dublin Bay, potentially outcompeting other native species and affecting species compositive and physical structure of the habitat. Therefore, it is possible that the spread / introduction of non-native invasive species could affect the integrity of the Grand Canal pNHA and pNHA sites in Dublin Bay.

It is not considered possible that the listed invasive species could spread to pNHA sites that are located a considerable distance from the Proposed Scheme and separated by a large marine waterbody (i.e., Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA and Baldoyle Bay pNHA).

As the Proposed Scheme has the potential to result in habitat degradation in downstream pNHA sites as the result of the spread of non-native invasive species, there is the potential for in combination effects to occur in association with other activities / plans / projects.

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1).

12.4.3.1.2.5 Habitat Degradation – Air Quality

Dust Emissions

Dust emissions associated with construction works could, in extreme circumstances, affect adjoining habitats, potentially burying sensitive habitats or plant species (e.g., opposite leaved pondweed, is known to occur in the Grand Canal pNHA and the Dodder Valley pNHA largely consists of riparian woodland). Best practice construction methodologies and mitigation measures have been designed to minimise construction generated dust and to contain it within the Proposed Scheme boundary. Mitigation measures in respect of managing construction dust are provided in Section 7.5.1 of Chapter 7(Air Quality)Chapter 7 (Air Quality).

Vehicle Derived Emissions

During the Construction Phase of the Proposed Scheme, emissions from car exhausts, and the deposition of particulate matter (PM) and heavy metals produced by engine, brake and tyre wear of construction vehicles, can contribute to increased deposition of pollutants such as oxides of nitrogen (NOx, NO_2) and PM in the vicinity of a road carriageway. This can affect the ecosystems and vegetation present, influencing plant growth rates and species composition, diversity, and abundance.

The current understanding of air quality impacts from roads and their interaction / effects on ecology are set out in the TII guidance document Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (NRA 2011) and three UK reports: The Ecological Effects of Diffuse Air Pollution from

Road Transport (Bignal *et al.,* 2004), The Ecological Effects of Air Pollution from Road Transport: An Updated Review (Natural England 2016), and Advice on Ecological Assessment of Air Quality Impacts (CIEEM 2021).

An assessment of the impact of the Proposed Scheme has been undertaken using the approach outlined in the IAQM guidance document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM 2020). The Proposed Scheme will cross the Grand Canal pNHA and associated haul routes will operate within 200m of the Dodder Valley pNHA.

Vehicle-derived air emissions were modelled during the Construction Phase along the Proposed Scheme at the Grand Canal pNHA (La Touche Bridge) crossing as well as several crossing points outside of the Proposed Scheme, e.g. Grand Canal pNHA (Canal Road, Charlemont Bridge, Charlemont Mall, Cheltenham Place, Dartmouth Walk, Emmet Bridge, Grand Parade, Grove Road, Leeson Bridge, Mespil Road, and Parnell Road) (refer to Section 7.4.3.3.4 of Chapter 7 (Air Quality) for details). The worst-case predicted annual average NO_x concentrations at various distances from the proposed road edge exceed the 30µg / m^3 limit value. In all cases where exceedances occur, the baseline environment is already in excess of this value. During the construction year of the Proposed Scheme, annual mean NO_x concentrations are predicted to result in an imperceptible change at Dodder Valley pNHA (M50 and Tallaght Road) (<0.1 µg / m^3 and -0.1 3µg / m^3 change) and remain unchanged at the proposed Grand Canal crossing point (La Touche Bridge) (0.0 µg / m^3 change). Associated haul routes / diverted traffic impacts to the Grand Canal pNHA were also assessed. The worst-case predicted annual average NO_x concentration increases vary between -0.1 µg / m^3 and 0.1 µg / m^3 change. During the construction phase of the Proposed Scheme, the ecological impacts associated with the Construction Phase traffic emissions are overall negative, slight and short-term. Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1).

The contribution of the construction phase of the Proposed Scheme to the NO_2 dry deposition rate was modelled at the Dodder Valley pNHA and Grand Canal pNHA. Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Grand Canal pNHA and Dodder Valley pNHA. These include canals (FW3), dry meadow / grassy verges (GS2), reed and large sedge swamps (FS1), and riparian woodland (WN5). The Dodder Valley pNHA site will be below the lower critical load of inland and surface water habitats of 5-10 Kg(N) / ha / yr (National Road Authority 2011) at the M50, however will exceed this at Tallaght Road. The future baseline NO_2 dry deposition rate is 5.47 kg(N) / ha / yr which is modelled to increase to 5.49 kg(N) / ha / yr. This is a very slight increase and is predicted to decrease to beneath the 5-10 Kg(N) / ha / yr critical load at 10m from the road edge, as such, harmful effects are not predicted.

The proposed Grand Canal pNHA crossing point is above the lower critical load of inland and surface water habitats of 5-10 Kg(N) / ha / yr (National Road Authority, 2011). The increases in the NO_2 dry deposition rate are modelled at 0.01 Kg(N) / ha / yr. This is a very slight increase and is predicted to decrease to beneath the 5-10 Kg(N) / ha / yr critical load at 10m from the road edge, as such, harmful effects are not predicted.

The Proposed Scheme is located within a highly urbanised locality with significant development in the surrounding area. It is likely that barrier effects may therefore limit the geographical extent of deposition, Tong *et al.,* (2016) identified the effectiveness of vegetative barriers as reducers of airborne Particulate Matter. They found that the most effective combination to reduce the pollutant escape is wide barriers with high leaf area density combined with solid barriers. The Proposed Scheme is unlikely to significantly change from existing urban environment in terms of the annual mean PM10 and PM2.5 concentrations at all modelled receptors (refer to Section 7.4.3.3.2 Chapter 7 (Air Quality) for details), therefore, impacts on vegetation within the pNHAs from particulate metals or heavy metals are not likely.

12.4.3.2 Habitats

This Section assesses the potential effects of the Proposed Scheme on habitats. In terms of quantifying the magnitude of effects on habitats, the estimated percentage of the local habitat resource being affected is based upon the total area of a given habitat type that was recorded within the study area of the Proposed Scheme. This provides some local context as to the magnitude of the habitat loss and whether the impact is significant or not, and at what geographic scale.

12.4.3.2.1 Habitat Loss and Fragmentation

The construction of the Proposed Scheme will result in habitat loss across its length. This occurs in the form of permanent land take of edge habitats adjacent to the existing road network, or as temporary land take to facilitate construction activities including the emplacement of Construction Compounds.

The Proposed Scheme proceeds as far as the R137 Dame Street. While there is no extension of the Proposed Scheme beyond Dame Street, a hydrological connection to the Liffey Estuary Upper, south of Wellington Quay, exists by virtue of existing drainage network from the Dame Street area. As the Proposed Scheme only proceeds as far as Dame Street and does not cross the River Liffey, the Liffey Estuary Upper will not be directly affected by the Proposed Scheme and therefore there is no potential for significant negative effects at any geographic scale on the Liffey Estuary.

The habitat type canals (FW3) may be affected by the Proposed Scheme. This habitat type is considered to be of National Importance. The Grand Canal will be traversed by the Proposed Scheme at La Touche Bridge, Charlemont. It is not considered likely that the proposed scheme will interact with the Grand Canal by virtue of the fact that this is an existing road crossing and that no Surface Water Outflows (SWOs) discharge to the Grand Canal. Therefore, there will be no permanent loss of this habitat type as a result of the Proposed Scheme. Therefore, there is no potential for significant effects at any geographic scale.

The habitat type depositing / lowland rivers (FW2) may be affected by the Proposed Scheme. This habitat type is considered to be of Local Importance (Higher Value). The River Dodder and Owenadoher River lie in close proximity to the Proposed Scheme, which will interact with these watercourses by virtue of the fact that surface water discharges from the Proposed Scheme, including surface water runoff during construction, will drain to these watercourses. In addition, the River Dodder is crossed by the Proposed Scheme at Pearse Bridge, Rathfarnham. There will be no permanent loss of this habitat type as a result of the Proposed Scheme. Therefore, there is no potential for significant effects at any geographic scale.

A number of habitat types considered to be of Local Importance (Higher Value) will be lost as a result of the Proposed Scheme. These include relatively small areas of (mixed) broadleaved woodland (WD1), scattered trees and parkland (WD5), hedgerow (WL1), and treeline (WL2) habitats. The overall total areas of the habitat types which overlaps with the Proposed Scheme boundary and be directly lost as a result of the construction of the Proposed Scheme is provided in Table 12.14. It should be noted that the extent of tree loss is calculated across the length of the Proposed Scheme and is captured under treelines (WL2) as the majority of habitat loss affects this habitat type. However small numbers of these trees may be lost from the habitat classification (mixed) broadleaved woodland (WD1). This distinction is considered in the habitat loss impact assessment. The permanent loss of such habitat types which are considered to be of Local Importance (Higher Value) has the potential to affect the conservation status of each of these habitat types and, therefore, result in a significant negative effect at the local geographic scale.

The remaining areas within the footprint of the Proposed Scheme comprise of habitats considered to be of a Local Importance (Lower Value). These include, improved amenity grasslands (GA2), dry meadows and grassy verges (GS2), wet grassland (GS4), planted flowers beds (BC4), ornamental / non-native shrub (WS3), areas of disturbed ground (ED2), scrub (WS1) and hard standing (BL3). These habitats are located next to existing urban development, and as such are highly disturbed. With the exception of the temporary loss of 0.455ha of GA2 habitat for the TR3 Construction Compound, habitat loss will consist of small, isolated sections adjacent to the existing road infrastructure. The overall total area of these habitat types which overlaps with the Proposed Scheme boundary and will potentially be lost as a direct impact during construction of the Proposed Scheme is not considered to be significant at any geographical scale.

The various KER habitat types affected and corresponding total areas which overlap with the Proposed Scheme boundary are summarised in Table 12.14. These calculations include all KER habitat areas within the Proposed Scheme boundary, as the possibility of areas within the Proposed Scheme boundary but outside of the footprint of the Proposed Scheme itself being affected by construction activities cannot be ruled out. KERs highlighted in blue will be subject to direct habitat loss as a result of the Proposed Scheme.

Habitat loss may also lead to habitat fragmentation, i.e., creating new divisions of existing habitat blocks and / or contributing to an existing trend of fragmenting semi-natural habitat blocks; however, considering the habitat types to be lost, their extents and the surrounding habitats beyond the Proposed Scheme boundary, this potential impact will not result in a significant effect at any local geographic scale.

The mitigation measures that have been designed to avoid or reduce the effects of direct impacts to habitats are in Section 12.5.1.

Table 12.14: Extent of KER habitat types within the Proposed Scheme

Habitat Type	Extent of permanent habitat loss	Extent of temporary habitat loss
National Importance		
Canal (FW3)	0.0003ha	0m
Local Importance (Higher Value)		
Depositing / lowland rivers (FW2)	0m	0m
Mixed broadleaved woodland (WD1)	Approximately 0.3ha	Approximately 0.1ha
Scattered trees and parkland (WD5)*	Approximately. 0.005ha	Approximately. 0.008ha
Hedgerows (WL1)	Approximately 0.15ha	Approximately 0.004ha
Treelines (WL2)	Approximately 0.08ha	Approximately 0.1ha

KERs highlighted in blue will be subject to direct habitat loss as a result of the Proposed Scheme.

*Extent of habitat removal refers to parkland only, tree loss is captured under Treeline (WL2) habitat code

12.4.3.2.2 Habitat Degradation – Surface Water Quality

During construction, possible contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water feature has the potential to have significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, the downstream habitats of the Liffey Estuary Upper and Lower and Dublin Bay coastal water bodies could also be affected.

It is unlikely that a pollution event of such a magnitude would occur during construction or if it did occur, it would be temporary in nature. Nevertheless, a precautionary approach has been adopted in the assessment of potential risk of impacts on water quality. Consequently, detailed mitigation measures are proposed to further minimise the risk of contaminated surface water runoff and / or an accidental spillage or pollution event of the Proposed Scheme having any perceptible effect on water quality during construction.

Construction works in close proximity to the River Dodder, Owenadoher River, the Grand Canal pNHA, Liffey Estuary Upper or existing surface water drainage infrastructure hydrologically connected to these watercourses, could possibly result in generated silt / sediment being released into these surface water features and in a worst-case scenario, potentially being transferred downstream including, potentially, into downstream transitional and coastal water bodies. Cement based products used in the Construction Phase of the Proposed Scheme (e.g., concrete and / or bentonite which are highly corrosive and alkaline materials), if released into the surface water network may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality at a local geographical scale and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, transitional and coastal habitats downstream, in the Liffey Estuary Lower, and Dublin Bay, could also be affected.

Habitat degradation as a consequence of construction effects on surface water quality has the potential to affect the conservation status of the Liffey Estuary Upper and Liffey Estuary Lower) and the Grand Canal pNHA. Similarly, Annex I habitats contained in European sites in and around Dublin Bay could also be affected and therefore, effects on surface water quality have the potential to result in a significant negative impact at a national scale, in the case of the aquatic / wetland Annex I and pNHA habitats located within the ZoI of the Proposed Scheme.

The mitigation measures that have been designed to avoid or reduce the potential impacts of the Proposed Scheme on surface water quality are presented in Section 12.5.1.

12.4.3.2.3 Habitat Degradation – Hydrological Regime

During the Construction Phase, the potential for temporary disruption to local drainage systems and hydrological regimes have been assessed in relation to the Proposed Scheme. This is not predicted to result in a likely significant negative effect on any aquatic habitats or species through effects on the hydrological regime (for more detail refer to Chapter 13 (Water)). In addition, and as detailed in the Construction and Environmental Management Plan (CEMP) for the Proposed Scheme (Appendix A5.1 in Volume 4 of this EIAR), specific controls / mitigation measures have been identified for implementation to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase.

12.4.3.2.4 Habitat Degradation – Groundwater

Any effects on the existing hydrogeological baseline supporting wetland habitats, has the potential to negatively affect habitat extent and distribution, and vegetation structure and composition. The potential effects upon the existing hydrogeological regime are not necessarily limited to habitats within the Proposed Scheme boundary but can be far-reaching, with significant negative long-term effects. As discussed in Chapter 14 (Land, Soils, Geology & Hydrogeology), the Proposed Scheme may involve the excavation of potentially contaminated ground, result in damage to the aquifer, or change the existing groundwater regime.

Groundwater dependent habitats were not identified in close proximity to the Proposed Scheme, therefore any potential impacts as a result of the Proposed Scheme arise with the interaction between groundwater and surface water.

It is predicted that while there may be no direct impact on the groundwater regime, there is potential for indirect impacts associated with the Proposed Scheme through surface water interaction (e.g., pumping). Given that pumping (if any) is expected to be limited and localised and temporary, the magnitude of this impact is considered negligible.

As detailed in the Construction Environmental Management Plan (CEMP) for the Proposed Scheme (Appendix A5.1 in Volume 4 of the EIAR), specific controls / mitigation measures have been prepared, i.e., surface water management plan (SWMP) including pollution control measures which will be put in place to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase.

12.4.3.2.5 Habitat Degradation – Air Quality

As discussed in Chapter 7 (Air Quality), the Proposed Scheme has the potential to generate dust during construction works which could affect vegetation in habitat areas adjacent to the Proposed Scheme.

The mitigation measures to control dust emissions during the Construction Phase are outlined in Chapter 7 (Air Quality) and Appendix A5.1 – CEMP in Volume 4 of this EIAR. These include standard measures to control nuisance dust such as inspection and cleaning of public roads, measures for stockpiling of materials within construction compounds, water misting / spraying, vehicle coverings, and hoarding around the construction compound.

Air quality modelling of NO_x concentrations, and deposition rates, were modelled for the Construction Phase of the Proposed Scheme at distances up to 200m from the proposed road development (refer to Chapter 7 (Air Quality) for details). The results from the Air Quality modelling deem the ecological impacts of the Proposed Scheme, with regards air quality, to be overall negative, slight and short-term. As such harmful effects on vegetation from these emissions are not likely.

12.4.3.2.6 Habitat Degradation – Non-native Invasive Plant Species

Planting, dispersing, or allowing / causing the dispersal, spread or growth of certain non-native plant species (and / or vector material such as soil that is contaminated with these non-native species) is controlled under regulation

49 of the (Birds and Natural Habitats) Regulations and refers to plant or animal species listed on the Third Schedule of those regulations (see also Section 12.3.7).

The accidental spread of such non-native invasive plant species as a result of construction works has the potential to impact on terrestrial as well as riparian/ aquatic habitats, potentially affecting plant species composition, diversity and abundance over the long-term. This is not only confined to habitats immediately adjacent to the footprint of the Proposed Scheme but includes habitat areas along the network of proposed haul routes associated with the Proposed Scheme (Figure 12.6 in Volume 3 of this EIAR).

The effects of introducing such non-native invasive plant species to highly sensitive and ecologically important habitat areas (e.g., designated area for nature conservation or areas of Annex I habitat) have the potential to result in a likely significant negative effect, at geographic scales ranging from local to international.

There were three non-native invasive plant species listed on the Third Schedule of the Birds and Habitats Regulations, 2011 which was identified along the Proposed Scheme; Japanese knotweed*,* Himalayan balsam *and* three-cornered garlic*.* The locations of this non-native invasive plant species is summarised above in Table 12.7 and shown on Figure 12.6 in Volume 3 of the EIAR.The desktop study revealed records for the following species in close proximity to the Proposed Scheme; Himalayan balsam, Japanese knotweed, Nuttall's waterweed, water fern, bohemian knotweed, three-cornered garlic, giant-rhubarb, American skunk cabbage, giant hogweed and Himalayan knotweed, as well as Canadian waterweed, which has been removed from the list of Third Schedule species.

During the interim between the original non-native invasive species surveys and commencement of construction, it is possible that newly established Third Schedule non-native invasive species may become established within the footprint of the Proposed Scheme.

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1).

12.4.3.3 Rare and Protected Plant Species

12.4.3.3.1 Habitat Loss

No protected plant species listed on the Flora Protection Order were recorded within the Proposed Scheme, however, opposite-leaved pondweed was recorded in close proximity to the Proposed Scheme at La Touche Bridge, Portobello. The desk study revealed records of two species listed on the Flora Protection Order, opposite-leaved pondweed and wood bitter-vetch, within 1km of the Proposed Scheme.

Of these, only one species, listed as 'Vulnerable' within Ireland (Wyse Jackson *et al.,* 2016) was recorded in close proximity of the Proposed Scheme (opposite-leaved pondweed). Green flowered helleborine *Epipactis phyllanthes,* listed as 'Endangered' on Ireland's Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al*., 2016), was recorded adjacent to the River Dodder at Pearse Bridge, Rathfarnham in 2022. This species was recorded within the habitats hydrologically connected to, but outside of the immediate footprint of the Proposed Scheme.

Other species noted in Section 12.3.6 were recorded outside the footprint of the Proposed Scheme. There is no potential for direct impacts on any of these species to occur as a consequence of the Proposed Scheme.

12.4.3.3.2 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora Protection Order were recorded within the Proposed Scheme during field surveys. However, the desk study returned records of the Flora Protection Order species opposite-leaved pondweed from the Grand Canal, as well as wood bitter-vetch along the River Dodder. The Red listed 'Endangered' green flowered helleborine was also recorded in close proximity to the Proposed Scheme along the River Dodder and is also hydrologically connected to the Proposed Scheme via the River Dodder.

Opposite-leaved pondweed may lie dormant in sediments for many years until conditions become suitable for regrowth. The construction of the Proposed Scheme, in the absence of mitigation, has the potential to result in

impacts on the surface water quality of the Grand Canal and River Dodder, through contamination with construction related run-off or accidental spillages (i.e., runoff of sediment / accidental spillages of harmful substances such as hydrocarbons/ cementitious materials etc). Impacts on the quality of surface water within the canal or River Dodder could affect the possible establishment of populations of opposite-leaved pondweed or green flowered helleborine present in the vicinity of the Proposed Scheme.

In the absence of mitigation, habitat degradation of the Grand Canal or River Dodder as a consequence of construction stage impacts on surface water, and the potential knock-on impacts this could have on the protected species opposite-leaved pondweed and 'Endangered' species green flowered Helleborine, is likely to be significant at the County to National geographic scale.

12.4.3.4 Mammals

12.4.3.4.1 Bats

12.4.3.4.1.1 Roost Loss

There are no confirmed bat roosts located within the footprint of the Proposed Scheme. Twelve trees with Potential Roosting Features (PRFs) were identified within the footprint of the Proposed Scheme as detailed in Section 12.3.8.1.8. Four of these trees, two sycamores, one oak and one yew, will be removed to facilitate the construction of the Proposed Scheme. The Proposed Scheme will not result in the loss of any known breeding / resting sites for any bat species, however, it will result in the removal of potential roost sites in the form of the above mentioned four PRF trees. Therefore, in the absence of mitigation, there is potential for the felling of these trees to result in direct harm and pose a mortality risk to bats, should bats be present in the trees at the time of felling. This could result in a significant effect on the conservation status of bats at the local geographic level.

12.4.3.4.1.2 Habitat Loss as a result of Fragmentation of Foraging / Commuting Habitat and Commuting Routes

Bats rely on suitable semi-natural habitats which support the insect prey upon which they feed. The Proposed Scheme will result in the loss of such habitats used for feeding by all bat species recorded in the study area.

Suitable habitat for foraging and / or commuting bats within the footprint of the Proposed Scheme includes hedgerows and treelines, mixed broadleaved woodland, rivers, areas of parkland, and open grassland. The area of the habitats which will be lost as a result of the Proposed Scheme is provided in Table 12.14 and shown in the Landscape General Arrangement drawings (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-0001 to 0037) in Volume 3 of the EIAR. This is not deemed significant, considering the extent of habitat loss, their location (adjacent to existing artificially lit roads in a generally highly disturbed urban environment) and the presence and relative abundance of other similar habitats in the wider locality, which will not be impacted by the Proposed Scheme. The Proposed Scheme will not result in any loss along the water courses. In assessing the impacts of habitat loss as a result of fragmentation of foraging / commuting habitat on bat populations, consideration was given to a species Core Sustenance Zone (CSZ). A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the '*resilience and conservation status'* of the colony using the roost. Bat Conservation Trust Guidance (Bat Conservation Trust 2016) states that:

"*With reference to planning and development the core sustenance zone is: The area surrounding the roost within which development work can be assumed to impact the commuting and foraging habitat of bats using the roost, in the absence of information on local foraging behaviour. This will highlight the need for species-specific survey techniques where necessary; and; The area within which mitigation measures should ensure no net reduction in the quality and availability of foraging habitat for the colony, in addition to mitigation measures shown to be necessary following ecological survey work*."

There is evidence of bats foraging and commuting within the study area of the Proposed Scheme, particularly along the River Dodder at Pearse Bridge in Rathfarnham (CBC1012BT002) and adjacent Bushy Park (CBC1012BT003). All parts of the Proposed Scheme which contain suitable habitat are likely to be within the CSZ of at least one bat roost. Considering the type of works proposed (e.g., upgrading of existing infrastructure for the most part), there is limited potential for the Proposed Scheme to act as a barrier to flight paths for bat species, as there will be no major changes to pre-existing habitats along most of the route.

The Proposed Scheme will result in loss and / or fragmentation of existing habitat used by local populations of commuting / foraging bats. Fragmentation of feeding habitat has the potential to disturb normal bat behavioural patterns, and thus adversely affect the ability of local bat populations to persist and reproduce, impacting on their local distribution and/or abundance. The barrier effect can manifest itself as soon as the site clearance phase commences and the barrier itself is in the form of the cleared lands. The Proposed Scheme will result in the removal/ fragmentation of small areas / strips of woodland, amenity grassland, scattered trees and parkland, treelines and hedgerows which could all be used by local bats. These habitats constitute a landscape feature which could be used by foraging / commuting bats and their loss, will result in a reduction of foraging / commuting habitat for local bats in this area.

Proposed works along the boundary of Rathfarnham Castle, comprising the relocation of the boundary wall, will result in the removal of the outermost section of mixed woodland (WD1) at this location. Habitats such as mixed woodland, may be used by foraging and commuting bats in the area. Given the peripheral nature of the section of woodland to be removed here and considering the extent of this habitat which will be retained, this will not result in any significant impact on local bat species.

Removal of suitable habitat for foraging and/commuting bats within the footprint of the Proposed Scheme is calculated as approximately 2.6ha. Habitat removal is within a highly disturbed urban environment with low numbers of species records, and, as such is not deemed to provide significant contributions to core sustenance zones of roosts outside of the footprint of the Proposed Scheme. The effect of habitat fragmentation and barrier effect associated with the construction of the Proposed Scheme is therefore considered to be significant at the local level only.

12.4.3.4.1.3 Installation of Temporary Working and Construction Compound Lighting which May Cause Direct / Indirect Disturbance of Flight Patterns

Construction Compounds are proposed in the following six locations:

- Construction Compound TR1 will be located south of the Spawell roundabout, at the Tallaght Road / Spawell Link Road junction;
- Construction Compound TR2 will be located north-west of Terenure Road North, between Eaton Road and Eagle Hill Avenue;
- Construction Compound TR3 will be located along Dodder View Road, across the road from Bushy Park, in the greenfield area between Dodder View Road, Woodview Cottages and Church Lane;
- Construction Compound TR4 will be located on Military Road, perpendicular to Rathmines Road Lower, south of St Marys College;
- Construction Compound TR5 will be located on Richmond Street South, on the slip road between Richmond Street South and Harcourt Road; and;
- Construction Compound TR6 will be located on Spawell Link Road, between Spawell Roundabout and Firhouse Road.

Security lighting will be installed in these compounds for the duration of construction (i.e., 24 months), thereby temporarily increasing the level of artificial lighting in this area. Artificial lighting within suitable habitat may result in avoidance behaviour by bats, and could prevent bats from accessing foraging areas or roosts and / or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Given the urban - suburban setting of these proposed Construction Compounds, bats in the area would be habituated to some level of artificial lighting. Provided security lighting does not involve high intensity lighting (e.g., floodlighting) the impact of increased artificial lighting at Construction Compounds is considered to be significant at the local level only.

The bulk of the construction works along the Proposed Scheme will typically be undertaken during normal daylight working hours, although it is recognized that some elements of night-time work may be required. The bulk of the existing corridor is largely illuminated by regularly spaced lighting columns for much of its length and therefore the requirement for lighting to accommodate construction works during night-time will be limited, in areas where existing light levels are low and of short duration. The effect of the additional lighting is therefore considered to be significant at a local level only and temporary.

12.4.3.4.2 Badger

Multi-disciplinary surveys recorded evidence of badger within the vicinity of the Proposed Scheme. Badger activity is highest within green spaces did not confirm any badger setts or evidence of badger within the footprint of the Proposed Scheme.

Although it cannot be predicted if badger will establish new setts within the ZoI of the Proposed Scheme before construction works commence, it is a possibility, and therefore this scenario has been taken into account in the mitigation strategy (refer to Section 12.5.1).

12.4.3.4.2.1 Mortality / Direct Injury

The green areas surrounding the River Dodder and Owenadoher River are known to support badger populations, as such, badger are likely to forage and commute within the ZoI of the Proposed Scheme. Uncovered deep excavations could be potentially hazardous for badger commuting / foraging in the area. Badger could fall into these excavations, becoming trapped and potentially hurt and distressed. This may result a likely significant negative effect, at the local geographic scale.

12.4.3.4.2.2 Loss of Foraging Habitat and Breeding / Rest Sites

There were no badger setts located within the footprint of the Proposed Scheme as recorded during surveys of accessible lands; therefore, there is no potential for the permanent loss of any badger sett to occur.

Construction may result in the permanent loss of 3.6ha (hectares) of suitable foraging / commuting habitat for badgers (e.g., amenity grassland (GA2), scattered trees and parkland (WD5), dry meadows and grassy verges (GS2), scrub (WS1), mixed broadleaved woodland (WD1) and hedgerows (WL1) / treelines (WL2)). In addition, the provision of construction compounds for the duration of the Construction Phase will result in the temporary loss of 1.3ha of amenity grassland (GA2) habitat, which could be used by commuting / foraging badgers. Given the relative abundance of suitable habitat in the wider vicinity (e.g., amenity grassland (GA2) within Tymon Park, Castle Golf Course, Terenure College Grounds, and greenspace surrounding the River Dodder both upstream and downstream of the Proposed Scheme, the temporary loss of these habitats is not considered significant at any geographic scale.

Permanent habitat removal will be largely adjacent to pre-existing roads / paths and will be limited to 2m linear sections of amenity grassland, existing hard surfaces, scattered trees and parkland and roadside woodland / treelines / hedgerows, within a highly disturbed urban environment. These areas of habitat removal are not likely to provide significant foraging habitat for the local badger population. Therefore, the Proposed Scheme is unlikely to affect the conservation status of the local badger population and will not result in a significant negative effect, at any geographic scale.

12.4.3.4.2.3 Disturbance / Displacement

In conjunction with any displacement effects associated with habitat loss, increased human presence and / or noise and vibration associated with construction works, the Proposed Scheme has the potential to displace badgers from both breeding / resting places and from foraging habitat located beyond the footprint of the Proposed Scheme.

As construction works in areas of suitable foraging habitat will typically be undertaken during normal daylight working hours and badgers are nocturnal in habit, displacement of badgers from foraging areas (outside of areas where foraging habitat will be lost as a result of the Proposed Scheme) is extremely unlikely to affect the local badger population and will not result in a likely significant negative effect, at any geographic scale. In addition, badgers residing within the wider study area are likely to be habituated to disturbance within the urban environment and therefore would be less sensitive to very localised, temporary increases in disturbance.

Disturbance and displacement effects on badger may also be the result of increased artificial lighting during construction. Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005). Although the majority of the Proposed Scheme corridor is already lit artificially, the proposal may result in the introduction of artificial lighting to previously unlit areas, if the proposed Construction Compounds require security lighting for the duration of construction.

Three of the six locations proposed for Construction Compounds are composed of suitable foraging or commuting habitat for badger (amenity grassland (GA2)). If high-intensity, non-directional security lighting (e.g., floodlighting) is installed in these proposed Construction Compounds, light spill into adjacent areas could render these areas unsuitable for foraging badger. Therefore, lighting associated with the Construction Phase of the Proposed Scheme could result in a negative effect on badgers, albeit temporary in nature and significant at the local level.

12.4.3.4.3 Otter

Multi-disciplinary surveys did not confirm any otter holts within the footprint of the Proposed Scheme, an inactive holt (at that time) was identified during 2020 field surveys 145m north-west of Construction Compound TR3 and approximately 145m north-west of the Proposed Scheme along Butterfield Avenue within the Owenadoher River. Evidence of otter was also recorded within the River Dodder, including to the north of Construction Compound TR6, and Grand Canal. These watercourses provide favourable habitat for otter populations. Otter populations present within the River Dodder and Owenadoher Stream are considered to potential form part of the Wicklow Mountains SAC population.

Although it cannot be predicted if otter will establish new holt or couch sites within the ZoI of the Proposed Scheme, or if the previously inactive holt will be once again be utilised before construction works commence, it is a possibility and this scenario has been taken into account in the mitigation strategy (refer to Section 12.5.1.4.3).

12.4.3.4.3.1 Loss of Breeding / Resting Sites

Based on the findings of the field surveys carried out, there were no otter breeding or resting places, holt or couch sites present within the Proposed Scheme boundary. Therefore, there will not be any loss of holt or couch sites as a result of construction works. Therefore, the Proposed Scheme will not have a likely significant effect on the conservation status of otter, as there will be no loss of breeding / resting sites, and will not have a likely significant negative effect, at any geographic scale.

12.4.3.4.3.2 Loss / Fragmentation of Foraging / Commuting Habitat

Evidence of otter was recorded within or in close proximity to the Proposed Scheme during the field surveys undertaken for the Proposed Scheme.

The provision of Construction Compounds for the duration of the Construction Phase is not expected to result in the temporary loss of any habitat used by otter, owing to the fact that the Construction Compound locations are removed from waterbodies and do not consist of suitable habitat for otter.

The Proposed Scheme is not expected to result in any loss / fragmentation to habitats used by otter. This is because it does not include any works to watercourses or associated riparian vegetation in the vicinity of the Proposed Scheme. The works that are proposed at the proposed River Dodder and Grand Canal crossing points will not come into contact with the water body itself or the riparian habitat. Proposed works will be carried out on existing bridges separated from the water bodies. Therefore, there is no potential for the Proposed Scheme to result in the loss / fragmentation of foraging / commuting habitat for otter.

Habitat loss associated with the construction of the Proposed Scheme will not have a significant effect on the conservation status of otter and will not have a significant negative effect, at any geographic scale.

12.4.3.4.3.3 Habitat Severance / Barrier Effect

There are works proposed over the River Dodder and Grand Canal water bodies. Proposed works will involve the above ground existing bridge structures and therefore will not impede passage beneath. Therefore, there is no potential for severance / barrier effects, as a result of construction works, to significantly affect the local otter population.

12.4.3.4.3.4 Habitat and Food Source Degradation – Water Quality

During construction, a potential contaminated surface water runoff and/or an accidental spillage or a pollution event into any surface water feature / existing drainage infrastructure has the potential to have a significant negative impact on water quality and consequently an impact on otter; either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats). The effects of frequent and / or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects.

However, it is considered unlikely that a pollution event of such a magnitude would occur during construction or be any more than temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Scheme having any perceptible effect on water quality during construction.

Construction works in close proximity to the River Dodder, Owenadoher River, the Grand Canal or any existing surface water drainage infrastructure could result in generated silt / sediment being released into these surface water features and potentially being transferred downstream including, potentially, into the estuarine waters of the Liffey Estuary Upper, the Liffey Estuary Lower and, potentially, the coastal waters of Dublin Bay. In the absence of mitigation, the potential increase in water turbidity, as a result of increased sedimentation in receiving watercourses, could affect the visibility of prey species for foraging otter. Cement based products used in the Construction Phase of the Proposed Scheme (e.g., concrete and / or bentonite which are highly corrosive and alkaline materials), if released into the surface water network may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on food supply for aquatic mammals such as otter.

Habitat degradation as a result of effects on surface water quality during Construction Phase has the potential to affect the species' conservation status and result in a significant negative effect, at the local geographic scale as there is potential for SAC population otter to be present within the vicinity of the Proposed Scheme. This is in consideration of the temporary nature and scale of the proposed impact, the availability of suitable habitat for otter in the wider vicinity and the relative abundance of otter across the study area, as revealed in the results of the desk study.

Proposed mitigation measures have been designed to protect water quality during Construction (see Section 12.5.1.

12.4.3.4.3.5 Disturbance / Displacement

No active holts were recorded within the footprint of the Proposed Scheme. A single holt was identified during the field surveys approximately 145m north-west of the Proposed Scheme (Butterfield Avenue / Rathfarnham Road R114 intersection and approximately 145m south-west of Construction Compound TR3 on Springfield Avenue), on the bank of the Owenadoher River. This holt was monitored using a camera trap for a period of two months with no otter activity observed during that time. Elsewhere otter activity was recorded at several locations across the River Dodder and Owenadoher River corridor, both of which are known to support otter populations. Similarly, the desk study identified that otter are known to use the Grand Canal for commuting purposes.

Increased human presence and / or noise and vibration associated with construction works at the Butterfield Avenue / Rathfarnham R114 Road intersection may result in increased levels of disturbance at the CBC1012M003 holt and temporarily displace otter. Construction activities in the vicinity of the Owenadoher River will include general road works and a retaining wall near Butterfield Avenue / Rathfarnham R118 Road junction. Noise levels produced by these general construction works will be between 59dB at 100m and 55dB at 150m from the Proposed Scheme (Chapter 9 (Noise & Vibration)). Noise levels produced by the boundary treatment works (retaining wall) will be between 60dB at 100m and 56dB at 150m from the Proposed Scheme (Chapter 9 (Noise & Vibration)). According to information contained within the Noise & Vibration chapter (Chapter 9), the predicted noise levels during construction, within 100m to 150m of the construction works at the Butterfield Avenue / Rathfarnham R114 Road intersection, are modelled as being similar to baseline noise levels at this location (e.g. in the region of 60dB). Therefore, given that otter within the urban- suburban Dublin area are habituated to similar consistent background noise levels, no significant disturbance/ displacement effects on breeding/ resting otter in this location, are predicted.

Construction compound TR3 is located approximately 145m north-east of the holt recorded at the Owenadoher River and activities here will involve site traffic, storage, offices and material handlings, etc., with noise levels generated predicted to be approximately 54dB at a distance of 150m of the Construction Compound. The existing Woodview Cottages housing development is currently situated between the Owenadoher River and the proposed compound, providing screening between the Owenadoher River and the Construction Compound TR3, therefore any disturbance impact is likely to be further diminished. The assessment contained within the Noise & Vibration chapter (Chapter 9), gives the predicted noise levels during construction, within 100m of the construction compound, are modelled as being similar to baseline noise levels at this location (e.g. in the region of 60Db). Therefore, given that otter within the urban- suburban Dublin area are habituated to similar consistent background noise levels, no significant disturbance/ displacement effects on breeding/ resting otter in this location, are predicted.

Other Construction Compounds that proximal to the River Dodder e.g., TR1 and TR6 are spatially separated from the watercourse and screened by vegetation, hence no significant disturbance / displacement effects on breeding/ resting otter in this location, are predicted along the sensitive River Dodder corridor.

Chapter 9 Noise and Vibration provides the indicative construction noise calculation associated with different construction activities of the Proposed Scheme at varying distances. The results of the noise assessment carried out for the Proposed Scheme confirmed that at 100m, noise levels for general construction activities will be in the region of 60dB or less. Therefore, construction activities would not be expected to result in any more than a moderate disturbance at distances beyond 100m. Therefore, 150m is considered to be a precautionary buffer in defining the ZoI of disturbance effects arising from construction activities.

In addition to disturbance impacts arising from noise and vibration impacts affecting the Owenadoher River holt, construction works associated with the Proposed Scheme have the potential to temporarily displace commuting or foraging otter at the proposed River Dodder and Grand Canal crossing points. Noise and disturbance levels associated with these works lie within the range 79-69dB, depending on the activity, at 10m from the Proposed Scheme boundary and return to background levels within 100m. As such disturbance for mammals is estimated to reach approximately 100m from the Proposed Scheme in this highly urbanized area. Active otter holts are outside of this Zol, therefore, disturbance effects from the Proposed Scheme are not deemed to cause displacement affects leading to abandonment of holts or territory.

Otter are known to tolerate human disturbance under certain circumstances (Bailey and Rochford 2006; The Environment Agency 2010; Irish Wildlife Trust 2012). There are numerous records of otter within the urban Dublin area, which suggests a relatively high level of habituation to human disturbance and noise by otter (Macklin *et al.* 2019). As construction works will typically be undertaken during normal daylight working hours and otter are generally nocturnal in habit, and that otter can (in many circumstances) tolerate high levels of human presence and disturbance, displacement of otter from their habitat is extremely unlikely to affect the local otter population. Therefore, disturbance during construction is not likely to have a significant effect on the species' conservation status and will not result in a significant negative effect, at any geographic scale.

Disturbance and displacement effects on otter may also be the result of increased artificial lighting during construction. Nocturnal mammals, such as otter, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005). Although the majority of the Proposed Scheme corridor is already lit artificially, the proposal may result in the introduction of artificial lighting to previously unlit areas, if construction compounds require security lighting for the duration of construction. Given the fact that the locations of proposed construction compounds are removed from any watercourses, lighting during construction is not considered likely to result in any significant effect to otters in the vicinity.

12.4.3.4.4 Marine Mammals

12.4.3.4.4.1 Habitat and Food Resource Degradation – Water Quality

As discussed in Section 12.4.3.2.2, the Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on marine mammals either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

However, it is considered unlikely that a pollution event of such a magnitude would occur during construction or be any more than temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Scheme having any perceptible effect on water quality during the Construction Phase.

Habitat degradation due to effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely significant negative effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed effect and the availability of suitable habitat in Dublin Bay.

Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1).

12.4.3.4.5 Other Mammals

No other protected mammal species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme. However, based on the results of desk study several mammal species, protected under the Wildlife Acts, are known to occur in the wider environment, including pine marten, red squirrel and hedgehog.

12.4.3.4.5.1 Habitat Loss

The construction of the Proposed Scheme will result in the temporary loss of suitable habitat for small mammals located within the boundary of the Proposed Scheme. Given the relatively low numbers of individuals of each species that are likely to be affected (i.e., red squirrel, hedgehog, pygmy shrew), and the abundance of alternative suitable habitat available locally, the effects of habitat loss associated with construction works are unlikely to affect the long-term viability of their local populations. Therefore, habitat loss is unlikely to affect the species' conservation status or result in a significant negative effect, at any geographic scale.

12.4.3.4.5.2 Mortality Risk

Site clearance works have the potential to result in the mortality of small mammal species. The potential for this impact to occur would be expected to be greater during the breeding season (February to October inclusive depending on species) when juveniles would be present in nests, or in the case of hedgehog impacts may be greater during their hibernation period. Furthermore, the potential for direct mortality to small mammals would be greater in more vegetated areas, as opposed to disturbed ground / urban habitats, as these areas would offer more in terms of breeding/ resting habitat for small mammal species. Given the relatively low numbers of individuals of each species that are likely to be affected, and that these species are highly mobile, site clearance is unlikely to result in a level of mortality that would affect the species' conservation status, and result in a significant negative effect, even at a local geographic scale.

12.4.3.4.5.3 Disturbance / Displacement

In conjunction with any displacement effects associated with habitat loss, increased human presence and/or noise and vibration associated with construction works, has the potential to displace mammals from both breeding/resting places and from foraging habitat. Mammals residing within the wider study area are likely to be habituated to disturbance within the urban environment.

As construction works in areas of suitable foraging habitat will typically be undertaken during normal daylight working hours and the relevant mammal species are nocturnal in habit, displacement of mammal species from foraging areas (outside of areas where foraging habitat will be lost as a result of the Proposed Scheme) is extremely unlikely to affect the local mammal population and will not result in a significant negative effect, at any geographic scale.

12.4.3.5 Birds

12.4.3.5.1 Breeding Birds

The assessment carried out in the NIS for the Proposed Scheme (which is a standalone document provided within the planning application to enable the Board, as competent authority to carry out an Appropriate Assessment for the purposes of Article 6(3) of the Habitats Directive) considered the potential for the Proposed Scheme to affect the bird species listed as SCIs of European sites. That assessment concluded that the Proposed Scheme would

not affect their breeding colonies or have any long-term effects on the local breeding populations. Therefore, for these species, the Proposed Scheme will not affect the conservation status of the breeding populations and will not have any adverse effects on the integrity of European sites.

12.4.3.5.1.1 Habitat Loss and Loss of Breeding / Resting Sites

The Proposed Scheme will result in the loss of breeding bird nesting and foraging habitat within the footprint of the Proposed Scheme. The areas of habitat loss within the Proposed Scheme boundary are provided in Section 12.4.3.2 and tabulated in Table 12.14 for all KER habitat types. These areas comprise a total area of approximately 0.78ha of hedgerows (WL1) and treelines (WL2) (also KERs), mixed broadleaved woodland (WD1) (KER) and approximately 0.05ha of scattered trees and parkland (WD5) habitats. In addition, there are areas of scrub (WS1), ornamental / non-native shrub (WS3) and amenity grassland (GA2) within the footprint of the Proposed Scheme, which are not KERs in their own right due to their limited botanical value. However, these habitats may provide nesting and / or foraging habitat for birds (approximately 3.4ha). These areas will be removed during construction of the Proposed Scheme resulting in an additional loss of breeding bird nesting and / or foraging habitat. In summary, the habitats that may be lost comprise:

- Treeline habitat located along R115 / R821 bordering Rathfarnham Castle Park;
- Treeline road median habitat along the R114 Rathfarnham Road adjacent to Rathfarnham Village;
- Residential Hedgerow / Treeline habitat along the R114 Rathfarnham Road south of Pearse Bridge;
- Hedgerow habitat along the R114 Rathfarnham Road between Pearse Bridge and Beechlawn Way;
- Hedgerow habitat along the R114 Terenure Road East, between Terenure Road North and Brighton Road;
- Mixed broadleaved woodland habitat along the R137 Templeogue Road at the entrance to Templeogue House;
- Residential hedgerow/ treeline habitat along the R137 Templeogue Road, east of Austin Clarke Bridge;
- Vegetation removal along the R137 Templeogue Road at Bushy Park (trees to be retained in this area, only understorey vegetation to be removed); and,
- Amenity grassland along the R112 Dodder View Road, adjacent to the Bushy Park Carpark, to accommodate the proposed Construction Compound TR3.

The primary consequence of habitat loss will be increased competition for resources (e.g., nesting habitat and / or prey / food source) both between and amongst breeding bird species. The magnitude of this effect will be largely defined by whether the local habitat resource has currently reached its carrying capacity or not in terms of breeding bird species. For species with larger home ranges during the breeding season, habitat loss at the scale of the Proposed Scheme is not likely to have any perceptible effects on breeding success or population dynamics. As the Proposed Scheme will be constructed within an already busy transport corridor, habitats suitable to support breeding birds are limited. Treelines and hedgerows are highly disturbed, and largely within the road median, therefore do not offer significant shelter for breeding bird species.

The habitat areas that will be lost as a result of the Proposed Scheme form a relatively small part of larger expanses of similar habitat types and mosaics in the wider locality. Parks and greenspaces form a vital resource for breeding birds within an urban setting. These areas of suitable breeding bird nesting and / or foraging habitat available in the wider locality of the Proposed Scheme (i.e., from approximately 0.3 to 2km from these existing sites located within the footprint of the Proposed Scheme) include:

- Parks and greenspaces with hedgerow, treeline and / or scrub boundaries such as Castle Golf Club, Milltown Golf Club, Bushy Park, Tymon Park, Dodder Riverbank Park, Orwell Park, Terenure College, Templeville Park, St. Mary's College RFC, Harold's Cross Park, Mount Argus Park, Eamonn Ceannt Park, Kenilworth Square, Palmerstown Park, Templeogue Synge Street GAA Club, Iveagh Gardens and St. Stephens Green;
- Woodland such as that present along the River Dodder at Bushy Park, Dodder Riverbank Park and Orwell Park;
- Wildfowl and waterbird habitat within the Upper Liffey Estuary, Lower Liffey Estuary and wider Dublin Bay area; and,

- Sections of the River Dodder both upstream and downstream of the Proposed Scheme.

None of the habitat areas to be lost are unique to the locality and, either individually or collectively, are not likely to support a significant proportion, or the only population, of any given breeding bird species locally. Although a temporary decline in overall breeding bird abundance could potentially occur at a very local level (i.e, the footprint of the Proposed Scheme), this is unlikely to affect the local range of the breeding bird species present nor is it likely to affect the ability of these breeding bird populations to maintain their local populations in the long-term.

Mitigation measures will be implemented to reduce the effects of habitat loss on breeding bird species locally (see Section 12.5.1).

12.4.3.5.1.2 Mortality Risk

If site clearance works were to be undertaken during the bird breeding season (i.e., March to August, inclusive) it is likely that nest sites holding eggs or chicks will be destroyed and birds killed.

Mortality of birds at the scale of the Proposed Scheme, over what is likely to be a single breeding bird season in terms of completing site clearance works, will likely have a short-term effect on local breeding bird population abundance.

However, in the longer-term this would be unlikely to affect the ranges of the breeding bird species recorded in the study area nor would it be likely to affect the long-term viability of the local populations. Mortality of birds during site clearance works is not predicted to significantly affect the conservation status of any of the breeding bird species present within the study area at any geographic scale.

In any event, mitigation measures will be implemented to reduce the potential mortality risk presented by any clearance works (see Section 12.5.1).

12.4.3.5.1.3 Disturbance / Displacement

The noise, vibration, increased human presence and the visual deterrent of construction traffic, associated with site clearance and construction will temporarily disturb breeding bird species and is likely to displace breeding birds from habitat areas adjacent to the footprint of the Proposed Scheme. Construction activities will largely involve carriageway and pavement resurfacing / reconstruction as required, readjustment of kerbs and new road. However, as an important transport corridor in a heavily urbanized landscape, there is an existing relatively high level of human disturbance within the immediate environment of the Proposed Scheme (e.g., Rathfarnham Road R114 and N81 / M50 Interchange) and as such it is likely that breeding species present are habituated to a certain degree of disturbance. The magnitude of the impact will be dependent on the type of construction works and their duration; general construction activities will have a less pronounced affect than blasting, in terms of its ZoI, but will be on-going from periods of up to 24 months and multiple breeding seasons across the entirety of the Construction Phase. However, phasing of the construction works in scheme section will reduce the temporary nature of this impact to approximately one to twelve month disturbances in each section of the Proposed Scheme. With regards to the proposed Construction Compounds disturbance impacts will be short-term in nature as they will be ongoing for the duration of the Construction Phase.

Table 12.15 provides a summary of the indicative construction noise calculations at varying distances, which have been modelled in the Chapter 9 Noise and Vibration in Volume 3 of this EIAR. All areas within 250m of the Proposed Scheme will be subject to construction activities which generate noise levels greater than 50dB (e.g., piling, rock-breaking, etc.). These activities will result in a greater magnitude of effect on the baseline environment. As a result, noise and vibration from these activities, will have the potential to result in the reduced breeding success of breeding bird species in the vicinity of the works. Breeding pairs will be temporarily displaced during the construction works. The area over which disturbance / displacement effects will occur, forms a relatively small part of larger expanses of similar habitat types in the wider locality (e.g., mixed broadleaved woodland (WD1)). As such, given the availability of suitable habitat in the wider locality of the Proposed Scheme, the construction works are therefore not likely to affect the conservation status of breeding birds and will not result in a significant negative effect, above the local geographic scale. Although it is not possible to quantify the magnitude of this potential impact (or the potential effect zone) with precision, it could potentially extend for several hundred metres

from the Proposed Scheme. The results of noise modelling carried out for the Proposed Scheme confirmed that at 150m, noise levels for all construction activities will be below 60dB (See Chapter 9 (Noise & Vibration)). Given the temporary to short-term nature of the construction works, coupled with the existing levels of disturbance within these urban areas, disturbance or displacement effects associated with the Construction Phase of the Proposed Scheme will also be over the short-term. Therefore, these impacts will not affect the conservation status of breeding bird species and will not result in a negative effect, above the local geographic scale.

12.4.3.5.1.4 Habitat Degradation – Surface Water Quality

The Construction Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies, with a consequent effect on breeding birds either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

Habitat degradation as a consequence of construction effects on surface water, if those impacts occur, is therefore, likely to be significant at the local level. However, as set out below, such impacts are not predicted to occur in circumstances of effective implementation of appropriate mitigation measures.

Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1).

12.4.3.5.2 Wintering Birds

This section of the impact assessment deals with wintering bird species, i.e. those bird species which are SCIs of SPAs for their wintering populations or are listed on either the BoCCI Red or Amber lists for their wintering populations. The assessment carried out in the NIS for the Proposed Scheme considered the potential for the Proposed Scheme to affect the bird species listed as SCIs of European sites for their wintering populations. As set out in the NIS, that assessment concluded that Proposed Scheme would not affect their wintering bird colonies or have any long-term effects on the local wintering populations. Therefore, for these species, the Proposed Scheme will not affect the conservation status of the wintering bird populations and will not result in an adverse effect on the integrity of any European sites.

12.4.3.5.2.1 Habitat Loss and / or Disturbance / Displacement

Potential impacts may arise due to the direct short-term loss of feeding habitat including a grassland area along the R112 Dodder View Road adjacent to Church Lane and the Bushy Park Carpark (approximately 0.455ha in total area), to accommodate the proposed Construction Compound TR3 (referred to as CBC1012WB001). Numbers recorded during wintering bird surveys undertaken here suggested that the site was not a significant wintering bird site, and that there was considerable potential for other for wintering birds in the wider vicinity (refer to Section 12.3.9.2).

The short-term loss of suitable amenity grassland (GA2) habitat at the proposed Dodder View Road Construction Compound TR3 is not deemed to have a significant impact on the wintering bird population at any geographical scale due to the following reasons:

- Relatively low frequency of occurrence of these bird species on lands located within the grassland adjacent to Dodder View Road, signifying that these species do not regularly use or rely upon these lands as foraging and / or roosting habitat, and are likely to use other suitable sites available in the wider area on a similar or more regular basis (see Section 12.3.9.2);
- Relatively low peak flocks recorded on lands located within the footprint of the Proposed Scheme, especially when compared to 1% of both their international flyway and national populations (see Section 12.3.9.2), signifying that these sites are not significantly important to the overall population of each respective bird species, and are likely to use other suitable sites available in the wider area on a similar or more regular basis; and
- The availability of large areas of suitable foraging and / or roosting habitat for these SCI bird species in the wider locality of the Proposed Scheme, including those in closer proximity to nearby SPAs. These include other similar public amenity grassland parks and sports pitches such as those discussed above. It is very likely that bird species currently utilise these and other suitable lands in the wider area to a similar and / or greater intensity during the 24 months in which the proposed Construction Compound located in the grassed area next to Dodder View Road will be in use.

The Proposed Scheme will also require the removal of a number of mature trees and loss / reduction of open ground. Much of this territory is not considered suitable for wintering birds, who have preference for inland feeding sites typically composed of larger open green fields as suggested in field surveys around Dublin (Scott Cawley Ltd. 2017).

Moreover, a temporary and / or permanent increases in noise, vibration and / or human activity levels during the construction and / or operation of the Proposed Scheme could result in the disturbance to and / or displacement of wintering bird species present within the footprint and / or the vicinity of the Proposed Scheme.

Current understanding of construction related noise disturbance to wintering waterbirds is based on the research presented in Cutts *et al.,* (2009) and Wright *et al*., (2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds, i.e., birds becoming alert and some behavioural changes (e.g., reduced feeding activity), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity (BS 5228) are generally below 60dB or, in most cases, are approaching the 50dB threshold. As such, disturbance effects for general construction activities across the majority of the Proposed Scheme would not be expected to extend beyond a distance of approximately 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond. Table 12.15 provides the indicative construction noise calculation associated with different construction activities of the Proposed Scheme at varying distances.

Table 12.15 Indicative Construction Noise Calculations at Varying Distances

Activity	Predicted CNL at Stated Distance from Edge of Works (dB $L_{Aeq,12hr}$ or $L_{Aeq,4hr}$)								
(dB)	10m	15m	20m	30m	50m	75m	100m	150m	250m
General Road works	79	76	73	69	65	61	59	55	51
Road Widening and Utility Diversion	83	80	77	73	69	65	63	59	55
Site compounds	78	75	72	68	64	60	58	54	50
Boundary wall construction	80	77	74	70	66	62	60	56	49
Urban realm landscaping	79	76	73	69	65	61	59	55	51

None of the construction activities proposed would be expected to result in any more than a moderate level of disturbance effect on wintering birds at distances beyond 250m. At 100m, noise levels are below 60dB or, in most cases, are approaching the 50dB threshold. Low, or no, effects would be expected for those noise levels. Any landscape features, vegetation cover or buildings between the construction site and winter bird sites would contribute to further reducing the ambient noise at any given distance. Therefore, 300m is considered to be a precautionary buffer in defining the ZoI of disturbance effects.

As the majority of works will be carried out during normal working daylight hours, the potential for construction to disturb wintering birds at night, will not arise. Impacts associated with increased levels of disturbance will likely result in the temporary displacement of these wintering bird species to other suitable available lands in the locality. These impacts will be associated with general construction activities (e.g. visual impact of construction workers and machinery and the associated vibration and more constant / continuous noise levels) and impulse noise disturbance from infrequent noise sources with a high noise level, such as blasting/ rock breaking.

Following the completion of construction, disturbance levels will likely return to baseline conditions and as a result these lands will become available again as foraging and / or roosting habitat for these wintering bird species.

The majority of wintering birds identified in the desk study are typically found in coastal, estuarine and intertidal habitats including the Liffey Estuary and Dublin Bay, and therefore will not be impacted directly during construction. Certain species, such as light-bellied Brent geese, often forage on inland sites in the Greater Dublin Area. Suitable sites are usually composed of open parkland / playing pitches. A single known inland wintering bird feeding site is known to occur within approximately 300m of the Proposed Scheme (Tymon Park), the distance within which birds would be expected to be displaced. However, the open grassland areas of Tymon Park likely to be utilized by wintering bird species are located more than 300m from the Proposed Scheme Boundary and as

such are not considered further in terms of disturbance / displacement effects. The grounds adjacent to the R112 Dodder View Road, for which a Construction Compound (TR3) is proposed to be located, was identified as having potential to support wintering birds. However, the survey results indicate relatively low frequency of occurrence of wintering bird species on these lands and suggests these species do not regularly use or rely upon these lands as foraging and / or roosting habitat. The peak flocks of each respective wintering bird species recorded at these sites are also relatively low in particular, when compared to 1% of their international flyway and national populations. A wetland is considered to be of International Importance if it regularly supports 1% of the relevant international, or flyway, population or if it supports a population of more than 20,000 waterbirds (Nagy and Lanngendoen 2018).

Table 12.16: Wintering bird species recorded during wintering bord surveys in comparison to the 1% of its International and National Populations

Common Name/Scientific Name/BTO Code	Peak Count Recorded at Site – Date Recorded	Threshold of International Population (1% of International Population)	Threshold of National Population (1% of National Population)
Black-headed gull *Chroicocephalus ridibundus* (BH)	21	South Dublin Bay and River Tolka Estuary SPA North Bull Island SPA The Murrough SPA	31,000
Herring gull *Larus argentatus* (HG)	1	Ireland's Eye SPA Lambay Island SPA Skerries Islands SPA	14,400

The following three known inland wintering bird feeding sites are known to occur within approximately 0.3-1km of the Proposed Scheme (i.e., beyond the ZoI), and it is likely that birds displaced from the R112 Dodder View Road site, would be displaced to the following known sites:

- St. Mary's College RFC (unknown importance);
- Templeogue College (unknown importance); and,
- Eamonn Ceannt Park (Major importance).

There are also large areas of suitable foraging and / or roosting habitat available for these wintering bird species both adjacent to, and in the wider locality of the Proposed Scheme (i.e., beyond the 300m study area, from approximately 300m from existing sites located within the footprint of the Proposed Scheme) including:

- Parks and greenspaces such as Castle Golf Club, Milltown Golf Club, Stanaway Park, Kenilworth Square, Dodder Riverbank Park, St. Enda's Park, Marlay Park; and,
- Wetland habitat associated with South Dublin Bay and River Tolka Estuary SPA, and North Dublin Bay SPA.

It is very likely that these wintering bird species currently utilise these and other suitable lands in the wider area to a similar and / or greater intensity.

The small numbers of wintering birds which are disturbed during construction will likely be displaced to suitable sites in the surrounding environment, such as those listed above, and therefore impacts are not considered to be significant beyond the local level. In addition, land take at the R112 Dodder View Road will be short term in nature and will be returned to amenity grassland (GA2) habitat during the Operational Phase of the Proposed Scheme. Therefore, in consideration of these factors, the loss of suitable foraging and / or roosting habitat within the Proposed Scheme boundary that is utilised by wintering birds and an increase in short-term disturbance or displacement effects will not affect the conservation status of any wintering bird species and will not result in a significant negative effect, at any geographic scale.

12.4.3.5.2.2 Habitat Degradation – Surface Water Quality

The Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in potentially significant negative impacts on wintering birds either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water quality during construction has the potential to result in a significant negative effect, at a local geographic scale. Mitigation measures have been designed to protect water quality during construction (see Chapter 13 (Water), and the CEMP (Appendix A5.1 in Volume 4 of this EIAR).

12.4.3.6 Reptiles

There were no reptile species recorded during the multi-disciplinary surveys and no suitable habitat confirmed within the footprint of the Proposed Scheme. The desk study did return one record for common lizard in the surrounding area and therefore their presence indicates that small numbers of reptiles may occur in the vicinity of the Proposed Scheme.

12.4.3.6.1 Disturbance and Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of, common lizard. Given relatively low area of potentially suitable habitat for common lizard in the wider study area, the number of individuals that would potentially be at risk is low and would be unlikely to affect the local populations in the long-term. Therefore, disturbance or mortality risk are not likely to affect the species' conservation status or result in a significant negative effect, at any geographic scale.

12.4.3.6.2 Habitat Severance / Barrier Effect

The temporary to short-term physical disruption of the existing landscape during site clearance and construction could fragment habitat used by common lizard. As a temporary to short-term impact, this is unlikely to present a significant barrier to the movement of the species such that it would affect the local common lizard population in the long-term. Therefore, habitat severance during construction and any associated barrier effect are not likely to affect the species' conservation status and are not predicted to result in a significant negative effect to the Common lizard, at any geographic scale.

12.4.3.7 Amphibians

No amphibian species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme, despite the presence of suitable habitat within the footprint of the Proposed Scheme (e.g., downstream riparian banks along the River Dodder and the Grand Canal). The desk study returned records for common frog and smooth newt within 1km of the Proposed Scheme, and therefore it cannot be ruled out that these species occur in the vicinity of the Proposed Scheme.

12.4.3.7.1 Disturbance / Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of amphibians. Given the relatively low area of potentially suitable habitat for amphibians in the wider study area, the number of individuals that would potentially be at risk is low and would be unlikely to affect the local populations in the long-term. Therefore, disturbance or mortality risk are not likely to affect the species' conservation status or result in a significant negative effect, at any geographic scale.

12.4.3.7.2 Habitat Severance / Barrier Effect

The temporary to short-term physical disruption of the existing landscape during site clearance and construction will fragment habitat used by amphibians. As a temporary to short-term impact, this is unlikely to present a significant barrier to the movement of the species such that it would affect the local amphibians population in the long-term. Therefore, habitat severance during construction and any associated barrier effect are not likely to

affect the species' conservation status and are not predicted to result in a significant negative effect to amphibians, at any geographic scale.

12.4.3.7.3 Habitat Degradation – Surface Water Quality

The Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on amphibians either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a significant negative effect, at a local geographic scale. Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1, Chapter 13 (Water)) and Appendix A5.1- Construction Environmental Management Plan in Volume 4 of the EIAR).

12.4.3.8 Fish

12.4.3.8.1 Habitat Loss / Severance and Barrier Effect

By virtue of the design of the Proposed Scheme and / or the nature of watercourses intersected by it, the Proposed Scheme will not result in the any direct permanent loss of aquatic habitat, nor result in a barrier effect in respect of aquatic biodiversity.

12.4.3.8.2 Habitat Degradation – Surface Water Quality

During construction, contaminated or heavily silted surface water runoff, pump discharges and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently on aquatic habitats and fish species, and potentially also in the marine environment downstream. This could be either directly (e.g*.,* acute or sub-lethal toxicity from pollutants or siltation events damaging spawning habitat downstream) or indirectly (e.g*.,* affecting their food supply or supporting habitats).

The effects of frequent and / or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects. It is considered unlikely that a pollution event of such a magnitude would occur during construction or if such an event did occur, it would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Scheme having any perceptible effect on water quality during construction.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the conservation status of affected fish species and result in a significant negative effect, at a local to County geographic scale, as described below.

Desk study records, as presented in Section 12.2.3 revealed that the River Dodder is known to support populations of Atlantic salmon and brown trout and aquatic surveys undertaken for the Proposed Scheme indicated excellent salmonid habitat at the site surveyed (CBC1012AR001). In addition, aquatic surveys undertaken along stretches of the Owenadoher River also indicated good salmonid habitat with brown trout being plentiful at each of the three areas surveyed. Given that salmonid species are protected under both national and international legislation, habitat degradation, as a result of effects on surface water quality on the River Dodder or Owenadoher River during construction, has the potential to result in a significant effect at the County level on salmonid species.

River lamprey and brook lamprey, two legally protected lamprey species, are known to occur in the River Dodder, as outlined in the desk study. Habitat degradation, as a result of effects on surface water quality during construction, has the potential to result in a significant effect at the County level on lamprey species, given the habitat value present and their protection under the Habitats Directive.

Results of the aquatic surveys carried out by Triturus Environmental Ltd in 2020 indicated that the River Dodder and Owenadoher River offer moderate quality eel habitat. In addition, the results of the desk study revealed that eel is known to occur in the River Dodder, in sites adjacent to and downstream of the proposed Scheme. Moreover, the Liffey Estuary serves as the gateway for eels migrating between freshwater and ocean environments, providing the necessary habitat for their transition. Habitat degradation, as a result of effects on surface water quality during construction, has the potential to result in a significant effect at the County level on eel, given the presence of suitable habitat and declining trend of eel in Irish waters.

With regards all other fish species, the effects of habitat degradation as a result of effects on surface water quality during construction has the potential to result in a significant effect at the local level given the fact that the other fish species in question are common in Irish waters and not of conservation concern. Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1, Chapter 13 (Water) and Appendix A5.1 Construction Environmental Management Plan in Volume 4 of the EIAR).

12.4.3.9 Invertebrates – Freshwater Molluscs

12.4.3.9.1 Habitat Loss / Mortality Risk

The desk study revealed records for three Red Listed freshwater molluscs, glutinous snail, iridescent pea mussel and false orb pea mussel, along the Grand Canal at Herbert Place.

By virtue of the design of the Proposed Scheme and / or the nature of watercourses intersected by it, the Proposed Scheme will not result in the any direct permanent loss of aquatic habitat nor result in a barrier effect in respect of aquatic invertebrates.

12.4.3.9.2 Habitat Degradation – Surface Water Quality

The Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on freshwater molluscs either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the conservation status of affected invertebrate species and result in a likely significant negative effect, at a local geographic scale. Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1, Chapter 13 (Water) and Appendix A5.1 Construction Environmental Management Plan in Volume 4 of the EIAR).

12.4.3.10 Summary of Potential Construction Phase Impacts (Pre-mitigation)

Table 12.17: Summary of Potential Construction Phase Impacts (Pre-mitigation)

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Designated Areas for Nature Conservation			
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Wicklow Mountains SAC	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA	International Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rockabill SPA	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale
Grand Canal pNHA	National Importance	Habitat degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Dodder Valley pNHA	National Importance	Habitat degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Habitats (outside of designated areas for nature conservation)			
Canals (FW3)	National	Habitat degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Depositing / lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Rare / Protected Plant Species			
Flora species listed on the Flora Protection Order	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Flora species on Ireland's Red lists (Vulnerable or of higher concern concern)	County to National	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
All other non-Red listed flora species	Local Importance (Lower Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Non-native invasive plant species	N/A	Spread at expense of other habitats, habitat degradation (hydrology)	Likely significant effect at the local to international scale geographic scale
Fauna Species			
Bats	Local Importance (Higher Value)	Habitat loss / fragmentation; disturbance / displacement	Likely significant effect at the local geographic scale
Badger	Local Importance (Higher Value)	Disturbance / displacement	Likely significant effect at the local geographic scale
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals	International to County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
SCI bird species	International Importance	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Amphibians	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Fish Species	Local Importance (Higher Value) – International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Non-Annex fish species	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Invertebrates - freshwater molluscs	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Local Biodiversity Areas			
DCC			
Grand Canal	National Importance	Habitat degradation (hydrology; non-native invasive plant species air quality)	Likely significant effect at the local geographic scale
River Dodder Corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale
SDCC			

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Network of streams and River e.g. Dodder	County Importance	Habitat degradation (hydrology non-native invasive plant species)	Likely significant effect at the local geographic scale
DLRCC			
Wildlife Corridors- Dodder Valley corridor and Ticknock to River Dodder corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale

12.4.4 Operational Phase

12.4.4.1 Designated Areas for Nature Conservation

12.4.4.1.1 European sites

12.4.4.1.1.1 Habitat Loss and Fragmentation

The potential for impacts on SCI bird populations for which SPAs are designated has been provided in the Natura Impact Statement (NIS).

Refer to Section 12.4.3.5.2.2 with regards to potential operational impacts on wintering bird species, which encompass all relevant SCI bird species.

12.4.4.1.1.2 Habitat Degradation / Effects on QI / SCI Species as a result of Hydrological Impacts

The Proposed Scheme is hydrologically connected to Dublin Bay via a number of watercourses and existing pipes which drain directly to Dublin Bay. The release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and the accidental spillage and / or leaks of contaminants. The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge point and therefore impact the downstream, i.e. Dublin Bay, within which European sites are located: North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay, River Tolka Estuary SPA and Dalkey Islands SPA, Baldoyle Bay SAC and Baldoyle Bay SPA.

This reduction in water quality (either alone or in combination with other pressures on water quality) could result in the degradation of sensitive habitats present within these European sites, which in turn would negatively affect the SCI bird species that rely upon these habitats as foraging and / or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI bird species. These potential impacts could occur to such a degree that the conservation objectives of the North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay, River Tolka Estuary SPA and Dalkey Islands SPA, Baldoyle Bay SAC, Baldoyle Bay SPA and The Murrough SPA may be undermined.

In a worst case scenario, the release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during operation, also has the potential to affect mobile SCI bird species and QI mammal species (otter and marine mammals) that commute, forage and loaf in the Lower Liffey Estuary Upper / Lower and areas of Dublin Bay and Baldoyle Bay i.e. birds associated with Skerries Islands SPA, Rockabill SPA and Lambay Island SPA, Ireland's Eye SPA, North Dublin Bay SPA, South Dublin Bay and River Tolka Estuary SPA, Baldoyle SPA, Malahide Estuary SPA, Rogerstown SPA, Dalkey Islands SPA, Murrough SPA and marine mammals associated with Rockabill to Dalkey Island SAC and Lambay Island SAC. This potential reduction in water quality could result in the degradation of sensitive habitats present downstream European sites, which in turn could negatively affect the SCI bird species that rely upon these habitats as foraging and / or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI and QI populations.

12.4.4.1.1.3 Habitat Degradation as a result of Introducing / Spreading Non-Native Invasive Species

There are ten areas of Japanese knotweed, Himalayan balsam and three cornered garlic, species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) present within, or in close proximity to the Proposed Scheme. In the absence of mitigation, there is potential for this to spread or be introduced during routine maintenance / management works, to terrestrial habitat areas in European sites downstream in Dublin Bay. (i.e., North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA). These in turn may result in the degradation of the existing habitats and therefore undermine the conservation objectives of these European sites.

It is not considered likely that invasive species could spread to European sites which are located a significant distance from the outfall locations of the Owenadoher River, Little Dargle, River Dodder and The Grand Canal (i.e., Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC and Dalkey Islands SPA), , by virtue of the habitat conditions in which the species normally occurs and subject to the full implementation of the non-native Invasive Species Management Plan (ISMP) refer to Appendix A5.1 Construction Environmental Management Plan in Volume 4 of the EIAR. In addition, the maintenance of the Proposed Scheme does not have the potential to result in habitat degradation of the QI / SCI species of any European site as the result of operation impacts and there is no potential for in combination effects to occur in that regard.

12.4.4.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

The potential impacts on European sites arising from the Proposed Scheme, outlined above in Section 12.4.4.1.1, may also negatively affect the following pNHA and NHA sites, which are located within the boundaries of European sites and designated for similar reasons: Skerries Islands NHA, Lambay Island pNHA, Portraine Shore pNHA, Ireland's Eye pNHA, Howth Head pNHA, Malahide Estuary pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Baldoyle Bay pNHA, North Dublin Bay pNHA, Booterstown Marsh pNHA, Dolphins, Dublin Docks pNHA, Rogerstown Estuary pNHA and South Dublin Bay pNHA. The respective European sites are provided in Table 12.5. The Proposed Scheme also has the potential to affect biodiversity in a broader sense than only the QIs / SCIs of those European sites. Where biodiversity receptors in these pNHAs do not form part of the QIs / SCIs in the NIS assessment, they are considered under the other individual impact assessment headings for each KER below. Potential impacts arising from the Proposed Scheme on these pNHA sites would result in a significant negative effect at a national geographic scale.

The assessment of potential impacts arising from the Proposed Scheme on the Grand Canal pNHA and Dodder Valley pNHA include habitat degradation as a result of surface water quality and the spread of invasive species (see Section 12.4.4.2.3), effects on rare and protected plant species (see Section 12.4.4.3) and negative effects on the protected fauna species associated with the canal such as bats, otter and riparian birds (see Section 12.4.4.4 and Section 12.4.4.5).

12.4.4.1.2.1 Habitat Degradation – Air Quality

Air quality modelling of NO_x concentrations, and deposition rates were modelled for the Operational Phase of the Proposed Scheme at distances up to 200m from the Proposed Scheme and associated traffic diversion routes, or where significant changes to AADT flows occur. The assessment methodology for air quality impacts from roads and their interaction / effects on ecology are discussed in Section 12.4.4.1.2.1 and also within Chapter 7 (Air Quality).

Vehicle-derived air emissions were modelled during the construction phase along the proposed road development at the Dodder Valley pNHA (M50 and Tallaght Road), and the Grand Canal pNHA crossing (La Touche Bridge) as well as several crossing points outside of the Proposed Scheme where traffic may be diverted during the Operation Phase Canal Road, Charlemont Bridge, Charlemont Mall, Cheltenham Place, Dartmouth Walk, Emmet Bridge, Grand Parade, Grove Road, Leeson Bridge, Mespil Road, and Parnell Road) (refer to Section 7.4.3.3.4 of Chapter 7 (Air Quality) for details). The worst-case predicted annual average NOx concentrations at various distances from the proposed road edge exceed the 30µg / m^3 limit value. In all cases where exceedances occur, the baseline environment is already in excess of this value. During the operational year (2028) of the Proposed Scheme, annual mean NOx concentrations are predicted to substantially decrease at Grand Canal pNHA (La Touche Bridge) (-25.95µg / m^3 and -10.55µg / m^3 at the western and eastern sides, amounting to an 86% and

35% reduction, respectively). At the Dodder Valley pNHA annual mean NO_x concentrations are predicted to increase slightly at the M50 site (91.7µg / m^3 to 93.5µg / m^3, amounting to a 6% increase) and decrease at Tallaght Road (108.3µg / m^3 to 102.7µg / m^3, amounting to an 18% reduction). With the exception of the Leeson Bridge modelling site, annual mean NO_x concentrations at all other Grand Canal sites modelled outside of the Proposed Scheme are predicted to decrease during the Operational Phase.

The contribution of the operational phase of the Proposed Scheme to the NO_2 dry deposition rate was modelled at the Dodder Valley pNHA (M50 and Tallaght Road) and the Grand Canal pNHA (La Touche Bridge). Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Grand Canal pNHA and Dodder Valley pNHA. These include canals (FW3), dry meadow / grassy verges (GS2), reed and large sedge swamps (FS1), and riparian woodland (WN5). The Dodder Valley pNHA site will be below the lower critical load of inland and surface water habitats of 5-10 Kg(N) / ha / yr (National Road Authority 2011) at the M50, however will exceed this at Tallaght Road due to the future baseline already being in excess of this value. However, during the Operation Phase, the NO_2 dry deposition is predicted to decrease from 5.66 Kg(N) / ha / yr to 5.44 Kg(N) / ha / yr. As such, harmful effects are not predicted.

The dry deposition rate for the proposed Grand Canal pNHA crossing point is modelled to be above the lower critical load of inland and surface water habitats of 5-10 Kg(N) / ha / yr (National Road Authority 2011) during the Operation Phase. However, this is due to an existing exceedance of this value, during the Operation Phase this is predicted to decrease to beneath the 5 Kg(N) / ha / yr value at both sides of the bridge. As such, harmful effects are not predicted during Operation and mitigation measures are not required.

12.4.4.2 Habitats

12.4.4.2.1 Habitat Degradation - Surface Water Quality

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. The drainage system for the Proposed Scheme will discharge to four surface water receptors: Dodder_040, Dodder_050, Owenadoher_010 and Liffey Estuary Upper, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. For the Proposed Scheme, there will be a net increase of 7,435m^2 in the impermeable area ultimately discharging to Dublin Bay. This increase in impermeable area will be managed for the Proposed Scheme through a combination of sealed drainage, grass surface water channels, swales and bioretention/rain gardens, filter drains, tree pits and oversized pipes, additional permeable areas will also be provided by the softening of public realm along the routes. Where no new paved areas are proposed, the existing drainage network will be retained and utilised (see Chapter 4 (Proposed Scheme Description) for more detail on drainage design).

The inclusion of Sustainable Drainage Systems (SuDS) will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 13 (Water). The Proposed Scheme will not exacerbate the existing surface water quality conditions in any of the receiving surface waters, or larger waterbodies such as Liffey Estuary Lower. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDS, where appropriate.

Without the incorporation of the above design mitigation, then during operation, contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water feature has the potential to have significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, the downstream habitats of the Liffey Estuary Lower and other transitional water bodies, and Dublin Bay coastal water body could also be affected. This is deemed to be significant at a local scale.

Mitigation measures to maintain SuDS are provided in Section 12.5.2.

12.4.4.2.2 Habitat Degradation – Hydrological Regime

Changes in the flow regime due to increased surface water runoff or discharges, in new locations, could result in changes to sedimentation processes and the structure of riverbanks. None of these are predicted to have any long-term effects that would give rise to a significant negative impact on any aquatic habitats or species through effects on the hydrological regime as the drainage design principles ensure that there will be no net increase in the surface water flow discharged to these receptors (for more detail refer to Chapter 13 (Water)).

12.4.4.2.3 Habitat Degradation – Non-Native Invasive Plant Species

Three invasive plant species, Japanese knotweed, Himalayan balsam and three-cornered garlic listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), were in close proximity to the Proposed Scheme during the field surveys at 10 locations (See Table 12.7). In the absence of mitigation, there is potential for routine maintenance works to inadvertently spread contaminated vegetation cuttings both within the Proposed Scheme boundary, and within the immediate vicinity.

The effects of introducing such non-native invasive plant species to highly sensitive and ecologically important habitat areas (e.g,. designated areas for nature conservation or areas of Annex I habitat) has the potential to result in a significant negative effect, at geographic scales ranging from local to international.

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1).

12.4.4.2.4 Habitat Degradation – Air Quality

As discussed above in Section 12.4.4.1.2.1, air quality modelling of NO_x concentrations and deposition rates were modelled for the Operational Phase of the Proposed Scheme at distances up to 200m from the Proposed Scheme (refer to Chapter 7 (Air Quality) for details). The results from the Air Quality modelling deem the Proposed Scheme overall positive, slight and long term during the Operational Phase of the Proposed Scheme. As such harmful effects on vegetation from these emissions are not likely.

12.4.4.3 Rare and Protected Plant Species

12.4.4.3.1 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora Protection Order were recorded within the Proposed Scheme during field surveys. However, the desk study returned records of the Flora Protection Order species opposite-leaved pondweed from the Grand Canal, as well as wood bitter-vetch along the River Dodder. The Red listed ‘Endangered’ green flowered helleborine was also recorded in close proximity to the Proposed Scheme along the River Dodder and is also hydrologically connected to the Proposed Scheme via the River Dodder.

Opposite-leaved pondweed may lie dormant in sediments for many years until conditions become suitable for regrowth. Surface water runoff containing harmful compounds from the Proposed Scheme could affect the water quality of the Grand Canal and River Dodder and affect populations of opposite-leaved pondweed and green flowered Helleborine which are present in the vicinity of the Proposed Scheme. With regards other rare / protected terrestrial species, for which records exist in the vicinity of the Proposed Scheme, as these species do not lie within the footprint of the Proposed Scheme, and are not aquatic in nature, there is no potential for the operation of the Proposed Scheme to result in direct or indirect impacts on populations of these species.

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on rare and protected plant species either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their supporting habitats).

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of protected plant species and result in a significant negative effect, at a County to National geographic scale.

Mitigation measures to maintain SuDS are provided in Section 12.5.2.

12.4.4.4 Mammals

12.4.4.4.1 Bats

12.4.4.4.1.1 Indirect Disturbance of Light Patterns Due to Operational Lighting

Additional permanent lighting features within suitable habitat may result in avoidance behaviour by bats. Such displacement (which would be a matter of metres) could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Given the urban / suburban environment of the Proposed Scheme, and the fact that artificial lighting is already present along the footprint of the Proposed Scheme, the effects of displacement as a result of increased artificial lighting are not considered to be significant at any geographic scale. This is because the lighting strategy involves the upgrade (replacement) / relocation of some existing lighting infrastructure and given that artificial lighting is already in place along the Proposed Scheme, bat species who utilise the area would already be habituated to some level of artificial lighting. The effects of operational artificial lighting on bat species is therefore not considered to be significant at any geographic scale.

12.4.4.4.1.2 Disturbance / Displacement – Increased Human Activity

`activity by virtue of it being along an existing transport corridor. Populations of bats associated with the Proposed Scheme are likely to be habituated to a certain degree of human disturbance. No significant effect as a consequence of increased human activity to bats are predicted.

12.4.4.4.2 Badger

Multi-disciplinary surveys recorded evidence of badger within the vicinity of the Proposed Scheme.

12.4.4.4.2.1 Habitat Severance / Barrier Effect

Barriers such as road infrastructure may affect foraging behaviour and dispersal corridors, e.g., the movement of species between breeding, foraging and hibernation sites, meaning that local populations can become isolated, having long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on badger is not considered to be significant at any geographic scale. The existing infrastructure itself acts as a barrier to badger movement across the landscape and the Proposed Scheme will neither exacerbate nor improve the barrier effect already in existence.

12.4.4.4.2.2 Mortality Risk

The Proposed Scheme will not result in any increase in terms of mortality risk to badger during operation. This is because the Proposed Scheme is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The Proposed Scheme will neither exacerbate nor improve the level of mortality risk associated with this infrastructure. Therefore, the impact of mortality risk to badger, as a result of the Proposed Scheme is not regarded to be significant at any geographic scale.

12.4.4.4.2.3 Light Spill

Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005). Although the majority of the Proposed Scheme corridor is already lit artificially, the proposal will result in the introduction of artificial lighting to no previously unlit area. Lighting proposals largely involve replacing existing lighting with new lighting columns approximately 1m back in line with the new proposed road alignment. Any new lighting which is proposed is roadside where there is existing lighting present.

The lighting design of the Proposed Scheme controls light emissions such that along the majority of the alignment light spill does not extend beyond the Proposed Scheme boundary and where it does, this is at tie-ins with the

existing road / footpath networks or at residential properties. There are no known badger setts, or areas of high badger activity, within the Proposed Scheme boundary that are located within the modelled light spill zone for the Proposed Scheme.

Considering the above, lighting associated with the Proposed Scheme will not disturb or displace badgers from habitat areas located beyond the areas immediately adjacent to the Proposed Scheme boundary, will not affect the species conservation status in that regard and will not result in a significant negative effect, at any geographic scale.

12.4.4.4.3 Otter

Multi-disciplinary surveys did not confirm any otter holts within the footprint of the Proposed Scheme, an inactive holt was identified during 2020 field surveys 145m north-west of the Proposed Scheme within the Owenadoher River. Evidence of otter was also recorded within the River Dodder, and Grand Canal. These watercourses provide favourable habitat for otter populations. Otter populations present within the River Dodder and Owenadoher River are considered to potentially form part of the Wicklow Mountains SAC population.

12.4.4.4.3.1 Habitat Severance / Barrier Effect

Barriers such as road infrastructure may affect foraging behaviour and dispersal corridors, e.g., the movement of species between breeding, foraging and resting sites, meaning that local populations can become isolated, having long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on otter is not considered to be significant at any geographic scale. The existing infrastructure itself acts as a barrier to otter movement (outside of the aquatic areas) across the landscape and the Proposed Scheme will neither exacerbate nor improve the barrier effect already in existence. Proposed works at the Grand Canal or River Dodder crossings will not involve any works creating a barrier to movement during the Operational Phase. Therefore, the impact of habitat severance / barrier effect on otter, as a result of the Proposed Scheme, is not considered to be significant at any geographic scale.

12.4.4.4.3.2 Disturbance / Displacement

Nocturnal mammals, such as the otter, would be likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005). Permanent lighting is proposed along all of the Proposed Scheme footprint however, it should be noted that the majority of the Proposed Scheme corridor is already lit artificially, and so otter in the area would be habituated to some degree of artificial lighting. There are no previously unlit areas near water courses which will be artificially lit as a result of the Proposed Scheme, as such no significant displacement effects on otter are predicted.

Disturbance or displacement associated with the operation of the Proposed Scheme is not likely to affect the conservation status of otter and therefore, will not result in a long-term significant negative effect, at any geographic scale.

12.4.4.4.3.3 Habitat Degradation – Surface Water Quality

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on otter either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

The drainage design for the Proposed Scheme incorporates pollution control measures in areas where the impermeable surface area is being increased. The inclusion of these Sustainable Drainage Systems (SuDS) will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 13 (Water). The Proposed Scheme will not exacerbate the existing surface water quality conditions in any of the receiving

surface waters, or larger waterbodies such as Liffey Estuary Lower. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDS, where appropriate.

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e., the Dodder_050, Owendoher_010 and Dodder_040, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of otter and result in a significant negative effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed impact, the availability of suitable habitat for otter in the wider vicinity and the relative abundance of otter across the wider environment, as demonstrated in the results of the desk study.

12.4.4.4.3.4 Mortality Risk

The Proposed Scheme will not result in any increase in terms of mortality risk to otter during the Operational Phase. This is because the Proposed Scheme is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The Proposed Scheme will neither exacerbate nor improve the level of mortality risk associated with this infrastructure. Therefore, the impact of mortality risk to otter, as a result of the Proposed Scheme is not considered to be significant at any geographic scale.

12.4.4.4.4 **Marine Mammals**

12.4.4.4.4.1 Surface Water Quality and Prey Abundance

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on marine mammals either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a consequence of operational effects on surface water is, therefore, not likely to be significant at the local geographic scale.

12.4.4.4.5 Other Mammals

No evidence of other protected terrestrial mammals was recorded along the Proposed Scheme during surveys undertaken. However, based on the results of the desktop study, other protected terrestrial mammals (see Section 12.3.8.5) are known to occur within the wider vicinity and therefore impacts on this species cannot be excluded.

12.4.4.4.5.1 Habitat Severance / Barrier Effect

Barriers such as road infrastructure can affect foraging behaviour and dispersal corridors, e.g., the movement of species between breeding, foraging and hibernation sites, meaning that local populations can become isolated, having long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on mammals is not considered to be significant at any geographic scale. The existing infrastructure itself already acts as a barrier to mammal movement across the landscape and the Proposed Scheme will neither exacerbate nor improve the barrier effect already in existence.

12.4.4.4.5.2 Mortality Risk

The Proposed Scheme will not result in any increase in terms of mortality risk to mammals during operation. This is because the Proposed Scheme is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The Proposed Scheme will neither exacerbate nor improve the level of mortality risk associated with this infrastructure. Therefore, the impact of mortality risk to mammals, as a result of the Proposed Scheme is not regarded to be significant at any geographic scale.

12.4.4.4.5.3 Light Spill

Nocturnal mammals are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005). Permanent lighting is proposed along the Proposed Scheme however, it should be noted that the majority of the Proposed Scheme corridor is already lit artificially, and so mammals in the area would be habituated to some degree of artificial lighting.

The lighting design of the Proposed Scheme controls light emissions such that along the majority of the alignment light spill does not extend beyond the Proposed Scheme boundary and where it does, this is at tie-ins with the existing road / footpath networks or at residential properties.

Considering the above, lighting associated with the Proposed Scheme will not disturb or displace small mammal species from habitat areas located beyond the areas immediately adjacent to the Proposed Scheme boundary, will not affect the species conservation status in that regard and will not result in a significant negative effect, at any geographic scale.

12.4.4.5 Birds

12.4.4.5.1 Breeding Birds

12.4.4.5.1.1 Disturbance / Displacement

Increases in noise levels, associated with the increased frequency of bus traffic, as well as increased human presence, owing to the provision of the proposed cycle tracks, and may also have a negative effect on bird abundance and occurrence in the locality. Increased noise levels, as well as causing disturbance to birds in the locality, may also affect the breeding success of local bird populations as bird calls would become drowned out by traffic noise.

It is important to note that the majority of the Proposed Scheme is located within a highly urbanised environment, and so traffic noise is an existing source of disturbance for breeding birds in the vicinity. Owing to this, the population of breeding birds which occur here is likely to already be habituated to some level of noise disturbance and the effect of increased noise is not likely to be significant at any geographic scale.

Localised disturbance effects on breeding birds will most likely be of greater impact at areas where greater quantities of vegetation may be lost than the remainder of the scheme (e.g., Rathfarnham Road and Templeogue Road). This could result in localised displacement due to this vegetation clearance. It is therefore considered that there may be a temporary significant effect on breeding birds at a local scale, until such a time that they have established new nesting sites.

The displacement of breeding birds from the Proposed Scheme boundary is likely to result in an increase in competition for resources (e.g., nesting habitat or prey / food sources) both between and amongst breeding bird species, which in turn would have negative impacts on local breeding bird populations in the long-term.

Although the Proposed Scheme is predicted to have a long-term effect on local breeding bird populations, even at a local level this is not predicted to affect the ability of local breeding bird species to persist within their current ranges or to maintain their populations long-term. Therefore, the Proposed Scheme is not likely to affect the conservation status of breeding bird species and will not result in a significant negative effect, at any geographic scale.

12.4.4.5.1.2 Habitat Degradation – Surface Water

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could result in contamination of receiving water bodies. In the absence of mitigation, this could potentially result in significant negative impacts on breeding birds either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water during operation is not predicted to affect the conservation status of aquatic or wetland bird species and will therefore, not result in a significant negative effect, at any geographic scale.

12.4.4.5.2 Wintering Birds

This section of the impact assessment deals with wintering bird species, i.e., those bird species which are SCIs of SPAs for their wintering populations or are listed on either the BoCCI Red or Amber lists for their wintering populations.

12.4.4.5.2.1 Disturbance / Displacement

During operation, the Proposed Scheme has the potential to disturb and displace wintering bird species from habitats near the Proposed Scheme boundary due to an increase in noise, human activity and visual disturbance associated with increased human presence and increased traffic flow. Although the operational disturbance / displacement effect cannot be quantified with precision, it is expected to be much less than the 300m ZoI associated with construction works because operational disturbance will be limited to vehicular traffic and periodic maintenance works, which is also present within the existing environment. Most species of wintering birds are likely to habituate to the increased traffic flows and human presence along cycle tracks etc. Any operational noise increases are not likely to alter the existing baseline effect on wintering birds using the habitats locally.

Although there is still likely to be some level of displacement effect, a perceptible effect would be expected to be limited to inland feeding site habitats immediately adjacent to the Proposed Scheme. A single known major wintering bird feeding site occurs immediately adjacent to the Proposed Scheme, however the grassland areas potentially utilised by wintering bird species are located approximately 400m north of the Proposed Scheme Boundary and hence are outside of the disturbance ZoI. The only area within the Proposed Scheme which was considered to have potential to support wintering birds was the R112 Dodder View Road Construction Compound (TR3). Survey evidence revealed low usage of the site, by a small number of SCI or wintering bird species. With the removal of the Construction Compound TR3 post-construction, the area will be returned to its managed state, with no loss of territory. As any operational noise increases are not likely to alter the existing baseline noise effect on wintering birds in the locality, effects of noise disturbance can also be excluded.

Therefore, any displacement of wintering birds from habitat areas during the Operation Phase of the Proposed Scheme is not likely to affect the conservation status of wintering bird species and will not result in a significant negative effect, at any geographic scale.

12.4.4.5.2.2 Habitat Degradation – Surface Water

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on wintering birds either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water during operation is not predicted to affect the conservation status of wintering bird species and will therefore, not result in a significant negative effect, at any geographic scale.

12.4.4.6 Reptiles

No evidence of any protected reptile species, such as common lizard, was identified along the Proposed Scheme during surveys undertaken. No suitable habitat for common lizard was recorded during the surveys undertaken either. The desktop review did reveal one recent records for common lizard in lands in close proximity to the Proposed Scheme. Therefore, a precautionary approach has been adopted which has not excluded the possibility of common lizard being present in the vicinity of the Proposed Scheme.

12.4.4.6.1 Habitat Severance/ Barrier Effect

Barriers such as road infrastructure may affect foraging behaviour and dispersal corridors, e.g., the movement of species between breeding and hibernation sites, meaning that local populations can become isolated, having long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on common lizard is not considered to be significant at any geographic scale. The existing infrastructure itself acts as a barrier to amphibian movement across the landscape and the Proposed Scheme will neither exacerbate nor improve the barrier effect already in existence.

12.4.4.6.2 Mortality Risk

The Proposed Scheme will not result in any increase in terms of mortality risk to common lizard during operation. This is because the Proposed Scheme is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The Proposed Scheme will neither exacerbate nor improve the level of mortality risk associated with this infrastructure. Therefore, the impact of mortality risk to common lizard, as a result of the Proposed Scheme is not considered to be significant at any geographic scale.

12.4.4.7 Amphibians

No evidence of any protected amphibian species, such as common frog or smooth newt, were identified along the Proposed Schemed during surveys undertaken. However, suitable amphibian habitat such as vegetated riverbanks were recorded within the Proposed Scheme. The desk study returned records of amphibians in the vicinity of the Proposed Scheme and therefore impacts on these species cannot be excluded.

12.4.4.7.1 Habitat Severance / Barrier Effect

Barriers such as road infrastructure may affect foraging behaviour and dispersal corridors, e.g., the movement of species between breeding and hibernation sites, meaning that local populations can become isolated, having long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on amphibian species is not considered to be significant at any geographic scale. The existing infrastructure itself acts as a barrier to amphibian movement across the landscape and the Proposed Scheme will neither exacerbate nor improve the barrier effect already in existence.

12.4.4.7.2 Mortality Risk

The Proposed Scheme will not result in any increase in terms of mortality risk to amphibians during operation. This is because the Proposed Scheme is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The Proposed Scheme will neither exacerbate nor improve the level of mortality risk associated with this infrastructure. Therefore, the impact of mortality risk to amphibians, as a result of the Proposed Scheme is not considered to be significant at any geographic scale.

12.4.4.7.3 Habitat Degradation – Surface Water

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on amphibians either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of amphibians and result in a significant negative effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed impact and the availability of suitable habitat for amphibians in the wider vicinity, as demonstrated in the results of the desk study.

12.4.4.8 Fish

12.4.4.8.1 Habitat Degradation – Surface Water

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on European eel and other fish species either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water during operation is not predicted to affect the conservation status of fish species and will therefore, not result in a significant negative effect, at any geographic scale.

12.4.4.9 Invertebrates

12.4.4.9.1 Habitat Degradation – Surface Water

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on freshwater molluscs either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

Habitat degradation as a result of effects on surface water during operation is not predicted to affect the conservation status of freshwater molluscs and will therefore, not result in a significant negative effect, at any geographic scale.

12.4.4.10 Summary of Potential Operational Phase Impacts (Pre-mitigation)

Table 12.18: Summary of Potential Operational Phase Impacts (Pre-mitigation)

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Designated Areas for Nature Conservation			
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Wicklow Mountains SAC	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA	International Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rockabill SPA	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale
Grand Canal pNHA	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Dodder Valley pNHA	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Habitats (outside of designated areas for nature conservation)			
Canal FW3	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
Depositing / lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Rare / Protected Plant Species			
Flora species listed on the Flora Protection Order	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Flora species on Ireland's Red Lists (Vulnerable or of higher concern concern)	County to National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
All other non-Red listed flora species	Local Importance (Lower Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Non-native invasive plant species	N/A	Spread at expense of other habitats	Likely significant effect at the local to international scale geographic scale
Fauna Species			
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
SCI bird species	International Importance	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology); collision risk	Likely significant effect at the local geographic scale
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Amphibians	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Fish Species	Local Importance (Higher Value) – International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Non-Annex fish species	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Invertebrates- freshwater molluscs	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Local Biodiversity Areas			
DCC			
Grand Canal	National Importance	Habitat degradation (hydrology; non-native invasive plant species air quality)	Likely significant effect at the local geographic scale
River Dodder Corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale
SDCC			
Network of streams and River e.g. Dodder	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
DLRCC			
Wildlife Corridors- Dodder Valley corridor and Ticknock to River Dodder corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale

12.5 Mitigation and Monitoring Measures

12.5.1 Construction Phase

Where deemed necessary a suitably experienced and qualified ecologist will be employed by the appointed contractor. The ecologist will advise the appointed contractor on ecological matters during construction,

communicate all findings in a timely manner to the NTA and statutory authorities, acquire any licenses / consents required to conduct the work, and supervise and direct the ecological measures associated with the Proposed Scheme.

12.5.1.1 Designated Areas for Nature Conservation

12.5.1.1.1 European sites

The mitigation measures that are required to ensure that the Proposed Scheme will not adversely affect the integrity of the European sites within the ZoI are presented in the Natura Impact Statement (NIS). Following a consideration and assessment of the Proposed Scheme on the identified relevant European sites, the following mitigation measures were developed to address potential impacts that were identified:

- Measures to protect surface water quality during construction;
- Measures to prevent the spread of invasive species to downstream European sites; and,
- Measures to prevent disturbance / displacement of Species of Conservation Interest during construction.

12.5.1.1.2 National sites

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on NHA and pNHAs within the ZoI are as per those for European sites as the boundaries coincide with the SACs and SPAs. Therefore, the mitigation measures outlined above in Section 12.5.1.1.1, and as detailed in the NIS, will prevent the Proposed Scheme resulting in a significant negative effect on these NHA and pNHAs at the national geographic scale. It should be noted that the full suite of mitigation measures proposed to protect surface water during the Construction Phase and to prevent the spread of invasive species to downstream European and national sites are set out in full in Appendix A5.1 CEMP in Volume 4 of this EIAR.

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on the Grand Canal pNHA and Dodder Valley pNHA including habitat degradation as a result of surface water and groundwater quality effects and the spread of non-native invasive species, and air quality (see Sections 12.5.1.2.2, 12.5.1.2.3 12.5.1.2.5, and 12.5.1.2.4 effects on rare and protected plant species (see Section 12.5.1.3), and negative effects on the protected fauna species associated with the sites such as mammals, riparian birds, and fish species (see Sections 12.5.1.4, 12.5.1.5, 12.5.1.8).

12.5.1.2 Habitats

12.5.1.2.1 Habitat Loss and Fragmentation

Where practicable, areas of vegetation including habitats of Local Importance (Higher Value), (i.e. mixed broadleaved woodland (WD1), scattered trees and parkland (WD5), hedgerow (WL1) and treeline (WL2) habitat types), which lie within the footprint, or along the boundary of the Proposed Scheme, will be retained. Vegetation to be retained is shown in further detail on the Landscape General Arrangement Drawings [BCIDC-ARP-ENV_LA1012_XX_00-DR-LL-9001] in Volume 3 of this EIAR. Proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor, shown as design mitigation, is listed below and displayed on the Landscaping General Arrangement drawings [BCIDC-ARP-ENV_LA1012_XX_00-DR-LL-9001] in Volume 3 of this EIAR. These areas will be protected for the duration of construction works and fenced off at an appropriate distance.

To mitigate loss of habitat, proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor listed below and displayed on the Landscaping General Arrangement drawings [BCIDC-ARP-ENV_LA1012_XX_00-DR-LL-9001] in Volume 3 of this EIAR:

- 400 trees planted;
- 126.4m of proposed hedgerow;
- 7,300 m^2 of proposed species rich grassland;
- 932 m^2 of proposed ornamental planting; and,
- 9,212 m^2 of proposed amenity grassland planting.

12.5.1.2.2 Habitat Degradation – Surface Water Quality

In terms of mitigation a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP) in Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval. At a minimum, all the control and management measures set out in the SWMP will be implemented by the appointed contractor. This includes measures relating to:

- Construction Compound management including the storage of fuels and materials;
- Control of Sediment;
- Use of Concrete;
- Management of vehicles and plant including refuelling and wheel wash facilities (if necessary); and
- Monitoring.

Following implementation of the mitigation measures outlined in the SWMP, the majority of impacts will not be significant. However, Construction Compound TR1 at Spawell Link Road, Construction Compound TR3 at Dodder View Road and Construction Compound TR6 along Spawell Link Road are in close proximity to the River Dodder.

Construction Compound TR1 is proposed on an existing greenfield site with no existing surface water drains within the site itself. However, there is potential for overland flow of pollutants, discharging to the Dodder_040 during the Construction Phase No additional specific mitigation measures other than listed above are required .

Whilst there is an existing low retaining wall along Dodder View Road in the vicinity of Construction Compound TR3 which will provide some protection to the water body from contaminated surface water runoff during the set up and operation of the compound, the close proximity presents a risk for potential impacts from storage of materials and runoff. Silt curtains/bunding or infiltration trenches will be installed by the appointed contractor on the boundary inside the retaining wall, and higher than it, to prevent any silty water or spillages from reaching the water body. The appointed contractor will store fuels as far away as possible from the road to minimise the chances of an overland flow of spillages, especially via access and egress routes. All other potentially risk activities or storage of materials will similarly be located at the southern boundary of the site.

Construction Compound TR6 is also located in the vicinity of the Dodder_040 and during the Construction Phase there is the potential for accidental spillages or runoff from stored materials and topsoil within the compound to result in impacts to this waterbody. Silt curtains or soil "bunds" (as used for the existing compound) will be installed and maintained for the duration of construction. In addition, fuel and other materials will be stored at the southern boundary of the site.

12.5.1.2.3 Habitat Degradation – Groundwater

The following mitigation measures will be implemented with regard to pollution of soil and groundwater:

- The construction management of the site will be implemented by the appointed contractor will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams *et al.* 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination; and
- Measures to be implemented by the appointed contractor to minimise the risk of spills and contamination of soils and waters include:
    - Employing only competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;

- Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access;
- The location of any fuel storage facilities will be considered in the design of the Construction Compound. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded;
- Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire Construction Phase;
- Potential pollutants to be adequately secured against vandalism;
- Provision of proper containment of potential pollutants according to codes of best practice;
- Thorough control during the entire Construction Phase to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and
- Spill kits will be provided and be kept close to the storage area. Staff to be trained on how to use spill kits correctly.

The mitigation measures to protect groundwater quantity and quality during the Construction Phase are also outlined in Chapter 14 (Land, Soils, Geology & Hydrogeology) and Appendix A5.1 in Volume 4 of this EIAR.

12.5.1.2.4 Habitat Degradation – Air Quality

A series of mitigation measures will be implemented by the appointed contractor to minimise dust nuisance impacts:

- Public roads affected by the Proposed Scheme works will be regularly inspected for soiling associated with the construction activities and cleaned as necessary;
- Material handling systems and stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays (or similar dust suppression methods) will be used as required if particularly dusty activities associated with the construction contract are necessary during dry or windy periods;
- During movement of dust generating materials both on and off-site, trucks will be covered with tarpaulin, and before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place; and,
- The appointed contractor will provide a site hoarding of 2.4m height along noise sensitive boundaries, at a minimum, at the Construction Compound, which will assist in minimising the potential for dust impacts off-site; and
- The appointed contractor will keep the effectiveness of the mitigation measures under review and revise them as necessary. In the event of dust nuisance associated with the Proposed Scheme occurring outside the works boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem.

12.5.1.2.5 Habitat Degradation – Non-Native Invasive Plant Species

The NTA will ensure that a confirmatory pre-construction non-native invasive species survey will be undertaken by a suitably qualified specialist to confirm the absence and / or extent of all Third Schedule non-native invasive species within the footprint of the Proposed Scheme. Where an infestation is confirmed / identified, this will require the implementation of a non-native Invasive Species Management Plan (refer to the Plan contained in the CEMP in Appendix A5.1 of Volume 4 of this EIAR).

Following the confirmatory pre-construction survey, the following mitigation measures will be implemented, as required:

- Where a pre-construction non-native invasive species re-survey has confirmed the presence of previously identified Third Schedule non-native invasive species, or identifies newly established non-native invasive species within the footprint of the Proposed Scheme, the ISMP produced will

provide a detailed description of the infestations (e.g. approximate area of the respective colonies (m^2), where feasible; approximate total number of stems, pattern of growth and information on other vegetation present), and where necessary, include calculations of volumes of infested soils to be excavated.

- The ISMP will be updated following the pre-construction survey as advised by a suitably qualified specialist, with regard to the guidance on The Management of Invasive Alien Plant Species on National Roads (Technical Guidance) (TII 2020a; 2020b) and other species-specific guidance documents including those listed in the ISMP, as necessary.

- The NTA will ensure that all control measures specified in the ISMP shall be implemented by a suitably qualified and licensed specialist prior to the construction of the Proposed Scheme to control the spread of non-native invasive species within the footprint of the Proposed Scheme. Furthermore, the appointed contractor will adhere to control measures specified within the ISMP throughout the Construction Phase of the Proposed Scheme.

The site will be monitored by the appointed contractor after control measures have been implemented. Any re-growth will be subsequently treated as detailed in the ISMP.

12.5.1.3 Rare and Protected Plant Species

12.5.1.3.1 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora Protection Order were recorded during the field surveys within the Proposed Scheme Boundary, however the desk study returned records of the Flora Protection Order species opposite-leaved pondweed from the Grand Canal, as well as wood bitter-vetch along the River Dodder. The Red listed 'Endangered' green flowered helleborine was also recorded in close proximity to the Proposed Scheme along the River Dodder and is also hydrologically connected to the Proposed Scheme via the River Dodder. Therefore, no species-specific mitigation is proposed.

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.4 Mammals

12.5.1.4.1 **Bats**

12.5.1.4.1.1 <u>Protection of Bats during Vegetation Clearance</u>

All bat species and their roost sites are strictly protected under both European and Irish legislation including:

- Wildlife Acts;
- The Habitats Directive; and,
- Birds and Habitats Regulations.

It is an offence to kill a bat or to damage or destroy the breeding or resting place of any bat species, and it is not necessary that the action should be deliberate for on offence to occur. This puts an onus of due diligence on anyone proposing to carry out works that might result in such damage or destruction. Under Section 54 of the Birds and Habitats Regulations, a derogation may be granted by the Minister where there is no satisfactory alternative, and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range.

No active roosts were identified during the multi-disciplinary surveys within the footprint of the Proposed Scheme. There were 9 no. trees identified with potential roost features (PRFs) (see Figure 12.7.2. in Volume 3 of this EIAR) from the multi-disciplinary surveys within the Proposed Scheme footprint (permanent and temporary landtake). Four of these trees will be removed during the Construction Phase of the Proposed Scheme, and the following mitigation measures will be implemented by the appointed contractor in respect of retained PRF (as well as other mature trees):

- Where works are required within the Root Protection Area (RPA) of trees (including those trees identified as PRFs), the mitigation measures as set out in the method statement within the Arboricultural Impact Assessment (refer to Appendix A17.1 in Volume 4 of this EIAR) and which follow the requirements of the British Standard Institution (BSI) British Standard (BS) 5837:2012 Trees in relation to in relation to design, demolition and construction – Recommendations will be implemented; and
- • These PRFs trees will in advance of any works commencing in the area be protected by the appointed contractor for the duration of construction works associated with the Proposed Scheme.

In addition to the above the following bat specific mitigation measures (in relation to vegetation clearance) will be implemented by the appointed contractor:

- Where the qualified arborist engaged by the appointed contractor is required to assess the condition of, and advise on any repair works necessary to, any trees which are to be retained (including PRF-containing trees or category U trees), these will be notified to the appointed ecologist to be surveyed to confirm if these trees contain PRFs (as done for the pre-construction surveys outlined in Section 12.5.1.4.1.2). Where these previously identified or new PRF trees require works including removal for example due to poor condition, they will be subject to mitigation as described in Section 12.5.1.4.1.2; and,
- There will be no additional lighting within 5m of any PRF tree during the Construction Phase of the Proposed Scheme to avoid potential disturbance to roosting bats.

12.5.1.4.1.2 Roost Loss

As previously mentioned,four trees with Potential Roost Features (PRFs) will be removed during the Construction Phase. However, it must be noted that trees that are currently unsuitable may become roosts between the pre-planning assessment contained within this EIAR and the Construction Phase of the Proposed Scheme.

Potential Roost Feature Re-appraisal (first step of Preconstruction Survey):

The NTA will ensure that a confirmatory pre-construction survey of all trees identified as containing PRFs or not to be removed within the boundary of the Proposed Scheme shall be rechecked for Potential Roost Features (PRFs) by an experienced bat specialist engaged by the NTA as part of the preconstruction surveys. The Appraisal will:

- Confirm that previously identified PRF trees which are to be retained are still standing; and
- Identify whether new PRF features (if any) may have developed owing to damage or management change to a PRF tree in the intervening period between the original surveys and grant of planning.

Pre-construction Survey

In the unlikely event that new PRFs are detected during the pre-construction survey it is recommended that:

- In advance of any clearance all trees deemed to contain PRFs which are subject to felling / clearance will be checked for the presence of bats by a suitably qualified / licenced bat specialist (using an endoscope under a separate licence held by that individual);
- In the unlikely event that bats are found on the proposed development site during construction works such as vegetation clearance, works will immediately cease in that area and the local NPWS Conservation Ranger will be contacted;
- An application will then be made to the National Parks and Wildlife Service for a derogation licence to permit actions affecting bats or their roosts that would normally be prohibited by law;

- After licence approval from the NPWS (which may include the necessity for additional mitigation measures to those recommended here) bats may be removed by a bat specialist licenced to handle bats and released in the area in the evening following capture; and
- Only then will PRF trees be felled and this should be undertaken 'in sections' where the section can be handled to avoid sudden movements or jarring of the sections.

Installation of Bat Boxes

In addition to mitigation proposals that may arise as result of the pre-construction survey (e.g. emergence surveys and confirmation of roost), it is proposed to install generalist / self-cleaning bat boxes for each PRF tree that is confirmed to be removed:

- Standard Schwegler 1FFH (2 number) and 3FF boxes (1 number) for all PRF trees to be removed;
- The boxes will be installed three months in advance of felling of any PRF tree and in public spaces managed by the Local Authority as close as possible to areas of the PRF tree to be felled and which overlap with areas of bat activity confirmed during activity surveys undertaken as part of the EIAR;
- The boxes will be installed on the tree at a height of 3-5 and firmly fixed to tree trunk;
- Where practicable, the bat boxes will be installed in an east, south and west orientation and protected from undue disturbance by selective placement away from light spill and at a height more than 3.5m;
- There will be 1m clearance (e.g., no overhanging branches or ivy encroachment near installed box) around each bat box opening; and,
- Installed bat boxes will labelled and data (reference number, GPS location and photographic record) will be supplied to Bat conservation Ireland (BCI), Local Authority Biodiversity Officer and NPWS.

12.5.1.4.1.3 Habitat Loss and Fragmentation

Where practicable, habitats of importance to bats such as scattered trees and parkland (WD5), hedgerow (WL1) and treeline (WL2) habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted by the Proposed Scheme will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-0001 to 0037) in Volume 3 of this EIAR.

To minimise the loss of habitat associated with the Proposed Scheme, there are also areas within the Proposed Scheme footprint which are included for mitigation planting where general construction works will not be undertaken. Proposed planting incorporated into the Proposed Scheme will be implemented, shown as design mitigation, is listed below and displayed on the Landscaping General Arrangement Drawings [BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-0001 to 0037] in Volume 3 of this EIAR:

- 400 trees planted;
- 126.4m of proposed hedgerow;
- 7,300 m^2 of proposed species rich grassland;
- 932 m^2 of proposed ornamental planting; and,
- 9,212 m^2 of proposed amenity grassland planting.

Many species may not roost near a road development due to disturbance (e.g., high levels of artificial lighting). Whilst the planting is not likely to fully offset the loss of foraging and commuting habitat it is likely to provide additional foraging habitat after trees and hedgerows grow to a sufficient maturity.

12.5.1.4.1.4 Disturbance of Flight Patterns / Foraging Routes as a result of Lighting Impacts

The appointed contractor in liaison with the suitably qualified licensed ecologist(s) will ensure that lighting at the Construction Compounds, and active work areas in proximity to known bat activity, will be designed to minimise light spill and be cognisant of light-spill onto these areas.

Notwithstanding the urban / suburban location of the Proposed Scheme and existing public illumination, there are areas of open and linear vegetation features that provide for bats. However, during construction, the use of security lighting such as that around the Construction Compounds and or additional lighting required for night-time works could impact on commuting / foraging territory.

Where deemed necessary, a suitably qualified licensed ecologist(s), engaged by the appointed contractor will ensure that lighting at the Construction Compounds and in active work areas, which are in close proximity to watercourses with known bat activity, will be designed to minimise light spill and be cognisant of downward light-spill onto watercourses.

Mitigation measures to reduce light spill will include the following:

- the use of sensor / timer triggered lighting;
- LED luminaires to be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- column heights to be considered to minimise light spill;
- accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed; and,
- Where night time works are required the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works (especially works carried adjacent to watercourses with known bat activity).

12.5.1.4.2 Badger

Badger, and their breeding and resting places, are protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure a badger or to wilfully interfere with or destroy their breeding or resting places (setts).

12.5.1.4.2.1 Protection of Badgers from Accidental Harm During Construction (Excavations)

Uncovered deep excavations could be potentially hazardous for badgers commuting / foraging in the area. Badgers could fall into these excavations, becoming trapped and potentially hurt and distressed.

To protect badgers from indirect harm during construction, where practicable, open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor.

Excavations will also be covered at night, where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow mammals to safely exit should they fall in.

12.5.1.4.2.2 Disturbance / Displacement

Although there were no signs of badger recorded during field surveys of accessible areas, badger could potentially establish new territory within the ZoI of the Proposed Scheme. Therefore, the NTA will ensure that a confirmatory pre-construction check of all suitable badger habitat will be completed within 12 months prior to any construction works commencing.

The presence of any new setts or significant badger activity will be treated and / or protected in accordance with the Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (NRA 2005b).

12.5.1.4.2.3 Lighting

For mitigation to reduce the impact of lighting on local badger please refer to Section 12.5.1.4.1.4.

12.5.1.4.3 Otter

Otter are listed on Annex II and Annex IV of the Habitats Directive and are strictly protected under the Birds and Habitats Regulations. Otter, and their breeding and resting places, are also protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure an otter or to wilfully interfere with or destroy their breeding or resting places (holts / couches). Although, there were no signs of otter activity recorded during field surveys, otter are known to occur in the vicinity of the Proposed Scheme, particularly along the River Dodder and Owenadoher River as well as the Grand Canal.

12.5.1.4.3.1 Loss of Breeding / Resting Sites

The otter holt within the Owenadoher River will not be lost as a result of the Proposed Scheme.

Although there were no otter holts recorded within the footprint of the Proposed Scheme during field surveys, otter could potentially establish new holt or couch sites within the footprint of the Proposed Scheme. The NTA will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed by a suitably qualified ecologist within 12 months prior to any construction works commencing.

The presence of any new holt / couch sites will be treated and / or protected in accordance with the Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA 2006b).

12.5.1.4.3.2 Disturbance / Displacement

Although the otter holt at the Owenadoher River was not active during 2020 surveys, otter could potentially re-establish at this site during the Construction Phase of the Proposed Scheme.

As detailed above in Section 12.5.1.4.3.1 prior to construction works commencing, the NTA will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed by a suitably qualified ecologist within 12 months prior to any construction works commencing, in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2006b).

12.5.1.4.3.3 Measures to Prevent Injury / Mortality Impacts

As detailed above in Section 12.5.1.4.3.1 prior to construction works commencing, the appointed contractor will engage the services of a suitably qualified ecologist to conduct a pre-construction otter survey of the Proposed Scheme in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2006b).

12.5.1.4.3.4 Habitat Degradation / Reduced Prey Availability – Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.4.3.5 Lighting

Refer to Section 12.5.1.4.1.4 for lighting mitigation measures.

12.5.1.4.4 **Marine Mammals**

12.5.1.4.4.1 Habitat and Food Source Degradation – Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.4.5 **Other Mammal Species**

No other protected mammal species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme. The Construction Phase of the Proposed Scheme is not deemed to affect the local populations of other small mammal species and will not result in a significant negative effect, at any geographic scale.

In terms of mitigation, a SWMP has been prepared (provided in the CEMP,
Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding,
preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.5 Birds

12.5.1.5.1 Breeding Birds

12.5.1.5.1.1 Habitat Loss & Fragmentation

Where possible, habitats of importance to breeding birds such as scattered trees and parkland (WD5), hedgerow (WL1) and treeline (WL2) habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

Planting of treeline, hedgerow and grassland habitats within the Proposed Scheme footprint will be carried out by the appointed contractor, as detailed in the landscape drawings (Refer to the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-9001) in Volume 3 of this EIAR for locations.

Many species may not nest near a road development due to disturbance (e.g., drowning out of bird song by traffic noise). Whilst the planting is not likely to fully offset the loss of breeding and foraging habitat (due to the proximity of road traffic disturbance on the operational road) it is likely to provide additional foraging habitat for some species.

12.5.1.5.1.2 Mortality Risk

Where practical, vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will not be removed, between the 01 March and the 31 August, to avoid direct impacts on nesting birds.

Where the construction programme does not allow this seasonal restriction to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of breeding birds prior to clearance.

Areas found not to contain nests will be cleared within three days of the nest survey, otherwise repeat surveys will be required. Vegetation clearance will not commence where nests are present, works will resume when birds have fledged and nests are no longer in use, or an agreement is reached with NPWS.

12.5.1.5.1.3 Disturbance / Displacement

Similar to the requirements provided above in terms of reducing mortality risk, vegetation clearance undertaken in the appropriate time should ensure that breeding birds have adequate time in which to identify alternative vegetation in which to establish nests.

To mitigate disturbance and / or displacement to breeding birds from noise and vibration activities the relevant mitigation measures as described in Chapter 9 (Noise & Vibration) will be implemented by the appointed contractor.

The use of noise generating equipment shall be tempered by the use of modern machinery that shall have appropriate noise restrictors for use in urban situations. Furthermore, the location of equipment that has the potential to cause long-term noise impacts, shall be sited in such a manner so that noise baffling screening reduces noise spill to adjacent areas of open ground.

12.5.1.5.1.4 Habitat Degradation – Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.5.2 Wintering Birds

12.5.1.5.2.1 Measures to Prevent Disturbance and Displacement Impacts during Construction

The following mitigation measures will be put in place at the Construction Compound TR3 by the appointed contractor to minimise disturbance to SCI bird species:

- The appointed contractor will undertake the establishment of the construction compound TR3 outside of the wintering bird season (October to March). However, where the construction programme does not allow this seasonal restriction to be observed, then the construction compounds will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to establishment. Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken;
- Hoarding of the Construction Compounds will be in place prior to the arrival of wintering birds and will be retained on all sides of the compound for the duration of the works;
- The use of lighting at Construction Compounds where required shall be such that it is not excessively tall thus providing an obstacle to low-flying birds potentially moving between feeding sites. Furthermore, and where security lighting is not required, lighting should not be continuously on when compound is closed. Sensor-operated lighting timers as necessary should be installed; and
- In addition to lighting at the Construction Compound aligning with Section , the lighting column heights will be considered by the appointed contractor, so as not to act as an obstacle to birds.

12.5.1.5.2.2 Habitat Degradation – Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.6 Reptiles

No reptile species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme. The Construction Phase of the Proposed Scheme is not deemed to affect the local reptile population and will not result in a significant negative effect, at any geographic scale. As such, no mitigation is proposed.

12.5.1.7 Amphibians

12.5.1.7.1 Habitat Loss, Disturbance and Mortality Risk

No amphibian species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme, despite the presence of suitable habitat adjacent to the footprint of the Proposed Scheme (e.g. vegetated riverbanks associated with the River Dodder and Grand Canal).

If vegetation clearance works by the appointed contractor are to begin during the season where frogspawn or tadpoles may be present (i.e., February to mid-summer), or where breeding adult newts, their eggs or larvae may be present (i.e., mid-March to September), a pre-construction survey of suitable habitat will be undertaken by a suitably qualified ecologist engaged by the appointed contractor to determine whether breeding amphibians are present. Where amphibians are present, mitigation measures outlined below will be completed before works recommence.

- In the case of common frog, any frog spawn, tadpoles, juvenile or adult frogs present will be captured, under a licence from NPWS and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat, beyond the ZoI of the Proposed Scheme;
- In the case of smooth newt, individuals will be captured, under a licence from NPWS, and removed from affected habitat either by hand net or by trapping and translocated to the nearest area of available suitable habitat, beyond the ZoI of the Proposed Scheme. If used, the type and design of traps shall be approved by the NPWS. This is a standard and proven method of catching and translocating smooth newt;
- If the size or depth of the habitat feature is such that it cannot be determined by a visual survey whether all amphibians have been captured, the suitably qualified ecologist engaged by the appointed contractor will advise on the appropriate course of action to confirm that no amphibian species remain. If drainage of the habitat feature is deemed to be the appropriate course of action, any mechanical pumps used will have a screen fitted, and be sited, such that no amphibian species can be sucked into the pump mechanism; and,
- Any capture and translocation works shall be undertaken immediately in advance of site clearance / construction works commencing.

12.5.1.7.2 Habitat Degradation- Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.8 Fish

12.5.1.8.1 Habitat Degradation – Surface Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.9 Invertebrates – Freshwater Molluscs

12.5.1.9.1 Habitat Degradation – Surface Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.2 Operational Phase

12.5.2.1 Designated Areas for Nature Conservation

12.5.2.1.1 European Sites

The mitigation measures that are specifically required to ensure that the Proposed Scheme will not adversely affect the integrity of the European sites within the ZoI are presented in the NIS. Following a consideration and assessment of the Proposed Scheme on the identified relevant European sites, the following mitigation measures were developed to address potential impacts that were identified:

- Measures to protect surface water quality during operation;
- Measures to prevent the spread of non-native invasive species to downstream European sites; and,
- Measures to prevent disturbance/displacement to Species of Conservation Interest.

12.5.2.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on pNHAs within the ZoI are as set out for European sites as the boundaries of the pNHAs follow those of the SACs and SPAs. Therefore, the mitigation measures outlined in Section 12.5, and as detailed in the NIS (which accompanies the application for approval), will prevent the Proposed Scheme resulting in a significant negative effect on these pNHAs.

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on the Grand Canal pNHA includes habitat degradation as a result of surface water quality effects (see Section 12.5.2.2.1.1) and the spread of non-native invasive species (see Section 12.5.2.2.1.2), effects on rare and protected plant species (see Section 12.5.2.3), and negative effects on the protected fauna species associated with the sites such as mammals, riparian birds, and fish species (see Sections 12.5.2.4, and Section 12.5.2.8).

12.5.2.2 Habitats

12.5.2.2.1.1 Habitat Degradation – Surface Water Quality

The proposed SuDS drainage system, as shown in Proposed Surface Water Drainage Works drawings (BCIDC-ARP-DNG_RD-0006_XX_DR-CD-9001 in Volume 3 of this EIAR), will be installed by the appointed contractor during the Construction Phase.

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. The increase in surface water run-off from the increase in impermeable area will be managed for the Proposed Scheme by the appointed contractor through a combination of bioretention areas and filter drains. Where no new paved areas are proposed, the existing drainage network will be retained and utilised. The effective implementation of these measures will ensure that there is no increase in existing runoff rates from newly paved areas and appropriate

treatment to ensure runoff quality. The range of measures including SuDS installed during the Construction Phase will reduce both the volume and rate of surface waters discharging into the existing surface water drainage network, as well as improving the environmental quality of any such discharges during the Operational Phase of the Proposed Scheme.

These standard drainage design controls have been proven through widespread use in developments across the country. The proposed SuDS drainage system incorporated into the design of the site are common drainage systems that are used in most development types. They are proposed and designed in accordance with the Greater Dublin Strategic Drainage Study (Dublin Drainage Consultancy 2005).

Once the Proposed Scheme is in operation, the Local Authorities will be required to implement a maintenance and inspection regime for SuDS which will be subject to their management procedures. No additional mitigation is required.

12.5.2.2.1.2 Habitat Degradation – Non-Native Invasive Plant Species

Once the Proposed Scheme is in operation, the local authorities will implement a maintenance and management regime subject to their management procedures, where any introduction of non-native invasive plant species will be managed. No additional mitigation is required.

12.5.2.2.1.3 Habitat Degradation – Hydrological Regime

Given there are no significant effects on habitats owing to impacts from hydrological regime changes, no mitigation is required.

12.5.2.2.1.0 Habitat Degradation – Groundwater

Given there are no significant effects on habitats owing to impacts from groundwater changes, no mitigation is required.

12.5.2.3 Rare and Protected Flora Species

12.5.2.3.1 Habitat Degradation- Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1.

12.5.2.4 Mammals

12.5.2.4.1 **Bats**

The Operational Phase of the Proposed Scheme is not predicted to result in any significant effects to populations of bats in the vicinity of the Proposed Scheme. Therefore, no mitigation is proposed.

12.5.2.4.2 Badgers

The Operational Phase of the Proposed Scheme is not predicted to result in any significant effects to populations of badger in the vicinity of the Proposed Scheme. Therefore, no mitigation is proposed.

12.5.2.4.3 Otter

12.5.2.4.3.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1.

12.5.2.4.4 **Marine Mammals**

12.5.2.4.4.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1.

12.5.2.4.5 **Other Mammal Species**

The Operational Phase of the Proposed Scheme is not predicted to result in any significant effects to populations of other small mammal species in the vicinity of the Proposed Scheme. Therefore, no mitigation is proposed.

12.5.2.5 Birds

12.5.2.5.1 Breeding Birds

12.5.2.5.1.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1.

12.5.2.5.2 Wintering Birds

12.5.2.5.2.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1.

12.5.2.6 Reptiles

No significant effects on reptile species are predicted during the Operational Phase of the Proposed Scheme. Therefore, no mitigation is required.

12.5.2.7 Amphibians

12.5.2.7.1 Habitat Degradation- Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1.

12.5.2.8 Fish

12.5.2.8.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1.

12.5.2.9 Invertebrates – Freshwater Molluscs

12.5.2.9.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality please refer to Section 12.5.2.2.1.1

12.6 Residual Impacts

12.6.1 Construction Phase

Following the implementation of the mitigation measures outlined in Section 12.5, the Proposed Scheme will not result in any significant residual effects above the local scale on the KERs identified (see Table 12.19) on its own, or cumulatively together with other proposed developments during the Construction Phase.

Table 12.19: Summary of Construction Phase Significant Residual Impacts

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Designated Areas for Nature Conservation				
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Wicklow Mountains SAC	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale	No significant residual effect
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
			national geographic scale	
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rockabill SPA	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
The Grand Canal pNHA	National Importance	Habitat degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Dodder Valley pNHA	National Importance	Habitat degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Habitats (outside of designated areas for nature conservation)				
Canals (FW3)	National Importance	Habitat degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Depositing / lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Rare / Protected Plant Species				

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Flora species listed on the Flora Protection Order	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Flora species on Ireland's Red lists (Vulnerable or of higher concern concern)	County to National	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
All other non-Red listed flora species	Local Importance (Lower Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Non-native invasive plant species	N/A	Spread at expense of other habitats, habitat degradation (hydrology)	Likely significant effect at the local to international scale geographic scale	No significant residual effect
Fauna Species				
Bats	Local Importance (Higher Value)	Habitat loss / fragmentation; disturbance / displacement	Likely significant effect at the local geographic scale	No significant residual effect
Badger	Local Importance (Higher Value)	Disturbance / displacement	Likely significant effect at the local geographic scale	No significant residual effect
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Marine mammals (all other marine mammals)	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
SCI bird species	International Importance	See SPAs above	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (habitat degradation (hydrology); mortality risk) Likely significant residual effect at the local geographic scale (habitat Loss; disturbance / displacement)
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Amphibians	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Atlantic salmon	Local Importance (Higher Value) – International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to international geographic scale	No significant residual effect
Brown trout	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
European eel / Lamprey species	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
All other fish species	Local importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Invertebrates - freshwater molluscs	International to National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Local Biodiversity Areas				
DCC				
Grand Canal	National Importance	Habitat degradation (hydrology; non-native invasive plant species air quality)	Likely significant effect at the local geographic scale	No significant residual effect
River Dodder Corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
SDCC				
Network of streams and rivers e.g. River Dodder	County Importance	Habitat degradation (hydrology non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
DLRCC				
Wildlife Corridors- Dodder Valley corridor and Ticknock to River Dodder corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect

12.6.3 Operational Phase

Following the implementation of the mitigation measures outlined in Section 12.5, the Proposed Scheme will not result in any significant residual effects on the KERs identified (Table 12.20) on its own, or cumulatively together with other proposed developments during the Operational Phase.

Table 12.20: Summary of Operational Phase Significant Residual Impacts

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Designated Areas for Nature Conservation				
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Wicklow Head SAC	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale	No significant residual effect
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale	No significant residual effect
Rockabill SPA	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale	No significant residual effect
The Grand Canal pNHA	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Dodder Valley pNHA	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Habitats (outside of designated areas for nature conservation)				
Canals (FW3)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Rare / Protected Plant Species				
Flora Species listed on the Flora Protection Order 2022	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Flora Species on Irelands Red Lists (Vulnerable or of higher concern concern)	County to National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
All other non-Red listed flora species	Local Importance (Lower Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Non-native invasive plant species	N/A	Spread at expense of other habitats	Likely significant effect at the local to International geographic scale	No significant residual effect
Fauna Species				
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine Mammals (Annex II and all other marine mammals)	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
SCI bird species	International Importance	See SPAs above	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Disturbance / displacement; habitat degradation (hydrology); Collision Risk	Likely significant effect at the local geographic scale	No significant residual effect
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Amphibians	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Atlantic Salmon	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Brown trout	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
European eel / Lamprey species	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
All other fish species	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Invertebrates - Freshwater molluscs	International to National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Local Biodiversity Areas				
DCC				
Grand Canal	National Importance	Habitat degradation (hydrology; non-native invasive plant species air quality)	Likely significant effect at the local geographic scale	No significant residual effect
River Dodder Corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
SDCC				
Network of streams and rivers e.g. River Dodder	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
DLRCC				
Wildlife Corridors- Dodder Valley corridor and Ticknock to River Dodder corridor	County Importance	Habitat degradation (hydrology, non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect

12.7 References

Aughney, T., Roche, N. & Langton, S. (2018). The Irish Bat Monitoring Programme 2015-2017. Irish Wildlife Manuals, No. 103. National Parks and Wildlife Service, Department of Culture Heritage and the Gaeltacht, Ireland.

Andrews, H. (2018). Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Bat Tree Habitat Key.

IAQM (2020). A guide to the assessment of air quality impacts on designated nature conservation sites.

Bailey, M. & Rochford, J. (2006). Otter Survey of Ireland 2004/2005 Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Barron, S.J., Delaney, A., Perrin, P.M., Martin, J.R. & O'Neill, F.H. (2011). National survey and assessment of the conservation status of Irish sea cliffs. Irish Wildlife Manuals No. 53. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Bat Conservation Trust (2016). Core Sustenance Zones: Determining zone size. Available at: https://www.bats.org.uk/our-work/landscapes-for-bats/core-sustenance-zones.

Benson, L. (2009). Use of Inland Feeding Sites by Light-bellied Brent Geese in Dublin 2008-2009: A New Conservation Concern? Irish Birds 8: 563-570.

Berthinussen, A. & Altringham, J. (2012) The effect of a major road on bat activity and diversity. Journal of Applied Ecology, 49 82-89.

Biesmeijer, JC, Roberts, S.P.M., Reemer, M., Ohlemuller, R., Edwards, M., Peeters, T., Schaffers, A.P., Potts, S.G., Kleukers, R., Thomas, C.D., Settele, J. & Kunin, W.E. (2006). Parallel declines in pollinators and insect‐pollinated plants in Britain and the Netherlands. Science, 313, 351‐354.

Bignal, K., Ashmore, M. and Power, S. (2004), The Ecological Effects of Diffuse Air Pollution from Road Transport. English Nature Research Report No. 580

Billington, G.E. and Norman, G.M (1997). The Conservation of Bats in bridges project: a report on the 1996 survey and conservation of bat roosts in bridges in Cumbria (SRP). Available at: http://publications.naturalengland.org.uk/publication/5454603824922624

Birdwatch Ireland (2020) Bird nesting behaviour. Available at: www.birdwatchireland.ie

Butterfly Conservation Ireland (2020). Butterfly Conservation Ireland Annual Report 2020.

BCI (2020/1/2) Bat Conservation Ireland Database.

BSBI (2022) Botanical Society of Britain and Ireland Maps [Online] Available from https://bsbi.org/maps

BSI (2008). Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1:2009+A1:2014). British Standards Institution.

BSI (2012). Trees in relation to design, demolition and construction – Recommendations (BS 5837:2012). British Standards Institution.

Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009). Ireland Red List No. 2 – NonMarine Molluscs. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

CBD (2006).Global Biodiversity Outlook 2 Secretariat of the Convention on Biological Diversity, Montreal, 81 + vii pages.

Central and Regional Fisheries Board (2008) Sampling Fish for the Water Framework Directive – Transitional Waters 2008.

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

CIEEM (2021) Advice on Ecological Assessment of Air Quality Impacts

Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition. The Bat Conservation Trust, London.

Cutts, N., Phelps & A., Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impact and Guidance. Report prepared by the Institute of Estuarine and Coastal Studies University of Hull and Humber INCA.

DCC (2015). Dublin City Biodiversity Action Plan 2015-2020.

DCC (2021) Dublin City Biodiversity Action Plan 2021-2025

DCC (2022). Dublin City Development Plan 2022-2028. Available at: https://www.dublincity.ie/residential/planning/strategic-planning/dublin-city-development-plan/development-plan-2022-2028

DCHG (2017). National Biodiversity Plan 2017 – 2021.

DHPLG (2018). River Basin Management Plan 2018 – 2021.

DLRCC (2022) Dún Laoghaire – Rathdown County Development Plan 2022- 2028

DLRCC (2021) Dún Laoghaire – Rathdown County Biodiversity Action Plan 2021 – 2025: Nature Recovery, Restoration & Reconnection

Doogue, D., Nash, D., Parnell, J., Reynolds, S. & Wyse Jackson, P. (1998). Flora of County Dublin. The Dublin Naturalists' Field Club, Dublin.

Dublin Drainage Consultancy (2005). The Greater Dublin Strategic Drainage Study (GDSDS) Final Strategy Report.

EPA (2018). EPA Catchments. Information on catchments. Available at: https://www.catchments.ie/.

EPA (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

EPA (2022). EPA Maps. Available at gis.epa.ie/EPAMaps/

European Commission (2013). Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.

European Commission (2017). Environmental Impact Assessment of Projects. Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU).

Farren, A., Prodöhl, P., Laming, P. & Reid, N. (2010). Distribution of the common lizard (*Zootoca vivipara*) and landscape favourability for the species in Northern Ireland. Amphibia-Reptilia, 31(3), 387-387.

Fitzpatrick, U., Murray, T.E. Paxton, R.J. & Brown, M.J.F. (2006). Building on IUCN National Red Lists to produce national lists of conservation priorities – a model using Irish bees (submitted to Conservation Biology).

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Heritage Council, Kilkenny, Ireland.

Fox, A. D. & Cham, S. A. (1994). Status, habitat use and conservation of the scarce blue-tailed damselfly Ischnura pumilio (Charpentier) (Odonata, Coenagrionidae) in Britain and Ireland. Biological Conservation, 68 (2), 115-122Gilbert, G., Gibbons, D. W. & Evans, J. (1998). Bird Monitoring Methods. RSPB, Sandy.

Gilbert, G., Stanbury, A. & Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020–2026. Irish Birds 9: 523-544.

Hayden T. J. & Harrington, R. (2000). Exploring Irish Mammals. Town House 2000.

Highways Agency (2001a). Design Manual for Roads and Bridges (DMRB) Design Manual for Roads and Bridges: Volume 10: Environmental Design and Mitigation Section 4. Nature Conservation: Part 3, HA 80/99. Nature Conservation Advice in Relation to Bats. The Highways Agency.

Highways Agency (2001b). Design Manual for Roads and Bridges (DMRB) Design Manual for Roads and Bridges: Volume 10: Environmental Design and Mitigation Section 4. Nature Conservation: Part 4, HA 81/99. Nature Conservation Advice in Relation to Otters. The Highways Agency.

Highways Agency (2005). Design Manual for Roads and Bridges (DMRB) Design Manual for Roads and Bridges: Volume 10: Environmental Design and Mitigation Section 4. Nature Conservation: Part 7, HA 116/05; Nature Conservation Advice in Relation to Reptiles and Roads. The Highways Agency.

IWT (2012). Cork City Urban Otter Survey 2011-2012. Irish Wildlife Trust.

Jacoby, D. & Gollock, M. (2014). *Anguilla anguilla*. The IUCN Red List of Threatened Species 2014: e.T60344A45833138

Marnell, F., Kelleher. C., and Mullen. E. (2022). *Bat Mitigation Guidelines for Ireland V2*. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland

Kelly F. L., Matson, R., Connor, L., Feeney, R., Morrissey, E., Wogerbauer C. & Rocks, K. (2012). Water Framework Directive Fish Stock Survey of Rivers in the Eastern River Basin District, 2011. Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin.

Kelly, F.L., Connor, L., Matson, R., Feeney, R., Morrissey, E., Coyne, J. and Rocks, K. (2015) Sampling Fish for the Water Framework Directive - Summary Report 2014. Inland Fisheries Ireland, Citywest Business Campus, Dublin 24, Ireland.

King, J., Marnell, F., Kingston, N., Rosell, R., Roche, W.K. & Cassidy, D. (2011). Ireland Red List No. 5: Fish, Amphibians & Reptiles. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland

Lockhart, N., Hodgetts, N. & Holyoak, D. (2012). Ireland Red List No.8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Macklin, R., Brazier, B. & Sleeman, P. (2019). Dublin City otter survey. Report prepared by Triturus Environmental Ltd. for Dublin City Council as an action of the Dublin City Biodiversity Action Plan 2015- 2020.

Marnell, F. (2002). The distribution and habitat of the common lizard, o Jacquin, in Ireland. Bulletin of the Irish Biogeographical Society. 26: 75-82.Marnell, F., Looney, D. & Lawton, C. (2019). Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Matson, R., Delanty, K., Gordon, P., O'Briain, R., McCarthy, E., Cierpal, D., Connor, L., Corcoran, W., Coyne, J., McLoone, P., Morrisey-McCaffrey, E., Brett, T., Gavin, A & Kelly, F.L., (2019). Sampling Fish in Rivers 2018 - Dodder, Factsheet No. 2. National Research Survey Programme. Inland Fisheries Ireland.

McCorry, M. & Ryle, T. (2009). Saltmarsh Monitoring Project 2007-2008 – Final Report. Contract reference D/C/227. Vols 1-5. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.

Merne, O.J. & Madden, B. (2000). Breeding seabirds of Ireland's Eye, County Dublin. Irish Birds 6:495- 506.

Mitchell-Jones, A.J. & McLeish, A.P. (1999). The Bat Workers' Manual.

Natural England (2016) The Ecological Effects of Air Pollution from Road Transport: An Updated Review

Nagy, S. & Langendoen, T. (2018). Report on the Conservation Status of Migratory Waterbirds in the Agreement Area. Seventh Edition.

NBDC (2021) All-Ireland Pollinator Plan 2021-2025, National Biodiversity Data Centre Series No. 25, Waterford. March

Nelson, B., Ronayne, C. & Thompson, R. (2011). Ireland Red List No.6: Damselflies & Dragonflies (Odonata). National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (2007a). Circular Letter NPWS 2/07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species / applications for derogation licences.

NPWS (2007b). Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites.

NPWS (2012a). Article 12 Spatial Data. Available at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-12-data

NPWS (2012b). Conservation Objectives: Baldoyle Bay SAC 000199. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013a). Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013b). Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013c). Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013d). Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013e). Conservation Objectives: Lambay Island SAC 000204. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013f). Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013g). Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013h) Conservation Objectives: Rockabill SPA 004014. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015a). Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015b). Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2017a) Conservation Objectives: Ireland's Eye SAC 002193. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017a). Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2019a). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.

NPWS (2019b). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report.

NPWS (2019c). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report.

NPWS (2019d) Conservation Objectives: Ballyman Glen SAC 000713. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2020a). Sandymount Strand / Tolka Estuary SPA 004024. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020b). Baldoyle Bay SPA 0004016. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020c). North Bull Island SPA 0004006. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020d). Dalkey Islands SPA 0004172. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020e). Wicklow Mountains SPA 0004040. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020f). Howth Head Coast SPA 0004113. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020g). Ireland’s Eye SPA 0004117. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020h). Broadmeadow / Swords Estuary SPA 0004025. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020i). Rogerstown Estuary SPA 0004015. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020j). Lambay Island SPA 0004069. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020k). The Murrough SPA 0004186. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020l). Skerries Islands SPA 0004122. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020m). Rockabill SPA 0004014. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2021a). Conservation objectives for Glenasmole Valley SAC [001209]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2021b). Conservation objectives for Knocksink Wood SAC [000725]. Generic Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2021c). Conservation Objectives for Rye Water Valley/Carton SAC [001398]. Version 1.0. Department of Housing, Local Government and Heritage (NPWS 2021c

NPWS Online Database (2021d). Online data available on Natura 2000 network of sites and on Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the National Parks and Wildlife Service. Available at:
https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=8f7060450de3485fa1c1085536d477ba

NPWS (2022a). *Conservation objectives for Dalkey Islands SPA [004172].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage NPWS

NPWS (2022b). *Conservation objectives for Wicklow Mountains SPA [004040].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage

NPWS (2022c). *Conservation objectives for Howth Head Coast SPA [004113].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage

NPWS (2022d). *Conservation objectives for Ireland's Eye SPA [004117].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage

NPWS (2022e). *Conservation objectives for Lambay Island SPA [004069].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage

NPWS (2022f). *Conservation objectives for The Murrough SPA [004186].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage

NPWS (2022g). *Conservation objectives for Skerries Islands SPA [004122].* First Order Site-specific Conservation Objectives. Version 1. Department of Housing, Local Government and Heritage

NRA (2005a). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.

NRA (2005b). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.

NRA (2006a). Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.

NRA (2006b). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.

NRA (2008a). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.

NRA (2008b). Environmental Impact Assessment of National Road Schemes – A Practical Guide. National Roads Authority.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes.

NRA (2011). Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes

Öckinger, E., Dannestam A. & Smith, H. G. (2009). The importance of fragmentation and habitat quality of urban grasslands for butterfly diversity. Landscape and Urban Planning 93(1):31-37.

O'Connor (2014). Review of ESB's Eel Trap and Transport Programmes. European Eel Foundation.

O'Leary, C., Becerra-Jurado, G., Cruikshanks, R. & Gargan, P. (2011). Eel Monitoring Programme of Ireland 2009-2011. Inland Fisheries Ireland.

Ó'Neill, L., Veldhuizen, T., de Jongh, A. & Rochford, J. (2009). Ranging behaviour and socio-biology of Eurasian otters (Lutra lutra) on lowland mesotrophic river systems. European Journal of Wildlife Research. 55:363-370.

Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D. & Wilson, C.J. (2010). Ireland Red List No. 4 – Butterflies. Department of the Environment, Heritage, and Local Government, Ireland.

Rich, C. & Longcore, T. (2005). Ecological Consequences of Artificial Night lighting. Island Press.

Russ, J. (2012). British Bat Calls: A Guide to Species Identification. Pelagic Publishing, Exeter.

SDCC (2022) South Dublin County Development Plan (2022-2028).

SDCC (2010) South Dublin County Heritage Plan 2010-2015.

SDCC (2020) Connecting with Nature Biodiversity Acton Plan for South Dublin County 2020-2026 (Draft).

Scott Cawley Ltd. (2017). Natura Impact Statement – Information for Stage 2 Appropriate Assessment for the Proposed Residential Development St. Paul's College, Sybill Hill, Raheny, Dublin 5.

Scottish Natural Heritage (SNH) (2016) Assessing Connectivity with Special Protection Areas (SPAs). June 2016 Version 3

Shiel, C.B., Shiel, R.E. & Fairley, J.S. (1999). Seasonal changes in the foraging behaviour of Leisler's bats (*Nyctalus leisleri*) as revealed by radio-telemetry. Journal of Zoology: 249: 347-358.

Smith, G.F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council Church Lane, Kilkenny, Ireland.

Stace, C. A. (2019). New Flora of the British Isles. 4th Edition. C&M Floristics.

Svensson, L., Mullarney & K., Zetterstrom, D. (2010). Collins Bird Guide 2nd Ed. 2009 HarperCollins Publishers, London.

Sweeney Consultancy (2018) Macroinvertebrate Biodiversity Assessment of a Section of the River Camac. Prepared for South Dublin County Council.

The Environment Agency (2010). Fifth Otter Survey of England 2009-2012. Full Technical Report. The Environment Agency, UK.

Tierney, N., Whelan, R., Boland, H. and Crowe, O. (2017). The Dublin Bay Birds Project Synthesis 2013-2016. BirdWatch Ireland, Kilcoole, Co. Wicklow.

Tierney, N., Whelan, R., Boland, H. and Crowe, O. (2017). The Dublin Bay Birds Project Synthesis 2013-2016. BirdWatch Ireland, Kilcoole, Co. Wicklow.

TII (2020a). The Management of Invasive Alien Plant Species on National Roads - Technical Guidance. Transport Infrastructure Ireland Publications.

TII (2020b). The Management of Invasive Alien Plant Species on National Roads – Standard.

Tong, Z., Baldauf, R. W., Isakov, V., Deshmukh, P. and Zhang, M. K. (2016). Roadside vegetation barrier designs to mitigate near-road air pollution impacts. Sci. Total Environ. 541, 920–927.

Trinity College Campus (2017). Trinity Campus Pollinator Plan (CPP). Available at: https://naturalscience.tcd.ie/pollinator/conserve.php

Triturus Environmental (2020) Aquatic baseline report for the BusConnects project, Dublin City.

Waterways Ireland (2021). Angling on the Grand Canal. Available at: https://www.waterwaysireland.org/places-to-go/grand-canal/angling.

Wright, M., Goodman, P. & Cameron, T. (2010). Exploring Behavioural Responses of Shorebirds to Impulse Noise. Wildfowl (2010) 60: 150-167.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016). Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

Directives and Legislation

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive).

Council Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive).

Council Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (The Birds Directive).

Council Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the impacts of certain public and private projects on the environment.

Inland Fisheries Acts 1959 to 2019

S.I. No. 477/2011 – European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).

S.I. No. 235/2022 – Flora (Protection) Order, 2022.

S.I. No. 115/2021 – Planning and Development Act 2000 (Exempted Development) (No. 2) Regulations 2021.

Wildlife Acts 1976 to 2021