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 associated with the Swords 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 the Operational Phase (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, and road realignments and the provision of new 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 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 has 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 (hereafter 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 European Union (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 to one another and within their 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 NTA and submitted with the application for approval, so as to enable 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 (the Habitats Directive documents).

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 (BCIDB) in Volume 3 of the 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 illustrated in Figure 12.1.1, Figure 12.1.2 and 12.5 in Volume 3 of this EIAR), 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 2018) 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 as 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.

Table 12.1: Ecological Survey Study Areas for Each Ecological Receptor

Ecological Receptor	Study Area Description
Habitats	An 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	An 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)	An 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 12.1.2 in Volume 3 of this EIAR.
Bats	An 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.
Nesting bird suitability i.e. Kingfisher	Watercourses crossed by 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 12.1.2 in Volume 3 of this EIAR.
Aquatic ecology	Watercourses crossed by 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 12.1.2 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 Roads Authority (NRA) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority (NRA 2005a);
- National Roads Authority (NRA) Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes. National Roads Authority (NRA 2005b);
- National Roads Authority (NRA) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA 2006a);
- Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006cb);
- 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. National Roads Authority (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 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 and 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. 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 multidisciplinary 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);
- Fingal Biodiversity Action Plan 2010-2015 (Fingal County Council 2010); and
- Fingal Development Plan 2023-2029 (Fingal County Council 2023).

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;
- The Wildlife Acts1976-2022;
- S.I. No. 235/2022 - Flora (Protection) Order 2022 (hereafter referred to as the Flora Protection Order); and
- 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 Online Database 2021c);
- Online data records available on the National Biodiversity Data Centre Database (NBDC Online database 2021 and updated 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 O03, O13 and O23, 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 with the selected area.

A desk study was carried out to identify any potential suitable inland feeding and / or roosting sites for winter 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 did not identify sites in which significant suitable foraging and / or roosting habitat 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. Aquatic surveys, suitability assessments for nesting birds, and otter surveys were undertaken at the proposed crossing points at which in-stream works, modifications to banks or significant disturbance (i.e. piling / rock breaking techniques) are proposed.

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 2023

Survey	Survey Date(s)	Surveyor Reference
Habitat survey	June to August 2018 August 2020 May 2022 April 2023	Scott Cawley Ltd
Mammal surveys (excluding bats)	June to August 2018 August 2020 October 2020 March 2022 April 2023	Scott Cawley Ltd
Bat surveys:	Walked transect activity surveys June to August 2018 September and October 2019 May 2020 July 2020 July 2021 Bat emergence and re-entry surveys May and July 2020 Identification of potential roost features (PRFs) June to August 2018 August 2020 April 2022 June 2022 – reassessment of trees at Cloghran Roundabout April 2023	Scott Cawley Ltd
Nesting bird suitability assessment i.e. kingfisher suitability	October 2020 March 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	Scott Cawley Ltd

Survey	Survey Date(s)	Surveyor Reference
	August 2020	
Fisheries/ aquatic surveys (Included evidence of otter activity)	July 2022	Triturus Environmental Services Ltd

12.2.3.3 Habitat Survey

Habitat surveys were carried out by Scott Cawley Ltd, between June and August 2018, and in August 2020, with follow up confirmatory surveys in May 2022 to capture any changes to the redline boundary and or significant changes in vegetation owing to management etc. Further limited surveys were undertaken in 2023 to capture changes to Construction Compound SW4.

Instream aquatic habitats were carried out by Triturus Environmental Services Ltd, in July 2022 (refer to Appendix A12.2 Aquatic baseline Report in Volume 4 of this EIAR). 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 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 2022 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 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).

A desk study was carried out to identify all hydrological crossing points within the footprint of the Proposed Scheme. Construction methodologies that involved in-stream works, modifications to banks or significant disturbance were deemed to require in-stream aquatic habitat surveys. From the outset, the Proposed Scheme design identified one site where water bodies would be subject to significant disturbance as a consequence of the Proposed Scheme, specifically the construction works associated with the Frank Flood Bridge crossing across the River Tolka along the Drumcondra Road (see Figure 12.2). The Proposed Scheme involves only minor modifications to watercourse banks, but this will result in significant disturbance during the Construction Phase at this site (CBC0002AR001) including the need for a temporary pontoon across the River Tolka followed by the erection of a scaffold platform to be used to enable some works to be undertaken. The results of the survey have informed the receiving environment and impact assessment. The site was surveyed by Triturus Environmental Ltd in July 2022 (refer to Appendix A12.2 Aquatic Baseline Report in Volume 4 of this EIAR). A broad habitat assessment was conducted at each site utilising elements of the methodology provided for in the Environment Agency's River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003 (Environment Agency 2003) and the Irish Heritage Council's A Guide to Habitats in Ireland (Fossitt 2000).

The site was assessed in terms of:

- Channel width and depth and other physical characteristics;
- Substrate type, listing substrate fractions in order of dominance, i.e. bedrock, boulder, cobble, gravel, sand, silt etc.;
- Flow type, listing percentage of riffle, glide and pool in the survey area;
- In-stream macrophyte and aquatic bryophytes occurring and the prominence of each (DAFOR scale); and
- General riparian vegetation composition.

12.2.3.4 Mammals (Excluding Bats)

The footprint of the Proposed Scheme was surveyed for badger *Meles meles* and otter *Lutra lutra* activity as part of the multidisciplinary walkover survey, undertaken between June and August 2018, and in August 2020. Evidence of otter activity was also recorded during the aquatic survey and fed into this Chapter. An additional

check for otter activity was undertaken at the key watercourse crossing, namely the River Tolka in March 2022 and again in July 2022 during the aquatic survey. 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.

The desk study identified one site where water bodies may be subject to significant disturbance as a consequence of the Proposed Scheme. The site is located at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge. A corridor of approximately 150m upstream and downstream of the crossing point was surveyed to identify the presence of otter holts, although given the sensitivity of the River Tolka, the downstream search was extended to cover potential suitable areas. Areas surveyed are shown on Figure 12.1.2 in Volume 3 of this EIAR. The 2022 survey along the River Tolka noted one additional record, where a partial print on wet muds was noted.

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*, Irish stoat *Mustela erminea hibernica* and Irish hare *Lepus timidus hibernicus*. Nevertheless, during all surveys, attention was paid to search for 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).

12.2.3.5 Bats

The following sections describe the methodologies employed to carry out the various bat surveys undertaken in between 2019 and 2021 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 - 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; and
- DER / BAT 2023-02 (amended) - Derogation licence to disturb bat roosts throughout the State.

12.2.3.5.1 Bats - Walked Transect Surveys

Walked bat activity transect surveys were conducted along preselected transect routes at six locations along the Proposed Scheme. Transect routes were located at lands adjacent to: Travelodge Dublin Airport North Swords hotel, referred to as CBC0002BT001; Dardistown Cemetery, Collinstown referred to as CBC0002BT002; Glen Dimplex referred to as CBC0002BT003; Santry Demesne referred to as CBC0002BT004; Ellenfield Park Whitehall referred to as CBC0002BT005; and Frank Flood Bridge referred to as CBC0002006. The walked transect routes are shown on Figure 12.1.1 in Volume 3 of this EIAR.

Walked transect surveys comprised four visits to each transect route across three seasons; 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 and July 2021. 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.

Bat emergence and re-entry surveys were conducted at the RCSI cottages on the Swords Road near Dardistown; referred to as CBC0002RI001, during Spring and Summer 2020. The post-dusk emergence survey was conducted on the 28 May 2020 and commenced approximately 15 minutes before sunset until approximately 1.5 to 2 hours after sunset. The dawn re-entry survey was conducted on the 31 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).

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).

12.2.3.5.2 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 multidisciplinary walkover survey carried out between June and August 2018 and August 2020. A resurvey in April 2022 identified some additional trees and reclassified some of the earlier trees based on current guidance) containing a further 11 number PRFs, with the majority of them occurring largely outside the Proposed Scheme footprint, but some adjacent to or alongside its boundary. These are all newly identified trees where the confirmation of PRF arises by virtue of natural damage and decay, landscaping maintenance or conversely lack of maintenance and growth of Ivy on these trees.

A number of trees located across the Proposed Scheme footprint 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.

12.2.3.5.3 Bats – Building Surveys

During the original multidisciplinary surveys for the Proposed Scheme, a single building Collinstown Industrial Estate, which was proposed for demolition was visually assessed, whilst another two buildings, also proposed for demolition, the RSCI cottages at RCSI sport grounds had potential to support bat roosts based on the condition of the house and the level of bat activity recorded nearby.

Both areas were revisited in April 2023, although it was only possible to undertake a visual inspection owing to 1) access of private commercial operation at Collinstown Industrial building and 2) the bricked up RCSI cottages.

Given the location of the Collinstown Industrial buildings in a highly developed and exposed area with significant light spill from the adjacent road and businesses, the building is not considered to have any PRFs; this limitation has been built into the mitigation strategy. Similarly, the two derelict cottages at RCSI sport grounds, could not be internally accessed as the building was blocked up. Notwithstanding the location of this structure alongside a highly illuminated road, the structure is considered to have the potential to support roosts based on the level of activity from earlier bat activity surveys carried out in support of the Proposed Scheme and the potential tree vegetation leading into the RCSI sports grounds.

12.2.3.6 Nesting Kingfisher Suitability Assessment

The desk study identified one site where waterbodies may be subject to significant disturbance as a consequence of the Proposed Scheme. This site is located at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge referred to as CBC0002AR001. With the exception of some limited emplacement of scour protection along the north-western boundary of the Frank Flood Bridge, the Proposed Scheme will not involve significant modifications to banks. It will, however, involve significant disturbance at the Frank Flood Bridge.

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 potential. Where suitable habitat existed, surveys extended 500m upstream and downstream of the proposed crossing point. Evidence of previous and current nest holes were recorded.

12.2.3.7 Wintering Birds

A desk study was carried out to identify any potential suitable inland feeding and / or roosting sites for winter 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 Species of Conservation Interest SCI bird species light-bellied Brent goose *Branta bernicla hrota* (Scott Cawley Ltd 2017).

Although there are four *ex-situ* wintering birds sites identified from the referenced report above, with 1 number site running alongside the Proposed Scheme namely – Whitehall (Plunkett College Grounds) on the Swords Road. This site will not be impacted. There were no other suitable wintering bird sites which would be subject to any habitat loss as a result of the Proposed Scheme. As such it was not deemed necessary to carry out wintering bird surveys. The results of the desk study have informed the assessment of potential impacts on wintering bird species arising from the Proposed Scheme.

12.2.3.8 Reptiles

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

12.2.3.9 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.

12.2.3.10 Fish

The desk study identified one site where water bodies may be subject to significant disturbance as a consequence of the Proposed Scheme. This site is located at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge, referred to as CBC0002AR001 and the results of the survey have informed the receiving environment and impact assessment. Areas surveyed are shown on Figure 12.1.2 in Volume 3 of this EIAR.

Aquatic surveys conducted by Triturus Environmental Ltd during July 2022 comprised of broad appraisal / overview of the upstream and downstream habitat at each site to evaluate the wider contribution to salmonid and lamprey spawning and general fisheries habitat (refer to Appendix A12.2 Aquatic Baseline Report in Volume 4 of this EIAR). The baseline assessment considered the quality of spawning, nursery and holding habitat within the vicinity of the survey sites using Life Cycle Unit (salmonids) and Lamprey Habitat Quality Index scores (lamprey). A broad appraisal / overview of the upstream and downstream habitat at each aquatic survey site was also undertaken to evaluate the wider contribution to salmonid and lamprey spawning and general fisheries habitat.

Fisheries habitat for salmonids was assessed using the Life Cycle Unit method (Kennedy 1984; O'Connor and Kennedy 2002) to map survey sites as nursery, spawning and holding habitat, by assigning quality scores to each type of habitat. Those habitats with poor quality substrata, shallow depth and a poorly defined river profile received a higher score. Higher scores in the Life Cycle Unit method of fisheries quantification are representative of poorer value, with lower scores being more optimal, despite appearing counter-intuitive. Overall scores are calculated as a simple function of the sum of individual habitat scores. The life cycle scoring system and values are shown on Table 12.3 (Triturus Environmental Ltd 2022).

Table 12.3: Life Cycle Unit Scoring System for Salmonid Nursery, Spawning and Holding Habitat Value (as per Kennedy 1984; O'Connor and Kennedy 2002)

Habitat Quality	Habitat Score	Total Score (three components)
Poor	4	12
Moderate	3	9-11
Good	2	6-8
Excellent	1	3-5

Lamprey habitat evaluation for each survey site was undertaken using the Lamprey Habitat Quality Index (LHQI) scoring system (as devised by Macklin *et al*. 2018). The LHQI broadly follows a similar rationale as the Life Cycle Unit score for salmonids. Those habitats with a lack of soft, largely organic sediment areas for ammocoete burrowing, a shallow sediment depth (<10cm) or of a compacted sediment nature, receive a higher score. Higher

scores in this index are thus of poorer value (in a similar fashion to the salmonid Life Cycle Unit Index), with lower scores being more optimal. Overall scores are calculated as a simple function of the sum of individual habitat scores.

Larval lamprey habitat quality as well as the spawning suitability was assessed based on the information provided in Maitland (2003) and Gardiner (2003). Unlike the salmonid Life Cycle Unit index, holding habitat for adult lamprey was not assessed owing to their different migratory and life history strategies, and that electro-fishing surveys routinely only sample larval lamprey.

The LHQI scoring system provides additional information compared to the habitat classification based on the observations of Applegate (1950) and Slade *et al*. (2003), which deals specifically with larval (sea) lamprey settlement habitat. Under this scheme, habitat is classified into three different types: preferred (Type 1), acceptable (Type 2), and not acceptable for larvae (Type 3) (Slade *et al.* 2003). Type 1 habitat is characterized by soft substrate materials usually consisting of a mixture of sand and fine organic matter, often with some cover over the top such as detritus or twigs in areas of deposition. Type 2 habitat is characterized by substrates consisting of shifting sand with little if any organic matter and may also contain some gravel and cobble (lamprey may be present but at much lower densities than Type 1). Type 3 habitat consists of materials too hard for larvae to burrow including bedrock and highly compacted sediment. This classification can also be broadly applied to other lamprey species ammocoetes, including *Lampetra* species. The Lamprey Habitat Quality Index (LHQI) scoring system and values are shown on Table 12.4 (Triturus Environmental Ltd 2022).

Table 12.4: Lamprey Habitat Quality Index (LHQI) Scoring System for Lamprey Spawning and Nursery Habitat Value (Macklin *et al*. 2018).

Habitat Quality	Habitat Score	Total Score (three components)
Poor	4	8
Moderate	3	6-7
Good	2	3-5
Excellent	1	2

River habitat surveys and fisheries assessments were also 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.) (Triturus Environmental Ltd 2022) (and refer to Appendix A12.2 Aquatic Baseline Report in Volume 4 of this EIAR).

12.2.3.11 Invertebrates – White Clawed Crayfish

The desk study identified one site where water bodies may be subject significant to disturbance as a consequence of the Proposed Scheme. This site is located at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge, referred to as CBC0002AR001. The Proposed Scheme does not involve significant modifications to banks and the only instream works required relate to the installation of a temporary scaffold platform to enable some works to the underside of the new structure (across two years and within the timeframe approved by Inland Fisheries Ireland. However, the results for the site have informed the receiving environment and impact assessment. Areas surveyed are shown on Figure 12.1.2 in Volume 3 of this EIAR.

The crayfish survey was conducted by Triturus Environmental Ltd in 2022 under the NPWS under license no. C31/2022, as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2012) to capture and release them to their site of capture under condition no. 5 of the licence. As per best practice, crayfish sampling began at the uppermost site on each watercourse / sub-catchment in the study area to prevent the transfer of pathogens or invasive species in an upstream direction. An aquatic biosecurity protocol was also applied for equipment use in water.

Sweep netting and hand-searching (following Reynolds *et al.* 2010) was utilised at each survey site to detect both adult and juvenile crayfish. Sweep netting involves the sampling of more stable refugia such as boulder and cobble accumulations, in addition to macrophyte beds and other potential habitat such as tree root systems. A second operator (with sweep net) was present to capture escape-swimming crayfish observed following the initial sweep

or refuge search. To estimate the relative density of crayfish at each site, searches were undertaken (moving upstream) in 10 objectively suitable refugia per 1-20m^2 of habitat (as per Peay 2003). Following capture, all crayfish were held temporarily in a retaining tank containing fresh river water. Each crayfish was sexed, measured (carapace length, to nearest mm) and general condition noted before being released in-situ.

A strict biosecurity protocol following the Check-Clean-Dry approach was employed during the survey. Equipment and PPE used was disinfected with Virkon® between survey sites to prevent the transfer of pathogens and/or invasive species between survey areas. Where feasible, equipment was also be thoroughly dried (through UV exposure) between survey areas. Particular attention was paid towards preventing the spread or introduction of crayfish plague (*Aphanomyces astaci*), given the known distribution of a particularly valuable peri-urban population of white-clawed crayfish (*Austropotamobius pallipes*) in the River Camac catchment. As per best practice, surveys were undertaken at sites in a downstream order (i.e. uppermost site surveyed first etc.) to prevent the upstream mobilisation of invasive propagules and pathogens (Triturus Environmental Ltd 2022).

12.2.3.12 Aquatic Macro-Invertebrate Survey (Kick-Sampling)

The desk study identified one site where water bodies may be subject to significant disturbance as a consequence of the Proposed Scheme. This site is located at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge, referred to as CBC0002AR001. The Proposed Scheme does not involve significant modifications to banks and the only instream works required relate to the temporary installation of a scaffold platform to enable some works to the underside of the new structure, as well as the temporary damming of a small section of the River Tolka to enable the safe installation of limited scour protection to the bank edge alongside the existing Frank Flood Bridge Structure. However, the results for the site has informed the receiving environment and impact assessment. Areas surveyed are shown on Figure 12.1.2 in Volume 3 of this EIAR.

Macro-invertebrate samples were collected by Triturus Environmental Services Ltd along the River Tolka at the Proposed River Tolka Pedestrian / Cycleway Bridge crossing the River Tolka, adjacent to the existing Frank Flood Bridge. All Q-samples were taken with a standard kick sampling net (i.e. 250mm in width and with a 500µm mesh size) from riffle/glide habitat, utilising a three minute per sample approach. Large cobble was also washed at each site where present and samples were elutriated (separation of heavier particles in a mixture by suspension) and fixed in 70% ethanol for laboratory identification. Any rare invertebrate species were identified from the NPWS Red List publications for beetles, stoneflies, mayflies and other relevant taxa. Macro-invertebrate samples were converted to Q-value ratings (as per Toner *et al.* 2005). The reference classes for Q-value rating are shown on Table 12.5.

Table 12.5: Description of Reference Classes for each EPA Q-value Ratings (Q1 to Q5) (after Toner *et al.* 2005)

Q-Value	Water Framework Directive Status	Pollution Status	Condition
Q5 or 4-5	High Status	Unpolluted	Satisfactory
Q4	Good Status	Unpolluted	Satisfactory
Q3-4	Moderate Status	Slightly Polluted	Unsatisfactory
Q3 or 2-3	Poor	Moderately Polluted	Unsatisfactory
Q2, 1-2 or 1	Bad	Seriously Polluted	Unsatisfactory

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);
- EPA Guidelines (EPA 2022);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Union 2013);

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022);
- 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 Statement have been submitted with the application for approval 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 12.6.

Table 12.6: 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. SACs, 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; affect the nature, extent, structure and functioning of component habitats; and / or, affect 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 the 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.

Moreover, 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 (NRA 2009) methodology, 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 Level, rather than International level.

12.3 Baseline Environment

The Proposed Scheme will run from the R132 / Swords Road at the Pinnock Hill junction to Parnell Square East in the City Centre, spanning a distance of approximately 12.5km. It has been split into five sections and a detailed description of the Proposed Scheme is provided in Chapter 4 (Proposed Scheme Description).

Across the length of the Proposed Scheme there are a variety of habitats, along with urban/suburban and townscape features. Commencing at the R132 / Swords Road / Pinnock Hill junction in Swords habitats include arable crops, amenity grassland, dry meadows and grassy verges and buildings and artificial surfaces. There is mixed land-use as the Proposed Scheme extends south along the R132 / Swords Road. It comprises of residential and commercial developments, agricultural lands dominated by mixed woodland, treeline / hedgerow, scrub and dry meadows and grassy verges, and roadside stretches of amenity grassland. At Dublin Airport, the Proposed Scheme is dominated by commercial buildings and artificial surfaces and amenity grassland largely associated with the airport. Immediately south of the airport between the aircraft hangers and the Quickpark facility, there is an approximately 500m stretch of habitat dominated by dry meadows and grassy verges present on both sides of the Swords Road and a discrete area of mixed broadleaved woodland.

The Proposed Scheme continues southwards along the R132 / Swords Road as it crosses the M50 motorway. South of the M50 motorway, the Proposed Scheme is dominated by commercial development and roadside amenity grassland associated with the Airways Industrial Estate. Scattered trees and parkland and dry meadows and grassy verge habitat types located within Santry Demesne pNHA and Morton Stadium form the western boundary of the Proposed Scheme as it extends southwards along the R132 / Swords Road through Santry, crossing the River Santry. The eastern boundary of the Proposed Scheme comprises residential and commercial developments, which continue from the River Santry through Whitehall and into Drumcondra where the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge across the River Tolka will be located. From this location commercial properties dominate as the Proposed Scheme crosses the Royal Canal at Binns Bridge and approaches the city centre along R132 / Dorset Street where the it terminates at Parnell Square East. Habitats frequently found in association with these developments include amenity grassland, hedgerows, treelines and flower beds and borders.

12.3.1 Zone of Influence

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 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 Table 12.1 (e.g. surface water quality effects of a sufficient magnitude can extend, and affect, receptors at considerable 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 greater distances.

The underlying aquifers are either Locally Important Bedrock Aquifer, Moderately Productive only in Local Zones (found in the North and centre of the region and also towards the southern end at Bray) or Poor Bedrock Aquifer, Moderately Productive only in Local Zones (most of the southern extent of the region). 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-dependent habitats, which are all located over 400m from any of the 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 regard 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 will cross bodies listed in Table 12.7 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 from the proposed crossing points listed in Table 12.7, and the marine environment of Dublin Bay. The ZoI for impacts to aquatic fauna species, such as Atlantic salmon *Salmo salmar* 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.

Table 12.7: Water Bodies Hydrologically Connected to the Proposed Scheme and within its ZoI

Waterbody Name	Connectivity to the Proposed Scheme
Glebe Stream (Ward_040)	Hydrologically connected to the Proposed Scheme via existing surface water drainage.
River Ward (Ward_040)	Hydrologically connected to the Proposed Scheme via existing underground drainage.
Sluice River (Sluice_010)	Crosses the Proposed Scheme south of Kilronan Equestrian Centre on the R132 / Swords Road.
Mayne River (Mayne_010)	Crosses the Proposed Scheme south of ALSAA on the R132 / Swords Road.
Cuckoo Stream (Mayne_10)	Crosses the Proposed Scheme south of Glen Dimplex on the R132 / Swords Road.
River Santry (Santry_010)	Crosses the Proposed Scheme at Northwood on the R132 / Swords Road.
River Tolka (Tolka_060)	Crosses the Proposed Scheme at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge.
Royal Canal	Crosses the Proposed Scheme at Binns Bridge.
Malahide Estuary (Broadmeadow Water)	Approximately 2.7km downstream of the Glebe Stream via Ward River and Broadmeadow River,
Baldoyle Bay (Mayne Estuary)	Approximately 6.9km downstream of Mayne River at Glen Dimplex Swords Road crossing. Approximately 7km downstream of Cuckoo Stream at ALSAA Swords Road crossing. Approximately 8.1km downstream of Sluice River at Kilronan Equestrian Centre Swords Road crossing.
Liffey Estuary Lower	approximately 2.3 km downstream of Royal Canal crossing.
Tolka Estuary	approximately 2. 3km downstream of River Tolka Frank Flood Bridge crossing.
Dublin Bay	Approximately 5. 6km downstream of Royal Canal / Binns Bridge crossing. Approximately 6.6km downstream of River Santry at Northwood Swords Road crossing. Approximately 2km downstream of River Tolka CP032 Frank Flood Bridge crossing.

The ZoI for small mammal species, such as the pygmy shrew, 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 may extend over greater distances than small mammal species and bird species due to their ability to disperse many kilometres from their natal / resting sites. The ZoI 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 the Proposed Scheme boundary) for badgers and otters has been defined in accordance with the following guidance: Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2005a), the Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2005b) and the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2006a) 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 from the Proposed Scheme boundary 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 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 hundreds of 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 Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance by (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 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 (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 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 Biodiversity Areas

The Fingal Biodiversity Action Plan 2010-2015 and the draft Fingal biodiversity Action Plan 2022-2030 highlights a number of areas considered to be of biodiversity value present within the boundaries of Fingal County Council. These areas that are located within the ZoI of the Proposed Scheme are provided below:

- Malahide and Baldoyle estuaries, and cliffs and rocky shores, which are located in the wider environs downstream of the Proposed Scheme and support a variety of waterbirds, and waders and fish species, and the surrounding terrestrial grasslands;

- Habitats considered to be of importance, such as arable land, semi-natural calcareous grassland, hedgerows and woodlands, which support a range of species and act as important ecological links/corridors across the wider landscape;
- Network of rivers and streams, including the River Tolka, River Santry, Sluice River and Mayne River, all of which are crossed by the Proposed Scheme. These watercourses support a range of riverine bird species, such as kingfisher *Alcedo atthis*, and fish species; and
- Parkland and gardens associated with houses, parks, playing fields, churchyards, cemeteries and brown field sites, all of which contain valuable wildlife habitats.

In addition, an area of pollinator planting maintained by the Local Authority within an existing verge is recorded at the intersection of R132 Swords Road and Coolock Lane within the footprint of the Proposed Scheme.

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. Such areas that are located within the ZoI of the Proposed Scheme are:

- 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 Santry Demesne pNHA, Santry Park, Ellenfield Park, St. Patrick's College and Holy Cross / Clonliffe College, support a variety of species and are considered to be a valuable biodiversity resource;
- Dublin City's network of rivers, streams and riparian zones. The Proposed Scheme will cross the River Santry and River Tolka. These watercourses support a range of riverine bird species, such as kingfisher *Alcedo atthis*, and fish species; and
- The Royal Canal will be crossed by the Proposed Scheme at Binns Bridge. It is noted as an important aspect of Dublin City's Green Infrastructure network, linking the River Shannon to Dublin Bay. It is a pNHA and also supports coarse fish species, including roach *Rutilus rutilus,* pike *Esox lucius*, rudd *Scardinius erythrophthalmus,* bream *Abramis brama* and tench *Tinca tinca*, and the legally-protected Flora Protection Order species opposite-leaved pondweed *Groenlandia densa* as well as the endangered Red List freshwater snail species glutinous snail *Myxas glutinosa*. Otter *Lutra lutra* activity is often recorded where the canal crosses with streams and rivers throughout the City.

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 will not overlap with any European site. The nearest European site is South Dublin Bay and River Tolka Estuary SPA followed by Malahide Estuary SPA and Malahide Estuary SAC, which are located approximately 1.9km, 1.96km and 1.93km east of the Proposed Scheme, respectively.

There are eight European sites located in Dublin Bay that are hydrologically connected and downstream of the Proposed Scheme. These European Sites are North Dublin Bay SAC, South Dublin Bay SAC, Howth Head SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Howth Head Coast SPA, and Dalkey Island SPA. European sites are hydrologically connected to the Proposed Scheme via River Santry, River Tolka and Liffey Estuary. There are four European sites located in Malahide and Baldoyle bay that are hydrologically connected to the Proposed Scheme. These European Sites are Malahide Estuary SAC, Malahide Estuary SPA, Baldoyle Bay SAC and Baldoyle Bay SPA. Malahide Estuary is hydrologically connected to the Proposed Scheme via the Glebe Stream. Baldoyle Bay is hydrologically connected to the Proposed Scheme via the Cuckoo Stream, the Mayne River and the Sluice River. Dublin Bay is hydrologically connected via the Santry River.

There are thirteen (13) SPAs designated for SCI species that are known to forage and / or roost at inland sites across Dublin City. These include Malahide Estuary SPA, Baldoyle Bay SPA, Rogerstown Estuary SPA, Skerries Islands SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Ireland's Eye SPA, Lambay Island SPA, Howth Head Coast SPA, Dalkey Islands SPA, Rockabill SPA, Wicklow Mountains SPA and The Murrough SPA.

There are 25 no. European sites (SACs or SPAs) located within the vicinity of the Proposed Scheme. These are listed in Table 12.8 and illustrated in Figure 12.3 in Volume 3 of this EIAR. Table 12.8 lists these sites, their distance from the Proposed Scheme, and the sites' designations (QIs / SCIs). There are 20 sites located within the ZoI of the Proposed Scheme (see Table 12.8, highlighted in Blue).

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

Table 12.8: European Sites (SACs and SPAs) Located with the ZoI (highlighted in light blue), and Those in the Wider Area, of the Proposed Scheme Boundary.

Site Name	Distance	Designation – QIs or SCIs (*= Priority Annex I Habitat)
SAC		
Malahide Estuary SAC [000205]	Approximately 1.9km 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]; • 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 2013a) and Natura 2000 – Standard Data Form (NPWS 2020a)
South Dublin Bay SAC [000210]	Approximately 3.7km south 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 2013b) and Natura 2000 – Standard Data Form (NPWS 2020b)
North Dublin Bay SAC [000206]	Approximately 4.8km 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].

Site Name	Distance	Designation – QIs or SCIs (*= Priority Annex I Habitat)
		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 2013c) and Natura 2000 – Standard Data Form (NPWS 2020c)
Rogerstown Estuary SAC [000208]	Approximately 5.6km north of the Proposed Scheme	Annex I Habitats: • Estuaries [1130]; • 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]; • 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. 286/2018 – European Union Habitats (Rogerstown Estuary Special Area of Conservation 000208) Regulations 2018* Source: Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1. (NPWS 2013d) and Natura 2000 – Standard Data Form (NPWS 2019e)
Baldoyle Bay SAC [000199]	Approximately 5.8km 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) and Natura 2000 – Standard Data Form (NPWS 2018a)
Howth Head SAC [000202]	Approximately 9.7km 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) and Natura 2000 – Standard Data Form (NPWS 2018b)
Rockabill to Dalkey Island SAC [003000]	Approximately 10km 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 2013e) and Natura 2000 – Standard Data Form (NPWS 2019f)
Ireland's Eye SAC [000203]	Approximately 10.7km 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) and Natura 2000 – Standard Data Form (NPWS 2020d)
Glenasmole Valley SAC [001209]	Approximately 12.5km south	Annex I Habitats:

Site Name	Distance	Designation – QIs or SCIs (*= Priority Annex I Habitat)
	of the Proposed Scheme	• 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. (NPWS 2021a) and Natura 2000 – Standard Data Form (NPWS 2018c)
Wicklow Mountains SAC [002122]	Approximately 12.7km 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]; • 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 2017b) and Natura 2000 – Standard Data Form (NPWS 2018d)
Lambay Island SAC [000204]	Approximately 13.1km north east of Proposed Scheme	Annex I Habitats: • Reefs [1170] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Annex II Species: • Grey seal *Halichoerus grypus* [1364] • 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 2013f) and Natura 2000 – Standard Data Form (NPWS 2019g)
Rye Water Valley/Carton SAC [003198]	Approximately 14.9km west of the Proposed Scheme	Annex I Habitats: • Petrifying springs with tufa formation (Cratoneurion) [7220]*. Annex II Species: • *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014]; and • *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016]. *S.I. No. 494/2018 – European Union Habitats (Rye Water Valley/Carton Special Area of Conservation 000206) Regulations 2018* Source: Conservation Objectives for Rye Water Valley/Carton SAC [003198]. Version 1.0 (NPWS 2021b) and Natura 2000 – Standard Data Form (NPWS 2019h)

Special Protection Areas		
South Dublin Bay and River Tolka Estuary SPA [004024]	Approximately 1.9km 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]; • 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 2020e)
Malahide Estuary SPA [004025]	Approximately 2km east of the Proposed Scheme	• Great Crested Grebe *Podiceps cristatus* [A005]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [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. (NPWS 2013g) and Natura 2000 – Standard Data Form (NPWS 2020f)
North Bull Island SPA [004006]	Approximately 4.5km east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *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* [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 2020g)
Baldoyle Bay SPA [004016]	Approximately 5.8km east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna* [A048]; • Ringed Plover *Charadrius hiaticula* [A137]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141]; • 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 2013h) and Natura 2000 – Standard Data Form (NPWS 2020h)
Rogerstown Estuary SPA [004015]	Approximately 6km north 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]; • 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 2013i) and Natura 2000 – Standard Data Form (NPWS 2020i)
Ireland's Eye SPA [004117]	Approximately 10.5km 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 1.0. Department of Housing, Local Government and Heritage (NPWS 2022a) and Natura 2000 – Standard Data Form (NPWS 2020j)
Howth Head Coast SPA [004113]	Approximately 12.1km 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 [004113First Order Site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage (NPWS 2022b) and Natura 2000 – Standard Data Form (NPWS 2020k)

Wicklow Mountains SPA [004040]	Approximately 12.9km 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: Wicklow Mountains SPA 004040. First Order Site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage (NPWS 2022c) and Natura 2000 – Standard Data Form (NPWS 2020l)
Lambay Island SPA [000204]	Approximately 13km north east of Proposed Scheme	• Fulmar *Fulmarus glacialis* [A009]; • Cormorant *Phalacrocorax carbo* [A017]; • Shag *Phalacrocorax aristotelis* [A018]; • Greylag Goose *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 1.0. Department of Housing, Local Government and Heritage (NPWS 2022d) and Natura 2000 – Standard Data Form (NPWS 2020m)
Skerries Islands SPA [004122]	Approximately 15.8km 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] • 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: Skerries Islands SPA 004122. First Order Site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage (NPWS 2022e) and Natura 2000 – Standard Data Form (NPWS 2020n)
Dalkey Island SPA [004172]	Approximately 13.8km south east of the Proposed Scheme	• Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and • Arctic Tern *Sterna paradisaea* [A194]. Source: Conservation Objectives for Dalkey Islands SPA [004172]. First Order Site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage (NPWS 2022f) and Natura 2000 – Standard Data Form (NPWS 2020o)
Rockabill SPA [004014]	Approximately 16.8km 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 2013j) and Natura 2000 – Standard Data Form (NPWS 2020p)
The Murrough SPA [004186]	Approximately 31.1km south east of the	• Red-throated Diver *Gavia stellata* [A001]; • Greylag Goose *Anser* [A043];

	Proposed Scheme	• 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: The Murrough SPA 004186. First Order Site Specific Conservation Objectives Version 1.0. (NPWS 2022g) and Natura 2000 – Standard Data Form (NPWS 2020q)

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 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. The pNHAs are offered protection in the interim period under the county or city development plans, which require that planning authorities give due regard to their protection in planning policies and decisions. The Proposed Scheme lies within the administrative boundaries of Fingal County Development Plan 2023-2029 (FCC 202023) and Dublin City County Development Plan 2022-2028 (DCC 2022).

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

The Royal Canal pNHA, which is crossed by the Proposed Scheme at Binns Bridge, and Santry Demesne pNHA which borders the Proposed Scheme at Northwood, are the closest pNHAs to the Proposed Scheme. Following this is North Dublin Bay pNHA, which is located approximately 1.7km east of the Proposed Scheme.

There are 10 pNHAs that are located downstream of the Proposed Scheme. These are Baldoyle Bay pNHA, Sluice River Marsh pNHA, Malahide Estuary pNHA, North Dublin Bay pNHA, Grand Canal pNHA, Dolphins Dublin Docks pNHA, Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, South Dublin Bay pNHA and Booterstown Marsh pNHA. These sites are hydrologically connected to the Proposed Scheme via the Glebe Stream, Mayne River, Cuckoo Stream, Sluice River, River Santry, River Tolka, Royal Canal and Liffey Estuary Lower.

There is one NHA and 30 pNHAs located within approximately 15km of the Proposed Scheme. These are listed in Table 12.9 and illustrated in Figure 12.4 in Volume 3 of this EIAR. Table 12.9 lists these sites, their distance from the Proposed Scheme, and the ecological features for which the sites are designated/proposed. 19 of these are located within the ZoI of the Proposed Scheme (see Table 12.9).

These NHAs and pNHAs are valued as being of National Importance.

Table 12.9: NHAs 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 Islands NHA [000204]	Approximately 15.8km north east of the Proposed Scheme	See Table 12.8 under Skerries Islands SPA
pNHAs		

Site Name	Distance	Description
Royal Canal pNHA [002103]	Traverses the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
Santry Demesne pNHA [000178]	Immediately adjacent to the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, and woodland
North Dublin Bay pNHA [000206]	Approximately 1.7km east of the Proposed Scheme	See Table 12.8 under North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA
Grand Canal pNHA [002104]	Approximately 1.8km south of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
Feltrim Hill pNHA [001208]	Approximately 1.8km north 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*
Malahide Estuary pNHA [000205]	Approximately 2 km east of the Proposed Scheme	See Table 12.8 under Malahide Estuary SAC and Malahide Estuary SPA
South Dublin Bay pNHA [000210]	Approximately 3.7km south of the Proposed Scheme	See Table 12.8 under South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA
Dolphins, Dublin Docks pNHA [000201]	Approximately 4.4km east of the Proposed Scheme	See Table 12.8 under South Dublin Bay and River Tolka Estuary SPA
Sluice River Marsh pNHA [001763]	Approximately 5km east of the Proposed Scheme	Freshwater marsh
Rogerstown Estuary pNHA [004015]	Approximately 5.6 km north of the Proposed Scheme	See Table 12.8 under Rogerstown Estuary SPA
Liffey Valley pNHA [000128]	Approximately 5.6km west 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.
Baldoyle Bay pNHA [000199]	Approximately 5.8km east of the Proposed Scheme	See Table 12.8 under Baldoyle Bay SAC and Baldoyle Bay SPA
Booterstown Marsh pNHA [001205]	Approximately 6km south of the Proposed Scheme	See Table 12.8 under South Dublin Bay and River Tolka Estuary SPA
Portraine Shore pNHA [001215]	Approximately 7.7km north of the Proposed Scheme	See Table 12.8 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Dodder Valley pNHA [000991]	Approximately 8.3km south of the Proposed Scheme	The last remaining stretch of natural riverbank vegetation on the River Dodder in the built-up Greater Dublin Area (GDA).
Howth Head pNHA [000202]	Approximately 9.2km east of the Proposed Scheme	See Table 12.8 under Howth Head SAC and Howth Head Coast SPA
Fitzsimon's Wood pNHA [001753]	Approximately 9.3km south of	Birch woodland, which is very rare in County Dublin.

Site Name	Distance	Description
	the Proposed Scheme	
Ireland's Eye pNHA [000203]	Approximately 10.7km east of the Proposed Scheme	See Table 12.8 under Ireland's Eye SAC and Ireland's Eye SPA
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	Approximately 11km 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 Rockabill to Dalkey Island SAC and Dalkey Islands SPA
Glenasmole Valley pNHA [001209]	Approximately 12.5km south west of the Proposed Scheme	See Table 12.8 under Glenasmole Valley SAC
Lambay Island pNHA [000204]	Approximately 13.1km north east of Proposed Scheme	See Table 12.8 under Lambay Island SPA
Lugmore Glen pNHA [001212]	Approximately 13.1km south of the Proposed Scheme	Presence of the rare Red Data Book species Yellow Archangel (*Lamiastrum galeobdolon*).
Dingle Glen pNHA [001207]	Approximately 13.4km south of the Proposed Scheme	Variety of habitat present, including woodland
Bog of The Ring pNHA [1204]	Approximately 13.7km north of the Proposed Scheme	Drained bog containing pockets of freshwater marsh
Loughlinstown Woods pNHA [001211]	Approximately 14.5km south east of the Proposed Scheme	Demesne type mixed woodland
Knock Lake pNHA [001203]	Approximately 14.6km north of the Proposed Scheme	Freshwater lake supporting wintering wildfowl, and otter.
Ballybetagh Bog pNHA [001202]	Approximately 14.6km south of the Proposed Scheme	Marshland
Rye Water Valley/Carton pNHA [001398]	Approximately 14.8km west of the Proposed Scheme	See Table 12.8 under Rye Water Valley / Carton SAC
Rockabill pNHA [004014]	Approximately 21.5km north east of the Proposed Scheme	See Table 12.8 under Rockabill SPA
The Murrough pNHA [004186]	Approximately 29.3km south east of the Proposed Scheme	See Table 12.8 under The Murrough SPA

12.3.4.3 Other Designated Sites

Other designations recognised in the Greater Dublin Area (GDA) including RAMSAR wetlands sites and UNESCO Dublin Bay Biosphere are considered in terms of the overall with European and National sites, whilst the three Special Area Amenity Order (SAAO) sites 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 for 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 UNESCO for its rare and internationally important habitats and species of wildlife. The 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 the three 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 Area Amenity Order (SAAO) 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. None are directly intersected by the Proposed Scheme. They include:

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

The designations reinforces 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 AA, respectively, by virtue of overlapping nature designations.

12.3.4.3.4 Tree Preservation Orders (TPO's)

A Tree Preservation Order (one of three in the Fingal) has been enacted under section 205 of the Planning and Development Act for Santry Demesne which overlaps with the pNHA and can apply to a tree, trees, group of trees or woodland.

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, after Fossitt (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. Full species lists for each habitat type are provided in Appendix A12.1 in Volume 4 of this EIAR. The results and summary of the findings of the aquatic habitat surveys have been incorporated into the relevant habitat descriptions.

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

- Arable crops (BC1);
- Flower beds and borders (BC4);
- Buildings and artificial surfaces (BL3);
- Spoil and bare ground (ED2);
- Recolonising bare ground (ED3);
- Depositing/ lowland rivers (FW2);
- Canals (FW3);
- Drainage ditches (FW4);
- Improved agricultural grassland (GA1);
- Amenity Grassland (Improved) (GA2);
- Dry meadows and grassy verges (GS2);
- Wet grassland (GS4);
- Residential;
- (Mixed) broadleaved woodland (WD1);
- Mixed broadleaved / conifer woodland (WD2);
- Scattered trees and parkland (WD5);
- Hedgerows (WL1);
- Treelines (WL2);
- Scrub (WS1);
- Immature woodland (WS2); and
- Ornamental / non-native shrub (WS3).

No Annex I habitats were recorded inside the boundary Proposed Scheme. The habitat type tidal rivers (CW2) corresponds with the Annex I habitat Estuaries [1130] and is present downstream of the proposed River Tolka Pedestrian Cycleway Bridge alongside the existing Frank Flood Bridge crossing where the River Tolka flows into Dublin Bay.

12.3.5.2 Arable crops (BC1)

This habitat type was recorded within three fields located west and east of the R132 / Swords Road between Dublin Road Swords and Airside Retail Park. The fields comprised a wheat species.

This habitat type is of Local Importance (Lower Value).

12.3.5.3 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 three locations across the Proposed Scheme. The largest areas of this habitat type are located along the R132 / Swords Road at Magenta Hall Santry and consists of planted beds bordering a residential area located opposite the Omni Shopping Centre. This habitat type is also present adjacent to Parfit on R132 / Dublin Road and at Drumcondra train station. Ornamental species present at this habitat include silver birch *Betula pendula* butterfly bush *Buddleja davidii* and cotoneaster species *Cotoneaster* spp.

This habitat type is also present throughout the Proposed Scheme in smaller areas associated with commercial developments or industrial complexes, planting at roundabouts and along roadsides in suburban areas.

This habitat type was also found in mosaics with the following habitats: amenity grassland (improved) (GA2) and buildings and artificial surfaces (BL3), treelines (WL2) and ornamental/ non-native shrub (WS3).

This habitat type is of Local Importance (Lower Value), due to its low species diversity.

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 association with the following habitats; flower beds and borders (BC4), ornamental / non-native shrub (WS3), amenity grassland (GA2), spoil and bare ground (ED2), recolonising bare ground (ED3), hedgerows (WL1) and treelines (WL2).

This habitat type is of negligible ecological value.

12.3.5.5 Spoil and bare ground (ED2)

This habitat type was present at five locations throughout the Proposed Scheme, the largest of which is located at the junction of R103 / Collins Avenue and R132 / Swords Road at Whitehall, followed by a construction site north of Kealy's retail shop located opposite the Express Green Long-Term Car Park at Dublin Airport. Additional locations included 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 butterfly bush and winter heliotrope *Petasites pyrenaicus*.

This habitat type was also found in mosaics with the following habitats: recolonising bare ground (ED3) and scrub (WS1).

This habitat type is of Local Importance (Lower Value), due to the highly disturbed nature of this habitat and very limited species diversity.

12.3.5.6 Recolonising bare ground (ED3)

This habitat type was assigned to areas of disturbed ground and/or artificial surfaces which have been recolonised by plants, and vegetation cover is now greater than 50%. This habitat type was identified in eight locations including: north of Omni Shopping Centre; the corner of Coolock Lane; Santry Business Park, south of the M50 motorway bridge; and in three other locations at Collinstown and at Kettles Lane.

Most of the vegetation recorded were ruderal species commonly found in this habitat type. These included silverweed *Potentilla anserina*, creeping thistle *Cirsium arvense*, cotoneaster species, wild teasel *Dipsacus fullonum*, rosebay willowherb *Chamaenerion angustifolium*, American willowherb *Epilobium ciliatum*, hairy willowherb *Epilobium parviflorum*, horsetail species *Equisetum sp*., fumitory species *Fumaria* sp., Yorkshire-fog *Holcus lanatus*, greater plantain *Plantago major*, creeping buttercup *Ranunculus repens*, broad-leaved dock *Rumex obtusifolius*, common ragwort *Jacobaea vulgaris*, hedge mustard *Sisymbrium officinale*, alexanders *Smyrnium olusatrum*, smooth sow-thistle *Sonchus oleraceus*, common dandelion *Taraxacum officinale* agg., red clover *Trifolium pratense* and mayweed *Tripleurospermum inodorum*.

This habitat type also occurred in mosaics with the following habitat types: spoil and bare ground (ED2) and scrub (WS1).

This habitat type is of Local Importance (Lower Value) due to the highly disturbed nature of this habitat.

12.3.5.7 Depositing/lowland rivers (FW2)

This habitat type refers to the River Gaybrook, Sluice River, Mayne River and its tributary the Cuckoo Stream, River Santry and River Tolka, which are all classified as depositing / lowland rivers. These watercourses are discussed individually below.

The Proposed Scheme will cross the Sluice River south of Kilronan Equestrian Centre (illustrated in Figure 12.3 in Volume 3 of this EIAR). The Sluice River is culverted under R132 / Swords Road at this location. The River Sluice is assigned a single EPA segment; Sluice_010. The Sluice_010 rises to the north of Dublin Airport and flows in an easterly direction through the towns and surrounding areas of Greenwood, Abbeville, Kinsealy and Old Portmarnock before entering the Mayne Estuary and subsequently the Irish Sea. The River Sluice has a total length of 15.17km. Land along the waterbody is utilised for agricultural purposes with the downstream extents being residential.

Sluice_010 has an Unknown WFD Status and is at risk of not meeting the WFD objective of Good Status by 2027, which is under review. The main risks are anthropogenic pressures. EPA River Quality surveys are not available for Sluice_010.

The Proposed Scheme will cross the Mayne River at two locations along the R132 / Swords Road. The Proposed Scheme will cross the Mayne River at Glen Dimplex on the R132 / Swords Road north of the M50 bridge. The Mayne River is culverted beneath the R132 / Swords Road at this location. The Proposed Scheme will cross the Cuckoo Stream, a tributary of the Mayne River, south of Aer Lingus Social and Athletic Association (ALSAA) grounds. The Cuckoo Stream is culverted beneath the R132 / Swords Road at this location (illustrated in Figure 12.3 in Volume 3 of this EIAR).

The Mayne River is assigned a single EPA segment; Mayne_010. The Mayne_010 commences at Dardistown (west of the M50 / M1 Motorway Interchange). It flows under the interchange, parallel to the Northern Cross Route Extension (R139 Road) until it crosses the R107 Malahaide Road. From that point it flows through the Castlemoyne Estate, where is joined by a tributary known as Cuckoo Stream and then continues to flow under the Dublin / Belfast railway line before discharging to the Mayne Estuary, in the Baldoyle Natural Reserve. The tributary (Cuckoo Stream) commences at Dublin Airport and flows under the M1 Motorway at Toberbunny and joins the main channel of Mayne_010 upstream of Balgriffin Park. The Mayne_010 (including the Cuckoo Stream) has a total length of 16.52km. Land to the north of the watercourse is utilised for agricultural purposes with land use to the south being predominantly urban.

Mayne_010 has a Poor WFD Status and is At Risk of not meeting the WFD objective of Good Status by 2027. The main risks are anthropogenic pressures. The Mayne_010 was last assessed in 2019 at one monitoring station approximately 5km downstream from the Proposed Scheme. The Q Value was unsatisfactory at Q2 to Q3.

Riparian vegetation recorded along the banks of the Mayne River include hedge bindweed *Calystegia sepium*, creeping thistle, hoary willowherb, field horsetail *Equisetum arvense*, meadowsweet *Filipendula ulmaria*, bramble *Rubus fructicosus* agg., common ragwort, common nettle *Urtica dioica*, Yorkshire-fog and false oat-grass *Arrhenatherum elatius*.

The Proposed Scheme will cross the River Santry at Northwood, which flows through Santry Demesne pNHA in a west to east direction (illustrated in Figure 12.3 in Volume 3 of this EIAR). The River Santry is culverted beneath the R132 / Swords Road. The River Santry is defined by two EPA segments, Santry_010 (upstream segment) and Santry_020 (downstream segment). The Santry_010 has its origins at Harristown Lane, south of R108 South Parallel Road. The Santry_010 flows through Silloge, under the M50 Motorway at Ballymun and through Santry Demesne. It then passes under the M1 / M50 Motorway at Santry, through Coolock where it flows into Santry_020 and under the Dublin / Belfast railway line before discharging to Dublin Bay at North Bull Island SPA. Land use within the catchment is predominantly urban with land surrounding the upstream portion of the river being used for agriculture purposes.

The Santry_010 EPA segment will be crossed by the Proposed Scheme at Northwood along the R132 / Swords Road. Santry_010 has a Poor WFD status and is At Risk of not achieving Good Status by 2027 due to a number of significant pressures such as urban wastewater, urban runoff from diffuse sources causing nutrient and organic pollution and altered habitat due to morphological changes in the watercourse.

The River Tolka will be crossed by the Proposed Scheme at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge. The River Tolka is assigned into six EPA segments, of which Tolka_060 is within the study area of the Proposed Scheme. Tolka_010 rises in the south-west of Dunshaughlin from where it flows through Dunboyne as Tolka_020 and Blanchardstown as Tolka_040, before entering the north-west of Dublin City as Tolka_050, becoming tidal downstream of Drumcondra at the Tolka_060 segment, and flowing into Dublin Bay along the northern edge of Dublin Port. Generally, the River Tolka has poor water quality, both biologically / ecologically and chemically. Ecological Status in both the Tolka_040 and Tolka_050 waterbodies was 'Poor' in the 2016 to 2021 monitoring cycle and both segments are At Risk. There are significant industrial pressures throughout the Tolka_SC_020 sub-catchment, particularly urban diffuse and misconnections. There have been misconnection studies initiated and extensive studies throughout the Tolka Valley Park area. Illegal dumping is also an issue in the Dunsink Lane area and there have also been improvement attempts made with a large-scale SuDS programme in the Ballymun area. The Tolka Estuary is a Nutrient Sensitive Area.

The EPA segment Tolka_060 will be crossed by the Proposed Scheme at Drumcondra, north-west of Holy Cross College. Its segment length is 3km and it flows directly into the Tolka Estuary approximately 500m downstream from the point at which it will be crossed by the Proposed Scheme. Tolka_060 is hydrologically connected to two designated European Sites (Malahide Estuary SAC and Malahide Estuary SPA).

Tolka_060 has an Unassigned WFD status and is At Risk of not achieving Good Status by 2027. Its main pressures are due to urban runoff and urban wastewater from Combined Sewer Overflows.

Biological water quality, based on Q-sampling undertaken by Triturus Environmental Ltd within the River , was calculated as Q3 (poor status) (Triturus Environmental Ltd 2022).

Riparian vegetation identified along the River Tolka gravel banks include butterfly bush, with marginal riparian stands of osier *Salix viminalis*, grey willow *Salix cinerea* and crack willow, alongside reed canary grass *Phalaris arundinacea* and scattered invasive Himalayan balsam *Impatiens glandulifera* on the north bank (Triturus Environmental Ltd 2022).

The River Tolka, adjacent to the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, at the existing Frank Flood Bridge CBC0002AR001 location, is a semi-natural lowland depositing watercourse (FW2) with a swift flow. Despite being located in a heavily urbanised area with high retaining walls, the river profile was surprisingly natural downstream of the bridge (upstream being glide dominated, held between retaining walls and with less

natural character). The river profile was dominated by glide (30%) and riffle (50%) with more localised pool (20%), the largest of which was located immediately downstream of the bridge apron/weir. The channel width was variable between 15m and 20m wide, the depth was also variable, ranging between 0.3 and 1.3m. The channel bed comprised rendered concrete under the road crossing but downstream of the bridge the substrata were mainly boulder and cobble with pockets of medium and fine gravels (in pools). The substrata were bedded but large pockets of well-sorted medium and coarse gravels were present at the pool tailing downstream of the weir at the bridge apron (Triturus Environmental Ltd 2020).

The instream vegetation of the River Tolka at the CBC0002AR001 survey location found that the bed suffered from moderate siltation and eutrophication pressures were evident with 20% filamentous algae cover. The macrophyte community included locally frequent emergent watercress, lesser water parsnip and blue water speedwell (*Veronica anagallis-aquatica*). A single stand of bulrush (*Typha latifolia*) was present on the river margin 50m downstream of the bridge. The coarse substrata on the bed also supported *Cinclidotus fontinaloides* and *Platyhipnidium riparoides* locally (Triturus Environmental Ltd 2022).

This habitat type is of County Importance as it is not common in the surrounding landscape and is an important biodiversity corridor with direct connectivity to downstream to European sites.

12.3.5.8 Canals (FW3)

The Proposed Scheme traverses the Royal Canal at Binns Bridge (illustrated in Figure 12.3 and Figure 12.5 in Volume 3 of this EIAR). The Royal Canal (Royal Canal Main Line (Liffey and Dublin Bay)) (hereafter referred to as the Royal Canal) is an artificial waterbody, primarily used for recreation and was constructed in the 18th century, shortly after the Grand Canal. The Royal Canal is 145km long and runs from the River Liffey in Dublin to Cloondara on the River Shannon, with an 8km branch line into the town of Longford. Along the length of the Royal Canal there are 46 sets of locks. The Royal Canal will be crossed by the Proposed Scheme at Binns Bridge in Dumcondra. As stated in the EPA Water Quality in Ireland 2013 – 2018 Report (EPA 2019), assessments of the Royal Canal using macroinvertebrates indicate generally good biological conditions. Similarly, positive results were identified in terms of macrophyte assessment. The Royal Canal achieved good ecological potential in the period from 2013 to 2015.Adjacent bankside habitat types consisted of scrub (WS1) and dry meadows and grassy verges (GS2) to the east of the bridge, with amenity grassland (Improved) (GA2) and treelines (WL2) to the west of the bridge. Species recorded along the canal banks include butterfly bush, sycamore, willow, small-leaves lime, hedge bindweed, and ash.

The legally-protected Flora Protection Order 2022 species opposite-leaved pondweed *Groenlandia densa* is recorded at several areas throughout the Royal Canal and Grand Canal, the desk study returned records for this species within approximately 1km of the Proposed Scheme, between Lock 4 at Binns Bridge and Lock 5 at Cross Guns Bridge.

The Royal Canal is designated as a pNHA. This habitat type is therefore valued as being of National Importance.

12.3.5.9 Drainage ditches (FW4)

Drainage ditches habitat was identified at three locations across the Proposed Scheme. At lands located north of the Travelodge Dublin Airport North Swords Hotel, this habitat type borders the perimeter of improved agricultural grassland (GA1) where it is adjacent to an area of scrub located along the R132 / Swords Road. It was identified opposite Swords Veterinary Hospital on lands adjacent to the R132 / Swords Road where it is bordered by wet grassland (GS4) to the south and dry meadows and grassy verges (GS2) with hedgerows (WL1) to the north. It was also identified along a treeline located south of Kilronan Equestrian Centre between a linear strip of dry meadows and grassy verges (GS2) and scrub (WS1) (illustrated in Figure 12.5 in Volume 3 of this EIAR).

The drainage ditches were dry at the time of survey. No riparian vegetation was recorded.

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

12.3.5.10 Improved agricultural grassland (GA1)

Improved agricultural grassland was present at three locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). Two of these locations were identified along the R132 / Swords Road at Pinnock Hill adjacent to Travelodge Dublin Airport North Swords Hotel and Swords Veterinary Hospital, a smaller area of this habitat type was observed at lands opposite Boland Car Dismantlers on R132 / Swords Road.

Grass species present included annual meadow-grass, cock's-foot, creeping bent, crested dog's-tail *Cynosurus cristatus*, meadow foxtail *Alopecurus pratensis*, perennial rye-grass, rough meadow-grass *Poa trivialis* and Yorkshire-fog, while forb species present included broad-leaved dock, common chickweed *Stellaria media*, common mouse-ear, common nettle, creeping buttercup, creeping thistle *Cirsium arvense*, daisy, dandelion, germander speedwell, greater plantain, red clover, ribwort plantain, silverweed *Anserina argentea*, spear thistle, sticky mouse-ear *Cerastium glomeratum* and white clover.

This habitat occurred in a mosaic with dry calcareous and neutral grassland (GS1).

This habitat type is of Local Importance (Lower Value) owing to the presence of common agricultural grassland sward species, typical of the habitat in the wider landscape.

12.3.5.11 Amenity grassland (Improved) (GA2)

Amenity grassland was a 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 include Ellenfield Park, Plunket College and Whitehall GAA pitch. Smaller areas include Halpenny Golf Range, Our Lady's Park and the Garden of Remembrance. This habitat type was also observed along road medians at Pinnock Hill and several locations along the R132 / Swords Road.

Grass species present included perennial rye-grass *Lolium perenne*, while forb species present included daisy *Bellis perennis*, hawk's-beard species *Crepis* spp., horsetail species, common ivy *Hedera helix*, ribwort plantain *Plantago lanceolata*, sow thistle, red clover and white clover *Trifolium repens*. Shrub and tree species present comprised of rose species *Rosa* sp., butterfly bush, willow species *Salix* sp., sycamore, cherry *Prunus kanzan*, small-leaved lime *Tilia cordata*, horse chestnut *Aesculus hippocastanum*, beech *Fagus sylvatica*, copper beech *Fagus sylvatica f. purpurea*, and Scots pine *Pinus sylvestris*.

This habitat type often occurred in mosaics with buildings and artificial surfaces (BL3), flower beds and borders (BC4), hedgerows (WL1), treelines (WL2) and scrub (WS1).

This habitat type is of Local Importance (Lower Value), as it is heavily modified resulting in the presence of common grassland sward species, typical of the managed habitat in the wider landscape.

12.3.5.12 Dry meadows and grassy verges (GS2)

This habitat type is comprised of unmanaged grassland areas including areas of parkland following a low maintenance regime and roadside verges. This habitat type was recorded in several areas of varying sizes located across the Proposed Scheme. Prominent areas of this habitat were identified at Dardistown, Pinnock Hill, and the road medians along the R132 / Swords Road from Dublin Airport to Pinnock Hill. Other areas of this habitat type were observed along the R132 / Swords Road at the M50 bridge, Whitehall GAA and north of Collinstown Business Park (illustrated in Figure 12.5 in Volume 3 of this EIAR).

Grass species present included false oatgrass, fescue species *Festuca* sp., Yorkshire-fog and perennial ryegrass. While forb species present included shepherds purse *Capsella bursa-pastoris*, creeping thistle, hawksbeard species, rosebay willowherb *Epilobium angustifolium*, American willowherb, hoary willowherb, horsetail species, ribwort plantain, creeping cinquefoil *Potentilla reptans*, broad-leaved dock, common ragwort, false nastursium *Senecio oxyriifolius*, white aster *Symphyotrichum ericoides*, red clover, colt's-foot *Tussilago farfara*, common nettle, yellow vetch *Vicia lutea*, bush vetch *Vicia sepium*, traveller's-joy *Clematis vitalba* and bramble. Trees observed alongside this habitat included cypress species *Cupressus* spp., and sycamore.

This habitat type also occurred in mosaics with scrub (WS1), hedgerows (WL1) and immature woodland (WS2), as well as other grassland assemblages

This habitat type is of Local Importance (High Value), due to good species diversity and relative scarcity as large expanses across the wider largely modified landscape

12.3.5.13 Wet grassland (GS4)

This habitat type was identified at one location across the Proposed Scheme at lands located opposite Swords Veterinary Hospital. An inaccessible area of wet grassland (GS4) approximately 0.1ha (hectare) was identified between agricultural fields comprising arable crops (BC1) to the south and a drainage ditch (FW4) to the north.

Based on survey data from the ongoing Metro Project[1] for similar habitat in accessible areas, these areas might be expected to support grass species such as creeping bent, rough meadow-grass and Yorkshire-fog. Rush species hard rush and soft rush would also be expected to be resent, along with false fox-sedge *Carex otrubae* and hairy sedge. Forb species present included those typical of wetter conditions, such as common fleabane *Pulicaria dysenterica*, bulrush *Typha latifolia*, field horsetail, great willowherb, meadowsweet and silverweed, as well as those more common in more improved grassland habitats, such as common nettle, common ragwort, creeping cinquefoil, curled dock and meadow buttercup.

This habitat type is of Local Importance (High Value), due to its limited extent and based on the likely composition similarity with other local wet grassland habitat areas.

12.3.5.14 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).

This habitat type was commonly encountered and was present across the entire scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR).

This habitat type is of Local Importance (Lower Value).

12.3.5.15 (Mixed) broadleaved woodland (WD1)

This habitat was identified at nine locations along the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat type are located at Santry Demesne, along the R132 / Swords Road at Pinnock Hill, and from Dublin Airport to Naul Road. Other areas of this habitat type were recorded at Parnell Square, Kilronan Equestrian Centre, Dardistown, Corballis Road and at Halpenny Golf Range.

The (mixed) broadleaved woodland (WD1) that was identified within Santry Demesne pNHA comprised of tree species including horse chestnut, sycamore, holly *Ilex aquifolium*, wych elm *Ulmus glabra*, ash, dog-rose *Rosa canina*, elder, oak *Quercus* spp. and beech *Fagus sylvatica.* The understory comprised of species including geranium species *Geranium* spp., hogweed *Heracleum sphondylium*, cyclamen species *Cyclamen* spp., lords-and-ladies *Arum maculatum*, herb-robert *Geranium robertianum*, bearded couch-grass *Elymus caninus*, broad-leaved dock, great wood-rush *Luzula sylvatica*, common dandelion, spleenwort species *Asplenium* spp*.,* cleavers *Galium aparine*, bush vetch *Vicia sepium*, piri-piri bur *Acaena novae-zelandiae* and meadowsweet.

The other eight locations where (mixed) broadleaved woodland (WD1) was identified comprised of the following tree species: field maple *Acer campestre*, sycamore, maple species *Acer sp*., horse chestnut, alder *Alnus glutinosa*, birch species *Betula* spp., coniferous species., hazel *Corylus avellana*, hawthorn *Crataegus monogyna*, Leyland cypress *Cupressus* × *leylandii*, beech, ash, spruce species *Picea* spp., sycamore, poplar species *Populus* spp., cherry laurel *Prunus laurocerasus*, blackthorn *Prunus spinosa*, willow species, elder *Sambucus nigra*, rowan *Sorbus aucuparia*, small-leaved lime, mallow species *Malva sylvestris* and Monterey cypress *Hesperocyparis*

[1] Survey Data kindly provided by Metro Ecologists who have finalised the biodiversity chapter for the proposed EIAR for the Proposed Scheme with permission of client.

macrocarpa. Where present, ground flora species included mint species *Mentha arvensis* sp., hedge bindweed, field bindweed *Convolvulus arvensis*, rosebay willowherb, hoary willowherb, common ivy, rose species, bramble and common nettle.

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.

12.3.5.16 Mixed broadleaved / conifer woodland (WD2)

This habitat type was identified at one location across the Proposed Scheme along the R135 / Swords Road at Furry Park Industrial Estate (illustrated in Figure 12.5 in Volume 3 of this EIAR).

Tree species recorded at this location include beech, silver birch, maple species, sycamore, Scot's pine, ash and downy birch *Betula pubescens*.

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

12.3.5.17 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 13 locations across the proposed scheme associated with parks, playing pitches and road medians (illustrated in Figure 12.5 in Volume 3 of this EIAR). The most significant areas of this habitat type were present at Morton Stadium, Santry Park, Santry Demesne, Santry Villas, Lorcan Road, Ellenfield Park and St. Patricks College.

Tree species identified at these locations include hawthorn, beech, copper beech, Scot's pine *Pinus sylvestris*, sycamore and blue spruce *Picea pungens*.

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.

12.3.5.18 Hedgerows (WL1)

Hedgerows were identified in 15 locations across the 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 recorded along the Proposed Scheme were along roadsides and within the vegetated median of larger roads, some areas consisted of screening vegetation at residential properties. Substantial areas of this habitat are present as field boundaries adjacent to agricultural lands along the R135 / Swords Road at Travelodge Dublin Airport North Swords hotel and Pinnockhill, and from Airside Retail Park to Naul Road. Other areas include road medians at Dublin Airport, Collinstown, Airways Industrial Estate and at several other locations along the R135 / Swords Road.

The species composition varied greatly within this habitat type across the different locations. Tree and shrub species consist of field maple, sycamore, maple species, horse chestnut, alder, grey alder *Alnus incana*, birch species, hornbeam *Carpinus fastigiata Lucas*, conifer species, hazel, hawthorn, Leyland cypress, beech, ash, blackthorn, oak species *Quercus* spp., rowan, yew *Taxus baccata*, holly, garden privet *Ligustrum ovalifolium*, New Zealand broadleaf *Griselinia Littoralis*, fuchsia species *Fuchsia* spp., and bramble. Ground flora and forb species consist of common ivy and poppy species *Papaver* spp.

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.

12.3.5.19 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 recorded widely 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 at Woodford Business Park, Lorcan Road / Shanrath Road, Ellenfield Park, Holy Cross / Clonliffe College and St. Patrick's College. Other areas of this habitat type include Furry Park Industrial Estate, Coolock Lane, North Circular Road, Parnell Square and several locations along the R135 / Swords Road.

Species frequently recorded include maple species, Norway maple *Acer platanoides*, horse chestnut, silver birch, birch species, conifer species, hazel, hawthorn, cypress species, beech, copper beech, ash, Monterey cypress, Scot's pine, sycamore, cherry, blackthorn, oak species, willow species, elder, rowan, small-leaved lime, downy birch and wych elm. The understory consists of butterfly bush and bramble.

This habitat type also occurred in mosaics with flower beds and borders (BC4), buildings and artificial surfaces (BL3), dry meadows and grassy verges (GS2), amenity grassland (GA2), hedgerows (WL1) and ornamental/ non-native shrub (WS3).

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.

12.3.5.20 Scrub (WS1)

Areas of scrub was identified in approximately twenty (20) discrete locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat were located along the R135 / Swords Road between Airside Retail Park and Naul Road, Furry Park Industrial Estate, Boroimhe, Top Oil, Santry Close and on both sides of the R135 / Swords Road at Glen Dimplex.

Shrub species recorded typically consisted of bramble along with forbs winter heliotrope, common nettle as well as other common ruderal species and several garden escapes.

This habitat type also occurred in mosaics with amenity grassland (GA2), dry meadows and grassy verges (GS2), immature woodland (WS2), spoil and bare ground (ED2) and recolonising bare ground (ED3).

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

12.3.5.21 Immature woodland (WS2)

Immature woodland was identified at five locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). These areas were located along the R135 / Swords Road at Boroimhe, Dublin Road and Naul Road junction, Halpenny Golf Range, Dublin Airport and at the Swords Road bridge at Whitehall.

Tree species identified include birch, beech, cherry laurel, sycamore, oak, ash, field maple, hazel, alder, poplar species, lime species, rowan and long-leaved willow. The understory, where present, comprised of hedge bindweed, bramble and hairy willowherb.

This habitat type also occurred in mosaics with scrub (WS1).

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

12.3.5.22 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 of commercial property at Airside Retail Park and Carland at Turnapin. Other areas of this habitat type include at the Carlton Hotel, Homefarm Football Club, Glenmore House and opposite a commercial premises - Fairco Windows and Doors.

Species identified include birch species, butterfly bush, cotoneaster species, fuchsia species, variegated ivy *Hedera helix variegata*, poppy species, rose species, small-leaved lime and shrubs in ornamental planters.

This habitat type was recorded in mosaics with the following other habitat types; flower beds and borders (BC4), treelines (WL2) and buildings and artificial surfaces (BL3).

This habitat type is of Local Importance (Lower Value).

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.

The desk study returned records of a total of seven species listed on the Flora (Protection) Order 2022 across the wider study area (i.e. Grid Squares O13 and O14) and are listed in Appendix A12.1 in Volume 4 of this EIAR. The legally-protected Flora Protection Order 2022 species opposite-leaved pondweed *Groenlandia densa* is recorded at several areas throughout the Royal Canal and the desk study returned records for this species within approximately 1km of the Proposed Scheme, between Lock 4 at Binns Bridge and Lock 5 at Cross Guns Bridge and along the Royal Canal within the 2km grid square O13N (NBDC online database 2022).

Others in the vicinity included Betony *Betonica officinalis,* Great Burnet *Sanguisorba officinalis* and Meadow Barley *Hordeum secalinum* none of which would be expected to occur along the Proposed Scheme corridor. All are classed as vulnerable, while another species Small Cudweed *Filago minima* is like opposite leaved pondweed classified as *near threatened.*

Another Flora Protection Order species which was previously known from Santry Woods pNHA is Hairy St John's Wort *Hypericum hirsutum*. The species was recorded historically inside the boundary wall of Santry Demesne and was considered highly likely that it was still present as seed within soils in the area. Hence a management plan was implemented for the species (Purser and Wilson 2015), although its current status following on from the implementation of that plan is unknown, it was recorded for an early scheme corridor in respect of a separate Bus Connects scheme. It was not returned from the desk top review of the NBDC online database (2022). And it was not recorded during surveys associated with the Proposed Scheme.

A rare charophyte (the only known Irish record) species tassel stonewort *Tolypella intricata* is found between Lock 5 and Lock 4 on the Royal Canal directly east of the Proposed Scheme at Cross Guns Bridge (NPWS 2009f). This species is considered to be "*Vulnerable*" (Wyse Jackson *et al.* 2016). This species is noted as 'Near Threatened' on Irelands Red List No. 10: Vascular Plants 2016 (Jackson *et al.* 2016).

The Locally Common Wild Clary *Salvia verbenaca* was returned from historical NPWS data in the vicinity of the Coachman's Inn, Cloghran. This rarity was not recorded during surveys for the Proposed Scheme, nor is it returned from the review of the NBDC Online Database 2022 (See Appendix A12.1).

12.3.7 Non-Native Invasive Plant Species

There were three non-native invasive plant species listed on the Third Schedule of the Birds and Habitats Regulations identified along the Proposed Scheme Himalayan balsam *Impatiens glandulifera,* Giant hogweed *Heracleum mantegazzianum* and Japanese knotweed *Reynoutaria japonica*. In total there are 12 locations of these non-native invasive plant species, many of which occur in proximity to each other, which are summarised below in Table 12.10 and shown on Figures 12.6.

The desk study returned records of a total of 17 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 across the wider study area (i.e. Grid Squares O13 and O14) and are listed in Appendix A12.1 in Volume 4 of this EIAR. Records within 1km of the Proposed Scheme include Canadian Waterweed *Elodea canadensis*[2] and Nuttall's Waterweed *Elodea nuttallii.* New Zealand Pigmyweed *Crassula helmsii* was recorded within the 2km Grid Square O13N. Giant hogweed *Heracleum mantegazzianum* and Himalayan balsam were recorded along the River Tolka, and Japanese knotweed *Reynoutria japonica* and

[2] Canadian waterweed has been delisted as a Third Schedule species, but as yet its designation has not been changed on the NBDC online database. This species is known to occur intermingled with Nuttall's waterweed, which remains a Third Schedule species.

three-cornered leek *Allium triquetrum* were recorded along the banks of the River Ward in Swords (NBDC online database 2022).

Table 12.10: 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	Location relative to Redline Boundary	Species	Description
CBC0002IAPS001	Outside, Upstream of Frank Flood Bridge	Himalayan balsam *Impatiens glandulifera*	Scattered along the banks of the River Tolka
CBC0002IAPS002	Outside, Upstream of Frank Flood Bridge	Himalayan balsam *Impatiens glandulifera*	
CBC0002IAPS003	Outside, Upstream of Frank Flood Bridge	Himalayan balsam *Impatiens glandulifera*	
CBC0002IAPS004	Inside, North western side of Frank Flood Bridge	Giant hogweed *Heracleum mantegazzianum*	
CBC0002IAPS005	Outside, downstream of Frank Flood Bridge	Giant hogweed *Heracleum mantegazzianum* Himalayan balsam *Impatiens glandulifera*	
CBC0002IAPS006	Outside, downstream of Frank Flood Bridge	Giant hogweed *Heracleum mantegazzianum*	
CBC0002IAPS007	Outside, downstream of Frank Flood Bridge	Giant hogweed *Heracleum mantegazzianum*	
CBC0002IAPS008	Outside, downstream of Frank Flood Bridge	Himalayan balsam *Impatiens glandulifera*	
CBC0002IAPS009	Outside, downstream of Frank Flood Bridge	Himalayan balsam *Impatiens glandulifera*	
CBC0002IAPS010	Outside, downstream of Frank Flood Bridge	Himalayan balsam *Impatiens glandulifera*	
CBC0002IAPS011	Outside, downstream of Frank Flood Bridge	Himalayan balsam *Impatiens glandulifera*	
CBC0002IAPS012	Outside, downstream of Frank Flood Bridge @Clonliffe College	Giant hogweed *Heracleum mantegazzianum*	

12.3.8 Mammals

12.3.8.1 Bats

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

Bat surveys were carried out across four seasons between 2018 and 2020 (as described in Section 12.3.8.1) in the preparation of this EIAR, with a follow on transect survey undertaken around the Frank Flood Bridge in 2021, owing to the level of bat activity previously recorded there and the nature of the proposed works at this location. Six transects were surveyed within the footprint of the Proposed Scheme. Transects CBC0002BT001 (Travelodge Dublin Airport North Swords hotel), CBC0002BT002 (Dardistown), CBC0002BT003 (Glen Dimplex), CBC0002BT004 (Santry Demesne), CBC0002BT005 (Ellenfield Park) and CBC0002BT006 (Frank Flood Bridge). The results of these are described in Section 12.3.8.1.8 to Section 12.3.8.1.8. The results of these surveys are also presented in Figures 12.8.1 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.

Bat emergence and re-entry surveys were conducted at the two RCSI cottages at the RCSI Sports Ground on Swords Road, referred to as CBC0002RI001, during Spring and Summer 2020. Three calls of Leisler's bat *Nyctalus leisleri* were recorded during the post-dusk emergence survey. 27 calls of common pipistrelle bat *Pipistrellus* were recorded during the pre-dawn re-entry survey. It was not possible to establish if individuals were roosting within the building. The site was revisited in April 2023, but again internal access could not be gained as the building was blocked up. The precautionary principle is applied, as such, CBC0002RI001 is assumed to contain roosting bats.

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 these species and 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 along four of the six transects surveyed between 2018 and 2020; [CBC0002BT001 CBC0002BT004, CBC0002BT005 and CBC0002BT006]. A total of 43 recordings of Leisler's bat were identified at these locations between 2018 and 2020. Leisler's bat activity was highest at Travelodge Dublin Airport North Swords hotel on CBC0002BT001, with 18 recordings attributed to this species at this location. There was a total of six recordings during summer 2018 all recorded at Santry Demesne along CBC0002BT004. During Autumn 2019 there were 11 recordings at Travelodge Dublin Airport North Swords hotel along CBC0002BT001, five at Santry Demesne along CBC0002BT004 and seven at Ellenfield Park along CBC0002BT005. In Spring 2020 there were a total of eight recordings, seven were recorded at Travelodge Dublin Airport North Swords hotel along CBC0002BT001 and one at Frank Flood Bridge along CBC0002BT006. All recordings of this species during Summer 2020 were captured at Frank Flood Bridge along CBC0002BT006. The results of the bat surveys as they relate to the Leisler's bat are shown on Figure 12.8.1 in Volume 3 of this EIAR.

One potential roost site was recorded for Leisler's bat during the surveys for the Proposed Scheme at RCSI cottages, referred to as CBC0002RI001.

The desk study found that Leisler's bats are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes several records of live sightings within 1km of the proposed scheme, these include records at Forest Road, Dublin Airport and Santry Demesne during 2008, and at Turnapin during 2011 (NBDC online database 2022).

12.3.8.1.2 Common pipistrelle bat *Pipistrellus*

Common pipistrelle bat was recorded along four of the six transects surveyed between 2018 and 2020; [CBC0002BT001 CBC0002BT004, CBC0002BT005 and CBC0002BT006]. A total of 54 recordings of common pipistrelle bat were identified in these locations between 2018 and 2020. Common pipistrelle bat activity was highest at Frank Flood Bridge along CBC0002006, with 42 recordings attributed to this species at this location. In Summer 2018 there was a total of 38 recordings, 37 of these were captured at Frank Flood Bridge along CBC0002BT006 and one at Santry Demesne along CBC0002BT004. During Autumn 2019 there were four recordings at Frank Flood Bridge along CBC0002BT006, five at Santry Demesne along CBC0002BT004 and one each at Ellenfield Park along CBC0002BT005 and at Travelodge Dublin Airport North Swords hotel CBC0002BT001. There was one recording captured in Spring 2020; at Travelodge Dublin Airport North Swords hotel along CBC0002BT001. During Summer 2020 there were three recordings at Travelodge Dublin Airport North Swords hotel along CBC0002BT001 and one recording at Frank Flood Bridge along CBC0002BT006. The results of the bat surveys as they relate to the common pipistrelle bats are shown on Figure 12.8.1 in Volume 3 of this EIAR.

One potential roost site for common pipistrelle bat was recorded during the surveys for the Proposed Scheme located at RCSI cottages, referred to as CBC0002RI001 (See Figure 12.8.2 in Volume 3 of this EIAR).

The desk study found that common pipistrelle bats are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes four records of live sightings within 1km of the Proposed Scheme, these include records at Forest Road during 2008 and at Dublin Airport during 2008, 2011 and 2012 (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 any of 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 known to occur within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes live records at Connolly Station during 2010 (NBDC online database 2022).

12.3.8.1.4 Soprano pipistrelle bat *Pipistrellus pygmaeus*

Soprano pipistrelle bat was recorded along four of the six transects surveyed between 2018 and 2020; [CBC0002BT001 CBC0002BT004, CBC0002BT005 and CBC0002BT006]. A total of 21 recordings of soprano pipistrelle bat were identified in these locations between 2018 and 2020. Soprano bat activity was highest at Frank Flood Bridge along CBC0002BT006, with 18 recordings attributed to this species at this location. There was a total of 17 recordings during Summer 2018 all captured at Frank Flood Bridge along CBC0002BT006. There were two recordings in Autumn 2019; one each at Travelodge Dublin Airport North Swords hotel along CBC0002BT001 and at Frank Flood Bridge along CBC0002006. There were no recordings of soprano pipistrelle captured during Spring 2020. There were two recordings during Summer 2020. One each at Santry Demesne along CBC0002BT004 and at Ellenfield Park along CBC0002BT005. The results of the bat surveys as they relate to the soprano pipistrelle bats are shown on Figure 12.8.1 in Volume 3 of this EIAR.

No roost sites for common 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 three records of live sightings within 1km of the Proposed Scheme. These include records at Santry Demesne and Forest Road during 2008 and at Turnapin during 2011 (NBDC online database 2022).

12.3.8.1.5 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 was recorded along four of the six transects surveyed between 2018 and 2020; [CBC0002BT001 CBC0002BT004, CBC0002BT005 and CBC0002BT006]. A total of 22 recordings of unidentified pipistrelle bat were captured in these locations between 2018 and 2020. Bat activity was highest at Frank Flood Bridge along CBC0002BT006 with 19 recordings at this location. There was a total of 20 recordings during Summer 2018, 19 of which were captured at Frank Flood Bridge along CBC0002BT006 and one at Ellenfield Park along CBC0002BT005. There was a total of two recordings during Autumn 2019 both of which were captured at Santry Demesne along CBC0002BT004.

The results of the bat surveys as they relate to the unidentified pipistrelle bats are shown on Figure 12.8.1 in Volume 3 of this EIAR.

12.3.8.1.6 Brown Long-Eared Bat *Plecotus auratus*

Brown long-eared bat was not recorded across the study area of the Proposed Scheme during any of 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 in the wider study area and utilise foraging habitat within the greater Dublin area (see Appendix A12.1 in Volume 4 of this EIAR for further details). The desk study found that brown long-eared bat did not occur within 1km of the Proposed Scheme (NBDC online database 2022).

12.3.8.1.7 *Myotis* bat species

Myotis bat species were not recorded across the study area of the Proposed Scheme during any of the walked transect surveys.

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

The desk study found that *Myotis* bat species are known to occur in the wider study area and utilise foraging habitat within the greater Dublin area (see Appendix A12.1 in Volume 4 of this EIAR for further details). The desk study returned no records of *Myotis* bat species including Daubenton's bat *Myotis daubentonii*, Natterer's bat *Myotis nattereri*, and Whiskered bat *Myotis mystacinus* within 1km of the Proposed Scheme (NBDC online database 2022).

12.3.8.1.8 Potential Roost Features

During the earlier stage of the surveys a number of trees or groups of trees having potential to support roosting bats (potential roosting features, PRFs) were identified. The majority were located outside the footprint of the Proposed Scheme and as such would not be impacted by the Proposed Scheme. Each tree, or grouping of homogenous trees, was classified with regard to their potential to support roosting bats after 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. Owing to design refinements and a modified footprint of the Proposed Scheme, PRFs within the Proposed Scheme were revisited in 2022 and those that are to be removed are listed in Table 12.11 and shown on Figure 12.8.2 in Volume 3 of this EIAR.

Table 12.11: Summary of Potential Roost Features (PRFs) Recorded within / adjacent to the Footprint of the Proposed Scheme

Reference	Location relative to Redline Boundary and Indication of Removal	Species	Description
CBC002PRF002	Inside	Alder *Alnus glutinosa*	Wounds
CBC002PRF006	Inside	Elm *Ulmus* sp. (Dead)	Ivy
CBC002PRF004	Inside	Ash *Fraxinus excelsior*	Ivy
CBC002PRF008	Inside	Sycamore *Acer pseudoplatanus*	Ivy/tear out
CBC002PRF009	Inside	Sycamore *Acer pseudoplatanus*	Bark
CBC002PRF010	Inside	Field Maple *Acer platonoides*	Lifting-bark
CBC002PRF011	Inside	Sycamore *Acer pseudoplatanus*	Knot-holes
CBC002PRF001	Inside	Alder *Alnus glutinosa*	Knot-holes
CBC002PRF003	Inside	Ash *Fraxinus excelsior*	Desiccation-fissures
CBC002PRF005	Inside	Ash *Fraxinus excelsior*	Shearing-cracks
CBC002PRF007	Inside	Horse Chestnut *Aesculus hippocastanus*	Shearing-cracks
CBC002PRF012	Inside	Poplar *Populus* spp.	Knot-holes
Strctures			

Reference	Location relative to Redline Boundary and Indication of Removal	Species	Description
CBC0002RI002	Inside	Collinstown Industrial Estate buildings	Modern commercial premises with wires
CBC0002RI001	Indise	RCSI cottages	Derelict Building on RCSI sport Grounds

Note: A description of each different type of PRF, as referred to in Table 12.11 is described in 'Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Bat Tree Habitat Key' (Andrews 2018).

12.3.8.2 Badger

Badger, and their breeding and resting places, are legally protected under the Wildlife Acts. Evidence of badger was identified at four locations within the footprint of the Proposed Scheme. Evidence of latrines was present along the banks of the River Tolka at Belvedere Rugby Club and Clonliffe College within approximately 500m of the Proposed Scheme at Frank Flood Bridge during aquatic / riparian surveys. The results of the field surveys as they relate to the badger are shown on Figure 12.7 in Volume 3 of this EIAR.

Badger are widely distributed throughout the GDA, often utilising public gardens and residential gardens. The desk study returned five records found within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes two records at Dublin Airport in 2007, Dardistown in 2012, Santry in 2013 and Swords in 2018 (NBDC online database 2022). 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 Act protected species.

12.3.8.3 Otter

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

The desk study found that otters are known to occur within 1km of the Proposed Scheme and across the wider study area (see Appendix A12.1 in Volume 4 of this EIAR for further details). There are several records of otter along the Ward River in Swords (1980-2013). In addition, there are records of otter along the River Tolka at Griffith Park in 2010, along the Royal Canal in 2018, at Santry Demesne in 1980 and along the Mayne River at Stockhole Lane in 1980 (NBDC online database). The River Tolka is known to support a local otter population. A cluster of otter activity was observed between National Botanic Gardens and Griffith Park Drumcondra (Macklin *et al.* 2019; NPWS 2019), within 1km upstream of the Ballymun section of the Proposed Scheme. Additional records of otter across the River Tolka included three holts and several spraints situated approximately 4.5km upstream of the Finglas section and further spraints, couches and prints also noted within the Tolka Valley Park approximately 1km upstream of the Finglas section of the Proposed Scheme (Macklin *et al.* 2019).

No evidence of otter activity (e.g. sprainting posts), holts or couch sites were recorded during the original multi-disciplinary surveys carried out along the Proposed Scheme. The results of the aquatic surveys conducted along the River Tolka at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge CBC0002AR001 location found a regular otter spraint site (mixed age) recorded on the bridge apron downstream of the bridge on the south bank (Triturus Environmental Ltd 2020). A further revisit to the Tolka River environs in 2022 noted a partial print comprising claws upstream of the Frank Flood Bridge.

In an Irish context, the conservation concern of otter is 'Least Concern' (Marnell *et. al.* 2019) due to population recoveries since 2009, but remains 'Near Threatened' at a European and Global level (IUCN Red List).

The Wicklow mountains SAC is the closest European site designated for otter, approximately 12.6km south as the crow flies. It is located within a different sub-catchment, approximately 20km upstream of the Proposed Scheme (from the Liffey Estuary Lower). The Proposed Scheme falls within the sub catchment Tolka_SC_020

whereas the Wicklow Mountains SAC falls within three sub-catchments; Dargle_SC_10, Dodder_SC_10 and Liffey_SC_10. As such, populations of otter within the footprint of the Proposed Scheme are not deemed to 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 relation to the Proposed Scheme is not likely to be in the region of 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 fourteen (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.

The Proposed Scheme will cross a number of watercourses; in particular the Tolka river, Royal Canal, the Ward River, and will interact with others via surface water discharges. Furthermore, the Proposed Scheme is hydrologically connected to Dublin Bay, Irish Sea Dublin and the North-western Irish Sea. Given the number of watercourses which the Proposed Scheme is likely to interact with, and the known abundance of otters within watercourses in and around Dublin City, the local otter populations likely to be affected by the Proposed Scheme are likely to be >1% of the County population.

Despite the fact that otter is of least concern from an Irish perspective, considering the above, the local otter population is valued as being of County importance given that it is distinct from the Wicklow Mountains SAC population, is unlikely to be in the region of 1% of the national population, is known to be abundant in watercourses in and around Dublin City and is likely to be >1% of the County population.

12.3.8.4 Marine Mammals

The Proposed Scheme is hydrologically connected to Dublin Bay via the River Santry, River Tolka, Royal Canal Liffey Estuary Upper and Liffey Estuary Lower. The Proposed Scheme is hydrologically connected to Malahide Estuary via the Glebe Stream, and to Baldoyle Bay via the Mayne River, Cuckoo Stream and Sluice River. There were no protected marine mammals identified along the Proposed Scheme during the multidisciplinary surveys There were no dedicated marine mammal surveys carried out as part of the assessment due to the Proposed Scheme being located inland.

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 also listed on Annex IV of the Habitats Directive. Harbour porpoise is a QI species designated as part of Rockabill to Dalkey Island SAC located approximately 10km east of the Proposed Scheme. Harbour seal and grey seal are listed on Annex II of the Habitat Directive and are listed QI species designated as part of Lambay Island SAC, which is located 13.1km 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, these species are valued as Internationally Important and all are considered to be of high conservation concern. A number of protected 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 and Annex IV of the Habitats Directive the local population are therefore valued as County Importance.

Risso's dolphin is found both in 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 Acts and Annex IV of the Habitats Directive) and are valued as being of 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):

- Pine Marten *Martes;*
- Red Squirrel *Sciurus vulgaris;*
- Hedgehog *Erinaceus europaeus;*
- Pygmy Shrew *Sorex minutus;* and
- Irish Hare *Lepus timidus* subsp*. hibernicus.*

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, which are valued as being of local importance as they are a Wildlife Act protected species.

Evidence of fox *Vulpes vulpes* and rabbit *Orytolagus 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.

No dedicated breeding bird surveys were carried out for the Proposed Scheme.

A habitat suitability assessment for nesting kingfisher, an Annex I species, was conducted along the River Tolka at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge in September 2020. No suitable nesting or foraging habitat was observed upstream of the Frank Flood Bridge, riverbanks were channelised with reinforced concrete banks and absent of overhanging branches / suitable foraging habitat throughout Griffith Park. Suitable foraging habitat and potential nesting habitat were recorded downstream of the Frank Flood Bridge where trees were overhanging the river providing suitable perching sites. A population of kingfisher are also known to be present on the River Santry.

A total of three sightings of kingfisher were observed within 1km of the Proposed Scheme. There were two sightings of kingfisher at Luke Kelly Bridge in Ballybough and one record of a calling kingfisher at Distillery Road Bridge approximately 670m downstream of the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge. A pair of grey wagtails were also observed along the River Tolka at this same location. The 2022 resurvey of the site did not record any additional records of Kingfisher activity, although that is not evidence of absence.

A desk study found that kingfisher are known to occur within 1km of the Proposed Scheme and across the wider study area. In particular, a population of kingfisher are reported to be present along the River Tolka in the vicinity of Tolka Valley Park and Holy Cross / Clonliffe College. Records were also returned from Baldoyle Bay and Malahide Estuary, downstream of the Proposed Scheme. A population of kingfisher are also known to be present along the River Santry. The nearest European site for which this species is designated is River Boyne and River Blackwater SPA, which is located approximately 30km north of the Proposed Scheme.

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 study carried out to inform this assessment are summarised below.

The desk study returned records of a total of 88 breeding bird species across the study area (i.e. Grid Squares O13 and O14). Records included 51 SCI species, including 35 species listed under Annex I of the Birds Directive, and an additional 15 Red Listed and 22 Amber Listed species. This includes 26 species with both 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, Dublin port. Seabirds such as terns, guillemots and kittiwakes nest on the cliffs and crevices of Rockabill Island in Dublin Bay SPA (Birdwatch Ireland 2020). Fulmar, shag razorbill and gannet nest in the cliffs of Irelands Eye SPA, which also has numbers of large *Larus* gulls, cormorant and puffin (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). As such, some gull species may utilise buildings within the footprint of the Proposed Scheme for nesting; however, the majority of other species are not deemed likely to breed within the footprint of the Proposed Scheme.

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 parkland habitats were observed in several locations across the Proposed Scheme including Northwood, Santry Park, Santry Demesne, Ellenfield Park, Griffith Park, St. Patrick's College, Holy Cross / Clonliffe College, and the Garden of Remembrance. These species therefore are likely to use lands within the footprint of the Proposed Scheme for breeding.

Breeding species which are associated with buildings were returned from the desk study include swallows and martins (Birdwatch Ireland 2020). Swallows and martins occurred across the larger study area (i.e. Grid Squares O13 and O14) and may therefore utilise buildings adjacent to the Proposed Scheme. Buzzards and sparrowhawks occurred across the larger study area (i.e. Grid Squares O13 and O14) and may therefore utilise open green spaces and trees adjacent to the Proposed Scheme. No suitable habitat was identified for merlin and desk study records were confined to coastal areas (i.e. Grid Squares (O13 and O14) and are therefore not deemed 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 and open

areas were identified at locations north of Dublin Airport. As such, some of these species may utilise the lands at these locations. Due to the urban locality of the Proposed Scheme, south of Dublin Airport these habitat types are localised or are highly fragmented. 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 i.e. Northwood, Santry Park, Santry Demesne, Ellenfield Park, Griffith Park, St. Patrick's College, Holy Cross / Clonliffe College, and the Garden of Remembrance (NBDC online database 2022).

Species that are known to utilise freshwater lakes, ponds, canals, and rivers in urban habitats include coots, moorhen, swans, ducks, herons, kingfisher and cormorants (Appendix A12.1. in Volume 4 of this EIAR). Suitable breeding habitats for these species located in proximity to the Proposed Scheme include Ward River, Sluice Rive and Mayne River, The River Santry is known for moorhen (Birds of North Bull Island 2020) kingfisher and wagtails (O'Connor *et al.* 2016). Northwood lake, the Royal Canal and the River Tolka are known to have populations of mute swan. Northwood lake also returned records of grey heron, common coot and cormorant (NBDC online database 2022). Rivers crossed by the Proposed Scheme provide important nesting and foraging sites for riparian and wetland species such as kingfisher and grey wagtail. The Proposed Scheme will cross the River Santry at Northwood and River Tolka at Frank Flood Bridge. Grey wagtail and kingfisher were identified during the habitat suitability assessment for nesting kingfisher conducted along the River Tolka.

Records of breeding birds relevant to the Proposed Scheme are listed in Table 12.12

Table 12.12: 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
Northern Lapwing *Vanellus vanellus* (L.)	Malahide Estuary; 2km Grids O14T, O14Y, O14X and O14W	Red (B/W)	✓	River Boyne SPA (*approximately* 30km)
Herring gull *Larus argentatus* (HG)	Across the Proposed Scheme	Red (B)	-	Ireland's Eye SPA (*approximately*10.5km)
Great Black-backed *Gull Larus marinus* (GB)	Malahide Estuary; 2km Grid O14Y	Amber (B)	-	-
Lesser Black-backed Gull *Larus fuscus* (LB)	Malahide Estuary; 2km Grid O14T, O14Y and O13S	Amber (B)	-	Lambay Island SPA (*approximately* 12.9km)
Black-headed Gull *Larus*[3] *ridibundus* (BH)	Malahide Estuary; Northwood; River Tolka at Griffith Park; 2km Grids O14Q, O14Y, O14L, O14T, O14W and O14X	Red (B)	-	-
Mediterranean Gull *Larus melanocephalus* (MU)	Within the 10km grids O13 and O14	Amber (B)	✓	-
Mew Gull *Larus canus* (CM)	Within the 2km Grid O14Y	Amber (B/W)	-	-
Yellowhammer *Emberiza citrinella* (Y.)	Within the 2km Grid O14Y	Red (B)	-	-
Red Kite *Milvus milvus* (KT)	Historical record (1973) at Swords	Amber (B)	✓	-
Eurasian Sparrowhawk *Accipiter nisus* (SH)	Within the 2km Grid O14Q	Amber (B)	-	-
Ringed Plover *Charadrius hiaticula (*RP)	Malahide Estuary; 10km grid O13	Amber (B/W)	-	Baldoyle Bay SPA (approximately5.8)
Little Egret *Egretta garzetta* (ET)	Malahide Estuary; 2km Grids O14Y and O14Q	Green (B/W)	✓	-
Grey Heron *Ardea cinerea* (H.)	Malahide Estuary; Northwood;	Green (B/W)	-	Wexford Harbour and Slobs SPA (approximately108km)

[3] *Larus ridibundus* has been renamed a *Chroicocephalus ridibundus*. However, as its BTO code has not changed, no change is made in this table.

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 Shelduck *Tadorna tadorna* (SU)	Malahide Estuary; 2km Grid O14Y	Amber (B/W)	-	Baldoyle Bay SPA (approximately5.8)
Common Coot *Fulica atra* (CO)	Northwood; 10km grids O13 and O14	Amber (B)	-	Wexford Harbour and Slobs SPA (approximately108km)
Great Cormorant *Phalacrocorax carbo* (CA)	Malahide Estuary; Northwood; 2km Grid O14Y	Amber (B)	-	Ireland's Eye SPA (approximately10.5km)
Red-breasted Merganser *Mergus serrator* (RM)	Malahide Estuary; 2km Grid O14Y	Green (B/W)		Malahide Estuary SPA (c1.8km)
Mute Swan *Cygnus olor* (MS)	Across the Proposed Scheme Population at Malahide Estuary, Northwood, River Tolka at Griffith Park and Royal Canal.	Amber (B/W)	✓	-
Moorhen *Gallinula chloropus* (MH)	Malahide Estuary; 10km Grids O13 and O14	(B)	-	-
Common Kingfisher *Alcedo atthis* (KF)	Malahide Estuary, Ward River, River Tolka; 10km Grids O13 and O14	Amber (B)	✓	River Boyne and Blackwater SPA (approximately30km)
Grey Wagtail *Motacilla cinerea* (GL)	River Broadmeadow; 2km Grids O14Q and O14Y 10km Grids O13 and O14	Red (B)	-	-

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 EU Birds Directive, and / or as SCIs within designated European sites. No wintering bird surveys were carried out for the Proposed Scheme. This is based on the fact that no land is required for the Proposed Scheme from any of the identified wintering bird sites that are adjacent to the Proposed Scheme including Whitehall (Plunkett College Grounds) on the Swords Road.

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.

The desk study returned records of a total of 20 regularly occurring wintering bird species across the study area (i.e. O13 and O14). Records included 51 SCI species, including 35 species listed under Annex I of the Birds Directive, and an additional fifteen (15) Red Listed and twenty two (22) Amber Listed species. This includes twenty six (26) 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.

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, located approximately 1.9km east of the Proposed Scheme, is considered of significant ornithological importance as it supports an internationally important population of light-bellied Brent goose, the 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 four known inland wintering bird feeding sites within approximately 300m of the Proposed Scheme as listed below. The importance of these sites is given relative to flock sizes of geese (major importance site 401+ geese; high importance site 51 to 400 geese; and moderate importance site 1 to 50 geese (Benson 2009).

- Whitehall (Plunkett College) on Swords Road / Pairc Imearta (High Importance) adjacent to the Proposed Scheme;
- Holy Cross / Clonliffe College (High Importance) approximately 30m from the Proposed Scheme;
- All Hallows, DCU Campus (Unknown Importance) approximately 160m from the Proposed Scheme; and
- St. Patrick's College (High Importance) approximately 190m from the Proposed Scheme.

Desktop records of wintering bird species utilising lands adjacent to the Proposed Scheme are provided in Table 12.13.

Table 12.13: 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
Light-bellied Brent goose *Branta bernicla* (BG)	Malahide Estuary; 2km Grid O14Y; Grids O13 and O14	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA (approximately 1.9km)
Eurasian oystercatcher *Haematopus ostralegus* (OC)	Malahide Estuary; St Vincent's GAA Marino; 2km Grids O14Y and O13T	Amber (B/W)	-	Malahide Estuary SPA (approximately 1.8km)
Red knot *Calidris canutus* (KN)	Malahide Estuary; 2km Grid O14Y	Amber (W)	-	Malahide Estuary SPA (approximately 1.8km)
Common goldeneye *Bucephala clangula* (GN)	2km Grid O14Y	Red (W)	-	Malahide Estuary SPA (approximately 1.8km)
Dunlin *Calidris alpina* (DN)	Malahide Estuary; 2km Grid O14Y, O13N	Red (W)	✓	Malahide Estuary SPA (approximately 1.8km)
Grey plover *Pluvialis squatarola* (GV)	2km Grid O14Y	Amber (W)	-	Malahide Estuary SPA (approximately 1.8km)
Black-tailed godwit *Limosa* (BW)	Malahide Estuary; 2km Grid O14Y	Amber (W)	-	North Bull Island SPA (approximately .4.8km)
Bar-tailed godwit *Limosa lapponica* (BA)	Malahide Estuary; 2km Grid O14Y	Amber (W)	✓	Baldoyle Bay SPA (approximately 5.8km)
Eurasian curlew *Numenius arquata* (CU)	Malahide Estuary; 2km Grids O14Y, O14W, O13Y and O13N	Red (B/W)	✓	North Bull Island SPA (approximately 4.8m)
European golden plover *Pluvialis apricaria* (GP)	Malahide Estuary; 10km Grids O13 and O14	Red (B/W)	✓	Baldoyle Bay SPA (approximately 5.8km)
Great crested grebe *Podiceps cristatus* (GG)	Malahide Estuary; 2km Grid O14Y	Amber (B/W)	-	Malahide Estuary SPA (approximately 1.8km)

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
Little grebe *Tachybaptus ruficollis* (LG)	Malahide Estuary; Northwood; Santry Demesne; 2km Grids O13N, O14Y and O14Q	Amber (B/W)	-	Lough Ree SPA (approximately 110km)

Downstream of the Proposed Scheme, Dublin Bay also supports internationally important number of black-tailed godwit and bar-tailed godwit between June and September (Dublin Bay Birds Project 2016). An additional 20 species occurred in Nationally important numbers across the Bay 2013 and 2016. These included shelduck, wigeon, teal, pintail and shoveler which favoured Dollymount Strand and North Bull Island, while great crested grebe and ringed plover favoured Sandymount Strand. Red-breasted merganser, red-throated diver, little egret, grey heron, oystercatcher, grey plover, knot, sanderling, dunlin, curlew, greenshank, redshank, and turnstone were recorded across all areas of Dublin Bay.

12.3.10 Reptiles

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

The desk study did not return records of common lizard within the immediate footprint of the Proposed Scheme and the wider study area. 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). However, it cannot be ruled out that these species are not in the wider study area.

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

12.3.11 Amphibians

Common frog and smooth newt are legally protected under the Wildlife Acts. Common frog is also listed under Annex V of the Habitats Directive. No evidence of common frog 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 the Proposed Scheme. This includes scattered areas of vegetated riverbank along the Glebe Stream, Gaybrook Stream, Sluice River, Mayne River and its tributary the Cuckoo Stream, River Santry and River Tolka. Three drainage ditches were identified: north of Travelodge Dublin Airport North Swords hotel bordering the perimeter of improved agricultural grassland (GA1); opposite Swords Veterinary Hospital bordering an area of wet grassland (GS4); and along a treeline south of Kilronan Equestrian Centre. These drainage ditches were dry during the survey period and as such may offer low suitability for amphibian species.

The desk 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 records of smooth newt along the Ward River at Swords Manor in 2018 (NBDC Online Database 2022).

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. Fish surveys were not carried out as part of the field surveys.

The Proposed Scheme lies within a number of sub-catchments, which in respect of fisheries potential are discussed individually.

Part of the Proposed Scheme lies within the Mayne_SC_010. The Mayne River catchment was surveyed by Inland Fisheries Ireland in 2019 when it was assigned an Ecological Fish Status of Poor (EPA 2019).

The Proposed Scheme lies within the Broadmeadow_SC_010, and Mayne_SC_010, sub-catchments, which were assigned an Ecological Fish Status of Poor (EPA 2018; EPA 2019). River Ward was assigned a WFD status of 'Poor' for the period 2016-2021. Ward_040 will not be directly crossed by the Proposed Scheme, but its source is located within approximately 330m of the footprint of the Proposed Scheme.

The Sluice River is classified as 'Poor' for the period of 2016-2021 Water Framework Directive.

The River Santry catchment was surveyed by Inland Fisheries Ireland in 2019 and was assigned an Ecological Fish Status of Poor (EPA 2019). It has no assigned Q Value since 1998. Under Water Framework Directive classification, the river has 'Poor' status in the upper reach, and 'Unassigned' status in the lower reach (Stack 2019). The Santry_010 was last assessed in 2019 at one monitoring station approximately 1.8km downstream of the Proposed Scheme.

The Proposed Scheme lies within the Tolka_SC_020 sub catchment. The River Tolka catchment covers an area of approximately 148km from Dunshaughlin, Co. Meath to Dublin Bay. Eight sites on the Tolka River Catchment were surveyed by Inland Fisheries Ireland in September 2017. The closest monitoring location was at St. Mobhi Drive approximately 1km upstream of the Proposed Scheme at Frank Flood Bridge, where the River Tolka was assigned an Ecological Fish Status of Poor (Matson, *et al.* 2018). Tolka_060 at Drumcondra has an Unassigned WFD status and is At Risk of not achieving Good Status by 2027. Its main pressures are due to urban runoff and urban wastewater from Combined Sewer Overflows.

In general fisheries terms, the July 2022 survey noted that owing to low flow, the river level was low and none of the three bridge arches were passable to fish (apart from European eel) (Triturus Environmental Ltd 2022).

12.3.12.1 Salmonid Species

The desk study returned records for Atlantic salmon on the River Tolka and Lower Liffey Estuary (Kelly *et al.* 2012). The Liffey system supports a regionally significant population of Atlantic salmon. The Liffey estuary serves as the natural linkage for salmon populations migrating between freshwater and marine environments (IFI Consultation 2020).

The Tolka River supports Atlantic salmon, lamprey and brown trout populations in addition to other fish species and provides a particularly important nursery function for salmonid species throughout. Salmon were recorded in the Glasnevin area in 2011. The River Tolka is regularly stocked with trout to supplement recreational angling and to bolster declining wild stocks.

A fish survey conducted by Inland Fisheries Ireland in July 2011 returned records of brown trout in the Ward River at Balheary (Kelly *et al.* 2012).

The Cuckoo Stream and the Mayne River are considered a non-salmonid system due to the presence of impassable features to fish movement at the lower reaches of the system. A survey carried out in 2016 found no salmonid species present in the Mayne River (Kelly *et al.* 2017).

Brown trout were recorded on the Sluice River, during an Inland Fisheries Ireland survey carried out in 2016 (Kelly *et al*. 2017). The River Sluice is known to support a resident brown trout population (IFI Consultation 2020).

The Santry River is considered non-salmonid because of the presence of a number of impassable features to fish located toward the lower end of the system. However, brown trout were recorded in the lower reaches, due to a DCC river restoration and greenway project along a 4,500m stretch of the river (IFI Consultation 2020).

The results of the aquatic surveys conducted at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge CBC0002AR001 location in 2022 indicated that downstream of

the bridge, the river was deemed a good brown trout nursery and good holding area for adult fish. Spawning for salmonids was considered locally good, despite siltation pressures. Upstream of the bridge the river was mainly a holding area for salmonids with deeper glide habitat held between retaining walls (Triturus Environmental Ltd 2022) (see Appendix A12.2).

Atlantic salmon are valued as being of National Importance.

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

12.3.12.2 Lamprey Species

The results of the aquatic surveys conducted at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge CBC0002AR001 location indicated that downstream of the bridge, the river was deemed a good holding area for adult fish. Spawning for lamprey was considered locally good, despite siltation pressures. Lamprey ammocoete habitat was sparse given the high energy nature of the site (Triturus Environmental Ltd 2020).

The desk study returned records for lamprey species on the River Tolka and River Liffey (in the case of river lamprey *Lampetra fluviatilis* only) (Kelly *et al.* 2012; IFI 2010). River lamprey and juvenile lamprey were recorded in the River Tolka in 2017, with suitable nursery habitat upstream of the Proposed Scheme (IFI 2018).

The desk study did not return records for Lamprey species within the Mayne River, River Sluice or Ward River. The River Santry is not considered suitable for lamprey due to the presence of a number of impassable features to fish located towards the lower end of the system (IFI Consultation 2020).

Lamprey populations are valued as being of National Importance.

12.3.12.3 European eel

The results of the aquatic surveys conducted at The River Tolka the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge CBC0002AR001 location indicated that European eel habitat was good downstream of the bridge owing to ample boulder refugia and deeper pool areas (Triturus Environmental Ltd 2022).

The desk study returned records for European eel *Anguilla anguilla* on the River Tolka, which is reported to have eels in its lower reaches (Greater Dublin Drainage 2012). The Liffey Estuary serves as the natural linkage for European eel migrating between freshwater and marine environments. During a fish stock survey carried out in the Tolka Estuary in 2008, 12 European eels were recorded (Central and Regional Fisheries Board 2008). The Tolka Estuary is located approximately 3.5km downstream of the Proposed Scheme. European Eel was also recorded in 2017 in the River Tolka within 1km of the Proposed Scheme (Matson *et al*. 2018).

The desk study returned records for European eel *Anguilla anguilla* on the Mayne River. WFD Fish survey reported that European eel was the second most abundant species present after three-spined stickleback *Gasterosteus aculeatus* (Kelly *et al.* 2011). Eel were recorded on the Sluice River, during an Inland Fisheries Ireland survey carried out in 2016 (Kelly *et al*. 2017).

No records of European eel were returned for River Santry (NBDC Online Database 2022).

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

The desk study returned records of a fish survey along the Ward River at Balheary, which was conducted by Inland Fisheries Ireland during July 2011. This survey found that three-spined stickleback was the most abundant species, followed by stone loach, eels, minnow, nine-spined stickleback and brown trout (Kelly *et al.* 2012).

An earlier survey which forms part of the data contained in the deskstudy carried out along the Sluice River during 2016 found that three-spined stickleback was the most abundant species followed by brown trout, eel and flounder. A fish survey along the Mayne River conducted during 2016 found that three-spined stickleback was the most abundant species, followed by eels and flounder (Kelly *et al*. 2017).

The desk study did not return any records of fish species on the River Santry.

Fish species recorded in the Lower Liffey Estuary in 2008 under WFD monitoring include sprat *Sprattus sprattus*, sand goby *Pomatoschistus minutus*, sand smelt *Atherina presbyter*, three-spined stickleback *Gasterosteus aculeatus,* cod *Gadus morhua*, and pollack species *Pollachius sp.* (Central Fisheries Board 2009).

Water sampling carried out along the River Tolka by Inland Fisheries Ireland during 2011 resulted very low fish diversity, with only minnow *Phoxinus phoxinus*, nine-spined stickleback *Pungitius pungitius* and three-spined stickleback.

These other fish species are valued as being of Local Importance (Higher Value).

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. Surveys for white-clawed crayfish were carried out as part of this assessment.

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. There were no records returned withing the 10km Grids O13 and O14. As such these species are not deemed to occur within the footprint of the Proposed Scheme.

No white-clawed crayfish were recorded during the aquatic surveys conducted along the River Tolka at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge CBC0002AR001. White-clawed crayfish have not been recorded on the River Tolka and are only known in Dublin from some stretches of the River Camac.

12.3.13.2 Freshwater Molluscs

The desk study found historical records of Mauge's shelled slug *Testacella maugei* at Lissenhall Swords in 1930 and the ‘endangered’ moss chrysalis snail *Pupilla (Pupilla) muscorum* at Swords in 1914. These species are listed as “vulnerable/endangered” on the *Ireland Red List No. 2 Non-Marine Molluscs* (Byrne *et al.* 2009).

Surveys for freshwater molluscs were carried out as part of this assessment by virtue of the Proposed Scheme No red listed mollusc species were recorded during the aquatic surveys conducted along the River Tolka at the Proposed River Tolka Pedestrian / Cycle Bridge crossing point, adjacent to the existing Frank Flood Bridge CBC0002AR001 or at the Royal Canal survey site in Phibsboro to inform a separate scheme, namely CBC0304 (Triturus Environmental Ltd 2022).

As such, due to only historical records being returned, these species are not deemed to occur within the footprint of the Proposed Scheme.

12.3.13.3 Marsh fritillary

Marsh fritillary *Euphydras aurina* are legally protected under Annex II of the Habitats Directive.

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 approximately 4.8km east of the Proposed Scheme at North Bull Island during 2019. 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. As such, marsh fritillary is not considered further in the assessment.

Surveys for marsh fritillary were not carried out as part of this assessment, as these habitats were not recorded within the footprint of the Proposed Scheme. In an Irish context, the conservation status of these species in Ireland is designated as 'Vulnerable' (Regan *et al.* 2010).

12.3.13.4 Other Invertebrates

The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned records for several invertebrates on Ireland Red List No. 2: Ireland Red List No. 4: Butterflies (Regan *et al.* 2010), Ireland Red List No. 6: Damselflies and Dragonflies (Odonata) (Nelson *et al*. 2011), Ireland Red) and Regional Red List of Irish Bees 2006 (Fitzpatrick *et al*. 2006) and Ireland Red List No. 7: Mayflies (Ephemeroptera) (Kelly-Quinn *et al.* 2012) (NBDC Online Database 2022). Mayfly records returned were historical (1947) and habitats will have altered since that time.

Butterfly are known to favour nectar-rich flowers which provide larval foodplants, preferred species include cock's-foot grass *Dactylis glomerata*, bird's-foot trefoil *Lotus corniculatus*, common nettle *Urtica dioica*, cuckoo flower *Cardamine pratensis*, garden nasturtium *Tropaeleum majus*, common holly *Ilex aquifolium* and common ivy *Hedera helix* (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). Scattered trees and parkland habitat is present within Morton Stadium, Santry Park, Santry Demesne, Santry Villas, Lorcan Road, Ellenfield Park and St. Patricks College. Larger areas of amenity grassland are present at Ellenfield Park, Plunket College and Whitehall GAA pitch. Smaller areas include Halpenny Golf Range, Our Lady's Park and the Garden of Remembrance. GS2 habitats were identified at Dardistown, Pinnockhill, and the road medians along the R132 / Swords Road. 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.* 2010a).

Bees favour sites with lots of flowers in unimproved grasslands and hay meadows. Improved agricultural grassland (GA1) habitats were identified at three locations across the Proposed Scheme. Species identified at these locations comprised of grass and wheat (the latter species associated with BC1 arable crops habitat, but windblown seed can result in its dispersal and establishment in adjacent grassland swards). The preferred foodplants for bees are native species with white, blue or yellow flowers (Fitzpatrick *et al.* 2006). Small, fragmented sites where suitable floral species were recorded along the Proposed Scheme include areas ornamental flower beds (BC4) within residential gardens; parkland with scattered trees (WD5), and amenity grasslands (GA2).

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, 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). There are small, isolated and fragmented sites along the route of the Proposed Scheme including: wildflower areas along the R135 Swords Road at Dublin Airport and Santry, within Santry Park and within private gardens as part of the All-Ireland Pollinator Plan. Golf Course Superintendents Association Of Ireland (GCSAI), green schools and Gaelic Athletic Association (GAA) are all partner organisations of the All-Ireland Pollinator Plan 2021-2025 (NBDC 2021).

These species favour species rich semi-natural grasslands and meadows, upland heath and sand dunes. Habitats in proximity to the Proposed Scheme which correspond to species requirements include species poor dry meadows and grassy verges, and areas of ornamental planting along roadsides, parkland, 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.* 2010b). As such, other invertebrates are not considered further in the assessment.

12.3.14 Summary Ecological Valuation and Identification of KERs

Table 12.14 summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance. KERs are highlighted in blue in Table 12.14. 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, that they are included within the impact assessment.

Table 12.14: Summary of Ecological Valuation and Identification of KERs

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
Malahide Estuary SAC [000205]	International Importance	Yes
South Dublin Bay SAC [000210]	International Importance	Yes
North Dublin Bay SAC [000206]	International Importance	Yes
Baldoyle Bay SAC [004016]	International Importance	Yes
Howth Head SAC	International Importance	Yes

Ecological Receptor	Ecological Valuation	KER?
Rockabill to Dalkey Island SAC	International Importance	Yes
Ireland's Eye SAC	International Importance	Yes
Lambay Island SAC	International Importance	Yes
Malahide Estuary SPA [000205]	International Importance	Yes
South Dublin Bay and River Tolka Estuary SPA [004024]	International Importance	Yes
North Bull Island SPA [004006]	International Importance	Yes
Baldoyle Bay SPA [004016]	International Importance	Yes
Rogerstown Estuary SPA	International Importance	Yes
Ireland's Eye SPA	International Importance	Yes
Howth Head Coast SPA	International Importance	Yes
Lambay Island SPA	International Importance	Yes
Skerries Islands SPA	International Importance	Yes
Dalkey Islands SPA	International Importance	Yes
Rockabill SPA [004014]	International Importance	Yes
The Murrough SPA [004186]	International Importance	Yes
All other SAC or SPA sites	International Importance	No – beyond ZoI
Skerries Island NHA [001218]	National Importance	Yes
Grand Canal pNHA [002104]	National Importance	Yes
Royal Canal pNHA [002103]	National Importance	Yes
Santry Demesne pNHA [000178]	National Importance	Yes
North Dublin Bay pNHA [000206]	National Importance	Yes
Malahide Estuary pNHA [000205]	National Importance	Yes
South Dublin Bay pNHA [000210]	National Importance	Yes
Dolphins, Dublin Docks pNHA [000201]	National Importance	Yes
Sluice River Marsh pNHA [001763]	National Importance	Yes
Baldoyle Bay pNHA [000199]	National Importance	Yes
Rogerstown Estuary pNHA [000208]	National Importance	Yes
Booterstown Marsh pNHA [001205]	National Importance	Yes
Portraine Shore pNHA [001215]	National Importance	Yes
Howth Head pNHA [000202]	National Importance	Yes
Ireland's Eye pNHA [000203]	National Importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	National Importance	Yes
Lambay Island pNHA [000204]	National Importance	Yes
The Murrough pNHA [004186]	National Importance	Yes
Rockabill pNHA [004014]	National Importance	Yes
All other NHA or pNHA sites	National Importance	No – beyond ZoI
Habitats		
Arable crops (BC1)	Local Importance (Lower Value)	No
Flower beds and borders (BC4)	Local Importance (Lower Value)	No
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	No
Spoil and bare ground (ED2)	Local Importance (Lower Value)	No
Recolonising bare ground (ED3)	Local Importance (Lower Value)	No
Depositing/ lowland rivers (FW2);	Local Importance (Higher Value)	Yes

Ecological Receptor	Ecological Valuation	KER?
Canals (FW3)	National Importance	Yes
Drainage ditches (FW4)	Local Importance (Higher Value)	Yes
Improved agricultural grassland (GA1)	Local Importance (Lower Value)	No
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 (Higher Value)	Yes
Residential	Local Importance (Lower Value)	No
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Yes
Mixed broadleaved / conifer woodland (WD2)	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
Immature woodland (WS2)	Local Importance (Higher Value)	Yes
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 Irelands Red Lists (Vulnerable or of higher concern concern)	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		
Otter	County Importance	Yes
Bats	Local Importance (Higher Value)	Yes
Badger	Local Importance (Higher Value)	Yes
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
Atlantic Salmon; European Eel; Lamprey Species	National Importance to County Importance	Yes
All other fish species	Local Importance (Higher Value)	Yes
Marine Mammals	National– County Importance	Yes
Amphibians	Local Importance (Higher Value)	Yes
Reptiles	Local Importance (Higher Value)	Yes
All other non-Red listed Invertebrates and Insects	Local Importance (Lower Value)	No

Ecological Receptor	Ecological Valuation	KER?
Non-native invasive animal species	N/A	No
Local Biodiversity Areas		
Fingal Green Infrastructure Network including Tree Preservation Order trees4	County Importance	No by virtue of avoidance
Dublin City's Green Infrastructure Network	County Importance	No by virtue of avoidance

12.4 Potential Impacts

The following section presents the assessment of 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 Scheme and its 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 the Construction and Operation phases as follows.

12.4.1.1 Construction Phase

The Proposed Scheme has been divided into the following five principal sections:

- Section 1: Pinnock Hill to Airside Junction;
- Section 2: Airside Junction to Northwood Avenue;
- Section 3: Northwood Avenue to Shantalla Road;
- Section 4: Shantalla Road to Botanic Avenue; and
- Section 5: Botanic Avenue to Granby Row.

The main characteristics of the construction stage of the Proposed Scheme that have potential for ecological impact are:

- Site preparation and clearance:
    - Vegetation (e.g. hedgerows, scrub, grassland) clearance and treatment of non-native invasive species (e.g. Japanese knotweed, Himalayan balsam, giant hogweed) will be undertaken within the Proposed Scheme boundary, where necessary; and
    - Trees to be retained within and adjoining the works areas will be suitably protected as necessary as per the British Standards Institution (BSI) British Standard (BS) 5837:2012 Trees in Relation to Design, Demolition, and Construction (BSI 2012). Trees identified for removal will be removed in accordance with BS 3998:2010 Tree Work. Recommendations (BSI 2010). The location of trees to be retained, and trees to be removed is shown on the Landscaping General Arrangement Drawings (BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001).
- As part of preparatory works, the Construction Compounds will be set up, which will include installation of the necessary facilities including the site office, welfare facilities, etc. Controlled access to the Construction Compounds will be implemented, fencing will be erected, and lighting will be installed;

[4] Morton Stadium and Santry demesne captured separately under pNHA discussion.

- Removal of existing boundaries, pavements, lighting columns, bus stops, and signage;
- Protection and / or diversion of buried services;
- Road widening, road reconfiguration, pavement reconstruction, lighting and kerb improvements;
- Partial demolition of Collinstown industrial buildings and demolition of two semi-detached Cottages at the Royal College of Surgeons Sports Ground;
- Strengthening work to Frank Flood Bridge (Tolka crossing) and the construction of a new pedestrian and cycle bridge is proposed on the western side of the existing Frank Flood Bridge leading into Our Lady's Park;
- Construction of sections of retaining walls throughout route;
- Installation of new bus stops and junction / roundabout modification;
- New footpaths and cycle tracks throughout each section of the Proposed Scheme;
- Property boundary reinstatement, signage replacement; installation of lighting columns; and
- Landscaping and tree planting, and reinstatement of temporary and permanent land acquisitions.

12.4.1.2 Structural Works

The principal structures which form part of the Proposed Scheme include the Pedestrian / Cycle Bridge at Frank Flood Bridge at Drumcondra and six retaining walls over 1.5 metres in height. Although the Proposed Scheme crosses the Royal Canal at Binns Bridge, the works proposed do not require any instream works nor construction of new structural elements.

12.4.1.2.1 Frank Flood Bridge

The Frank Flood Bridge (formerly known as Drumcondra Bridge) is an existing structure which is included on the Industrial Heritage Record, which carries the preferred route corridor over the River Tolka. The Proposed Scheme corridor is wider than the existing arrangement and consequently a proposed independent parallel pedestrian and cycle bridge is being proposed.

The existing bridge which was constructed in 1813 consists of a 3-span masonry arch with a total length of 19.48m and a width of 19.43m. The new highways arrangement will result in the removal of the western footpath and the introduction of a northbound bus lane running adjacent to the western parapet. This will require strengthening of the spandrel wall to accommodate the increase in surcharge. Mitigation measures will also be introduced to reduce the risk of collision with the substandard western parapet.

The proposed pedestrian and cycle bridge consists of a 50 metre 2-span steel structure comprising central varying depth box girder with a tie down arrangement at the north of the structure. The span arrangement is governed by the floodplain on the south side of the river which needs remain open for high flow situations. North span will be 38m and south span will be 12m. The distance between the deck soffit and the ground varies. A minimum clearance of 1.5m is provided at the abutments.

Foundations for the proposed abutments, set back from the Tolka River on either bank will be situated in boulder clay and will require piled foundations to reach bedrock approximately 10 to 20 metres below ground level.,

The superstructure will consist of a central varying depth box girder to be proportioned to minimise structural depth above deck level and provide unobstructed views of the existing bridge from Our Lady's Park. The girder will increase in depth over the support locations and 'disappear' below deck level at mid span locations. Transverse members will have sufficient stiffness to distribute load into the central girder such that edge girder size can be minimised. Allowance will be made to accommodate the large amount of services required below the deck. The substructure will consist of conventional bank seat abutments supported on piled foundations at the north and south end of the structure. The central support will consist of a leaf pier supported by piled foundations set back an appropriate distance from the river wall. A tie down arrangement will be created to the north of the

structure with a tension connection between the central box and an independent pile group. This will limit midspan deflections allowing for a more slender structure.

The bridge deck superstructure will be continuous. It will be supported on bearings at both abutments and central pier. Additionally, the superstructure will be connected to an independent pile group via mechanical pin connections. The cross-section of the deck is governed by the need to accommodate a large number of utility diversions.

In respect of the Proposed Works, the following is the proposed indicative construction methodology:

- Site set-up including Construction Compound preparation – this will involve the partial closure of Our Lady's Park and the temporary removal of its heritage statue to a safe storage location offsite (if it cannot be protected onsite);
- Enabling works including: Three new river bores under the River Tolka to accommodate the diversion of 2 number high voltage transmission cables and a large diameter water main;
- The northern riverbank will be regraded, and part of the river wall will be demolished (small outstand at top of bank). Erosion control will be implemented at the toe of the riverbank to mitigate against future scour. Sediment will be prevented from entering the watercourse via silt curtains or closure of the northern arch, via sandbags. Further observation of river levels will be required to confirm the exact methodology. Operatives working in the watercourse will not be permitted outside the months of July and September;
- Piles will be installed for the abutment and tie down. The existing wingwalls will be protected via the removal of highway loading or propping as appropriate. Temporary flood defences will be implemented as appropriate;
- Construction of the north abutment, service bay, and tie down concrete plinth will be completed;
- The south bank will be excavated to finished ground level (FGL) from the river wall to pier. The ground will be prepared from pier southwards to accommodate plant access. Piles for the pier will then be installed;
- The pier will be constructed and a crane mat will be established south of the pier;
- The mobile crane will be brought to site. The central beam river span will be delivered to the existing bridge under a full closure. The section will be lifted into position in a single operation to be supported with temporary bearings at the north abutment and pier locations;
- A temporary platform / pontoon will be erected within the river channel to facilitate construction. The platform / pontoon will be located immediately upstream of the existing bridge. To ensure no increased in flood risk, the following mitigation measures will be put in place:
- Instream works at the Frank Flood Bridge will be undertaken only during the periods 1st July to 30th September. In the first year, the instream works that are required include installation of rock armour as an erosion control measure at the north-west riverbank and provision of temporary access support under the river span, facilitating bolted and welded connections of the bridge. The temporary supports will be removed from the river before the 30th September.
- Once the proposed Pedestrian / Cycle Bridge is completed, diversion of services from the west footpath will commence after 1st July and will be completed before 30th September in the second year. Instream works in the form of temporary access support will be installed to facilitate alterations to the west parapet of the existing Frank Flood bridge.
- Transportable sections of the remainder of the river span will be delivered to the existing bridge under a northbound lane closure. Sections will be lifted into position and spliced from the riverbank and river access locations;
- Deck plates will be lifted into place and secured via countersunk bolts;
- The crane will be demobilised and removed from site, and the south bank will be excavated to FGL to south abutment location. South abutment piles will be installed;
- The south abutment will be constructed and backfilled;

- The crane mat will be established south of the south abutment. The crane will be mobilised to carry out the works;
- Back span sections will be delivered to site and lifted into position. Splices will be made from the south bank;
- Back span deck plates will be lifted into position and secured to the outstand plates via countersunk bolted connections;
- Tie connections will be formed with no grout beneath the plate. Bolts will be tightened to remove any slack in the connection, and grout will be placed beneath the base plate, with bolts stressed via embedded post tensioned bars;
- The west footway and one northbound lane will be closed. Utilities will be diverted from the west spandrel wall and western footway to the new structure;
- False soffit panels will be installed, paint system defects and areas around welds will be touched up, and the access system will be removed;
- The bridge approaches will be surfaced, and the bridge deck will be completed. The bridge will then be opened to foot traffic. Our Lady's Park will remained closed until the completion of landscaping activities;
- A scaffold system will be introduced to the existing structure, with no anchor points on the elevation of the bridge, and no supports in the river outside of the months August and September. The scaffold will encapsulate the spandrel to prevent pollution entering the water course. Parapet works will be completed to raise the west parapet and the approach walls will be realigned to match;
- Preferred bridge strengthening works will be completed under sequential lane closures over the existing bridge. Works will be completed concurrently to realign the carriageway. Access requirements for these works will not impact the elevation of the existing bridge and no in-stream works are permitted outside the months of August and September; and
- Instream works will be carried out between 1st July to 30th September only, and may extend across two years, depending on the final programme.
    - The installation of the scaffold system although attached to the existing bridge to enable operatives to connect the underside of the new bridge structure, there will be a requirement for narrow upright supports to be placed in the riverbed to support the scaffold. Thereafter, the scaffold system will have kickboards etc., to ensure that sediment control; and
    - Works to the bank to address scour issues to the northwest bank of the existing bridge will be conducted such that minimal impact to the existing vegetation occurs. Full extent of scour protection to be confirmed in the detailed design stage; however, while a soft engineered solution (i.e. planting) is preferred, hard engineering (rock armour) cannot be completely ruled out. In any event, design of any erosion control will be compliant with the guidance produced by IFI. The scour protection would be installed via either via temporary sandbagging parallel to the northern arch to restrict flow or use of silt curtains. There after the temporary sediment control measures will be removed and the river channel (albeit minor inclusion of scour protection) will be returned to pre-construction condition.

12.4.1.2.2 Retaining Walls

Retaining walls with a retained height greater than 1.5m are classified as principal structures. There are seventeen required, as detailed in Table 12.15. All others that are below 1.5m in height are consider as minor structure and are described in Chapter 4 (Proposed Scheme Description).

Table 12.15: Principal Structures – Retaining Walls

Structure Reference	Structure Type	Details	Chainage (m)	Length (m)	Max Retained Height (m)	Construction Section Reference
RW010	Precast Concrete Retaining Wall	RW010 is located on the west side of R132 Swords Road. Supports car dealership.	A5550 to A5620	70	2.5	Section 2c
RW016	In-situ Concrete Gravity Wall	RW016 is located on the west side of the R132 Swords Road. It is proposed to set back the residential	A7220 to A7290	70	1.5	Section 3b

Structure Reference	Structure Type	Details	Chainage (m)	Length (m)	Max Retained Height (m)	Construction Section Reference
		wall and provide off-street residential parking at this location.				
RW017	In-situ Concrete Gravity Wall	RW017 is located on the east side of the R132 Swords Road. The proposed widening at this location encroaches into the front gardens of several residential properties.	A7255 to A7280	25	1.5	Section 3b
RW018	In-situ Concrete Gravity Wall	RW018 is located on the east side of the R132 Swords Road. The proposed widening at this location impacts the front gardens of a row of properties.	A7315 to A7385	70	1.5	Section 3b
RW022	Precast Concrete Retaining Wall	RW022 is located on the west side of R132 Dublin Road north of Cloghran roundabout. The proposed widening at this location encroaches on an existing cutting which supports agricultural land.	A1940 to A1990	50	2.0	Section 2a
RW029	Precast Concrete Retaining Wall	RW029 is located on the east side of the N1 encroaching into fencing that forms the boundary to Highfield Hospital. Directly behind the wall is an access road for the hospital located approximately 2m to 3m above the highway level.	A8560 to A8640	80	2.5	Section 4a

Retaining walls will generally be constructed of a graded slope, reinforced concrete, either precast off site, or cast *in-situ*. They will generally be constructed by first isolating the site of the retaining wall using fencing, as appropriate, to the location. The existing ground will then be stripped to formation level. Existing services will be diverted as required to enable wall construction. A side slope will be battered back to enable construction. Blinding will be installed at formation level. For *in-situ* structures, formwork and reinforcing steel for the wall will be fixed in place. Then concrete will be poured in sections and formwork removed after initial curing of concrete. After a sufficient curing period the area behind the wall will be backfilled. Precast sections will be manufactured off site and lifted on previously prepared ground.

12.4.1.2.3 Building Demolition

To accommodate the construction of Proposed Scheme by virtue of proposed landtake, the following structures are proposed to be demolished or removed. They are:

- Collinstown industrial buildings; and
- Two Semi-Detached Cottages at the Royal College of Surgeons Sports Ground.

All demolition work sites will be appropriately hoarded and signposted. Best practice industry standard working methods will be used to minimise the generation of dust, noise and other environmental effects resulting from the demolitions as described in Chapter 7 (Air Quality) and Chapter 9 (Noise & Vibration) of this EIAR.

12.4.1.2.4 Surface Water Drainage Infrastructure

The drainage system for the Proposed Scheme will discharge to seven surface watercourses the Ward_040, Sluice _010, Mayne_010, Santry _010 and Tolka_060, as well as Ringsend WwTP, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. No new outfalls are proposed. For the Proposed Scheme, there will be a net increase of 21,860m^2 (1,739m^2 in Ward_040, 5,264m^2 in Sluice_010, 4,065m^2 in Mayne_010, 6,219m^2 in Santry_010, 4,340m^2 in Tolka_060 and 233m^2 in the Liffey Estuary Upper) 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 the proposed drainage infrastructure are provided in Chapter 13 (Water) and the proposed Surface Water Drainage Drawings (BCIDB-JAC-DNG_RD-0002_XX_OO-DR-CD-9001) in Volume 3 of this EIAR.

12.4.1.2.5 Lighting

The majority of the Proposed Scheme is already artificially lit. During the Construction Phase, temporary lighting will be required at times along the Proposed Scheme at certain locations. Where it is necessary to disconnect public lighting during the Construction Phase or to undertake works outside of daylight hours where existing lighting is low, appropriate temporary lighting will be provided. Temporary lighting will also be installed at the Construction Compounds for the duration of the Construction Phase. The standard of temporary lighting installed during the Construction Phase will meet the standard of the existing carriageway and will be appropriate to the speed and volume of traffic during the Construction Phase. Temporary construction lighting will generally be provided by tower mounted floodlights, which will be cowled and angled downwards to minimise spillage of light from the site. Details of the lighting design are provided in Chapter 5 (Construction) of this EIAR.

A review of the existing lighting provision along the extent of the route has been carried out to understand the impact of the Proposed Scheme on lighting columns and associated infrastructure. Where existing lighting columns conflict with the Proposed Scheme, they will be relocated (typically to the back of footpaths away from road edge). These include heritage lighting columns, which will be replaced by like for like. The Proposed Scheme also calls for new lighting in some places and it will be installed in accordance with the requirements of the relevant National Standards and guidances. All relocated and new lighting columns are identified as proposed lighting columns as shown on the Street Lighting drawings (BCIDB-JAC-LHT_RL-0002_XX_00-DR-EO-9001) in Volume 3 of this EIAR. Light Emitting Diode (LED) lanterns will be the light source for all lighting columns provided. All lighting columns will aim to minimise the effects of obtrusive light at night and reduce visual impact during daylight. Lighting schemes will comply with the 'Guidance notes for the Reduction of Light Pollution' issued by the Institution of Lighting Professionals (ILP 1992). Details of the lighting design are provided in Chapter 4 (Proposed Scheme Description) of this EIAR.

12.4.1.2.6 Landscape and Public Realm

The Proposed Scheme includes a planting strategy which includes replacement of street trees and groups of trees that may be impacted by the Proposed Scheme, but also the introduction of new tree planting and street trees within other spaces and along streets. Full details of the Public Realm and the planting strategy are included in Chapter 4 (Proposed Scheme Description) and the Landscape General Arrangement Drawings (BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

The Proposed Scheme includes three mixed material typologies/palettes which will reinforce existing landscape character, while aiming to better these areas through the use of better quality surface materials. In addition, specific community enhancement interventions have been proposed which will improve the overall amenity, character and appeal of the route corridor and localities along it, as well as enhancing biodiversity.

In respect of Landscaping, the design includes for the replanting of trees, hedges, native and ornamental planting, as well as the creation of amenity and species-rich grassland that will provide mitigation for loss of trees in particular, ecological benefits and visual enhancements to the public realm.

12.4.1.2.7 Construction Compounds

The locations of the Construction Compounds in relation to the Proposed Scheme are shown in Figure 5.1 in Volume 3 of this EIAR. The Construction Compounds have been selected due to the amount of available space, their location near the majority of the Proposed Scheme major works and access to the National and Regional Road network. Refer to Chapter 6 (Traffic & Transport) of this EIAR for an assessment of the construction traffic. The Construction compounds will be located at the following sites:

- Construction Compound SW1: Cloghran Juction;
- Construction Compound SW2: Collinstown Cross;
- Construction Compound SW3: Coolock Lane;
- Construction Compound SW4: Collins Avenue; in rough ground owned by Dublin City Council; and

- Construction Compound SW5: Drumcondra (Frank Flood) Bridge.

As shown in images 12.1 to 12.5, the 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 36 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 licensed facility.

Appropriate environmental management measures will be implemented at the Construction Compounds for example, to minimise the risk of fuel spillage, and to ensure that the Construction Compounds and the approaches to it are appropriately maintained. Further information on the air quality, noise and vibration, and water related mitigation measures that will be implemented are described in Chapter 7 (Air Quality), Chapter 9 (Noise & Vibration) and Chapter 13 (Water) of this EIAR.

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

Construction Compound SW1 will be located in amenity grassland/roadside verge to the north-east of the Cloghran Junction, as shown in Image 12.1.

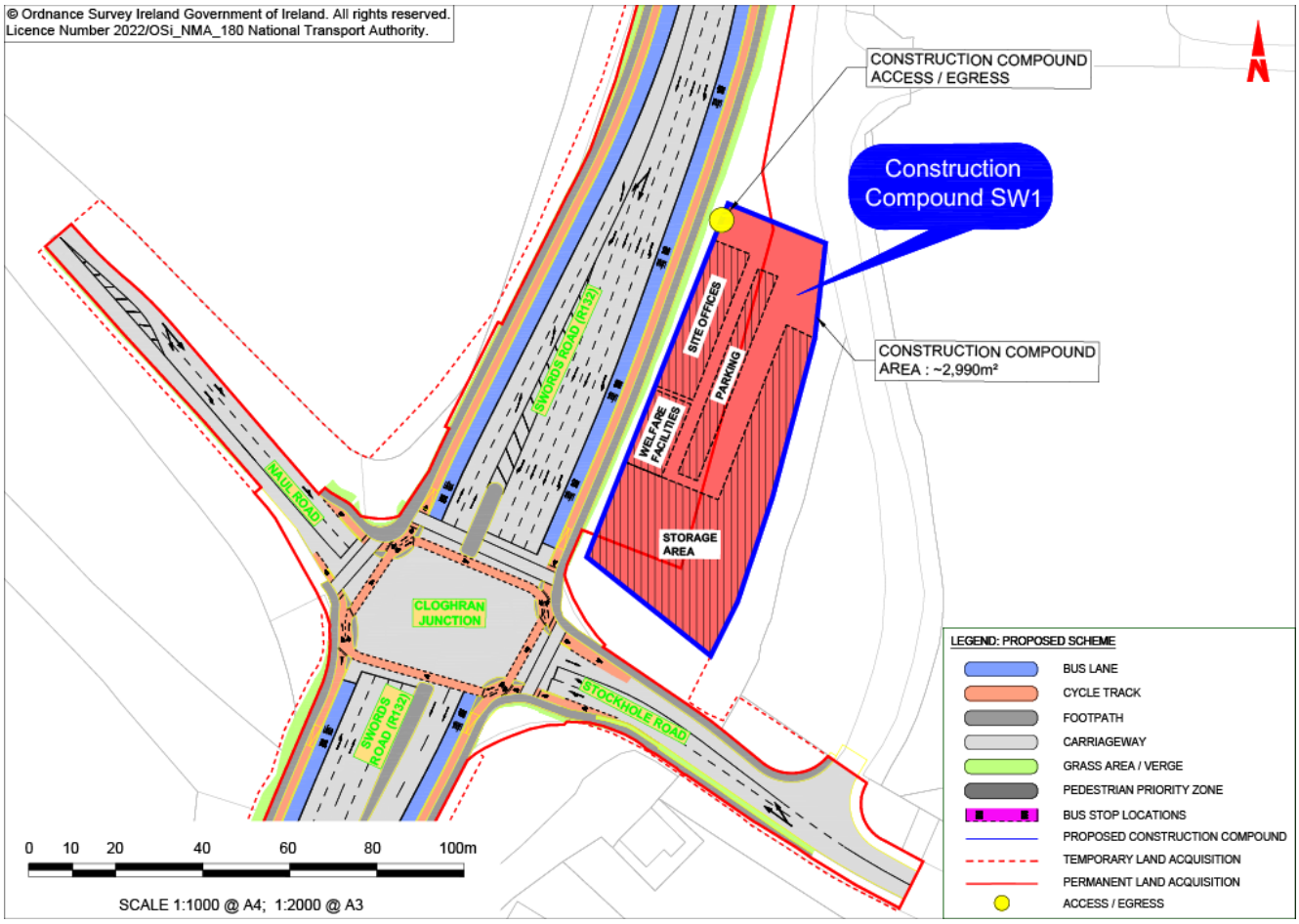

Image 12.1: Location and Extent of Construction Compound SW1

Construction Compound SW2 will be located at Collinstown Cross in an area of undeveloped rough ground, as shown in Image 12.2.

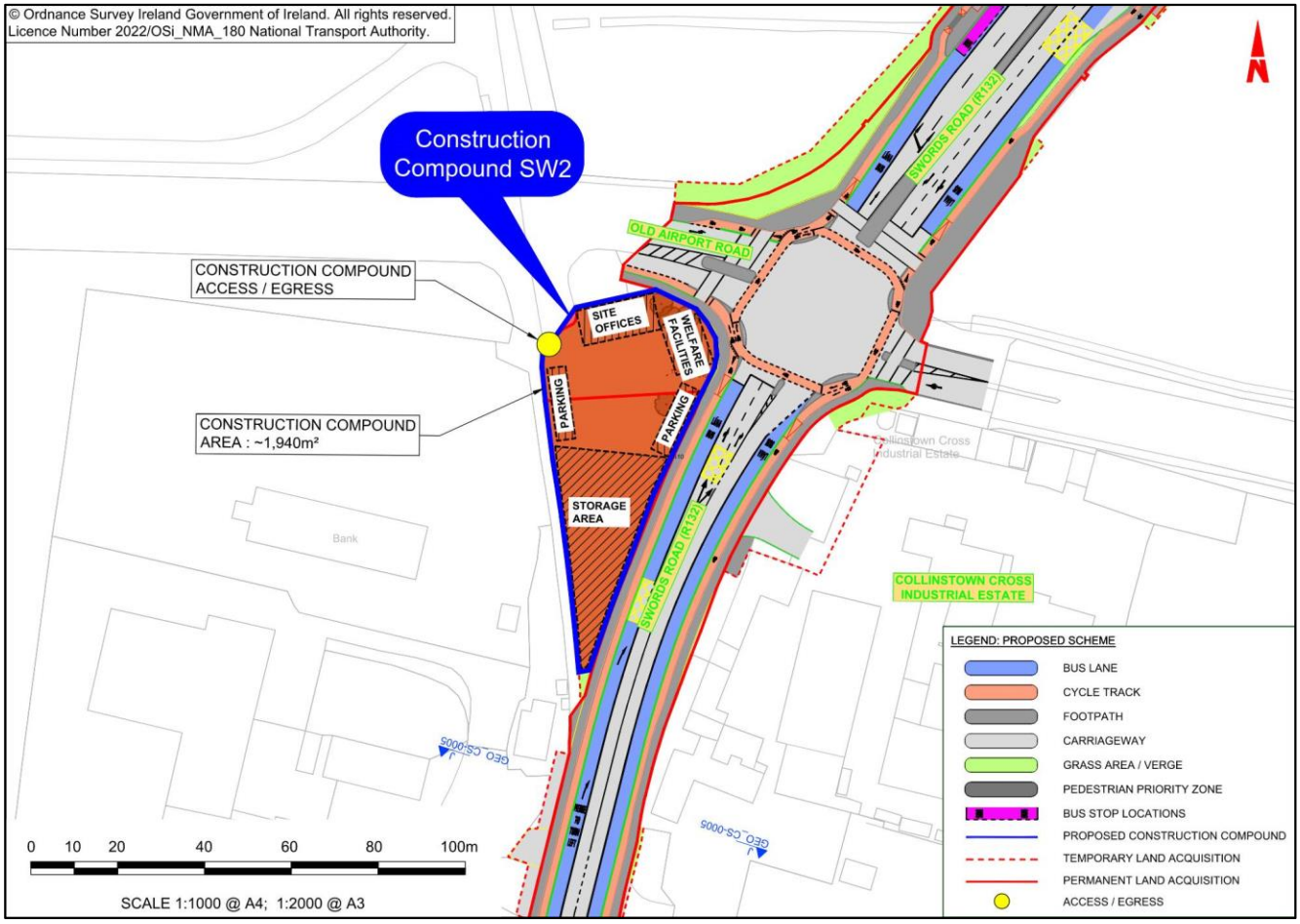

Image 12.2: Location and Extent of Construction Compound SW2

Construction Compound SW3 will be located at Coolock Lane in an area of roadside verge amenity grassland, as shown in Image 12.3.

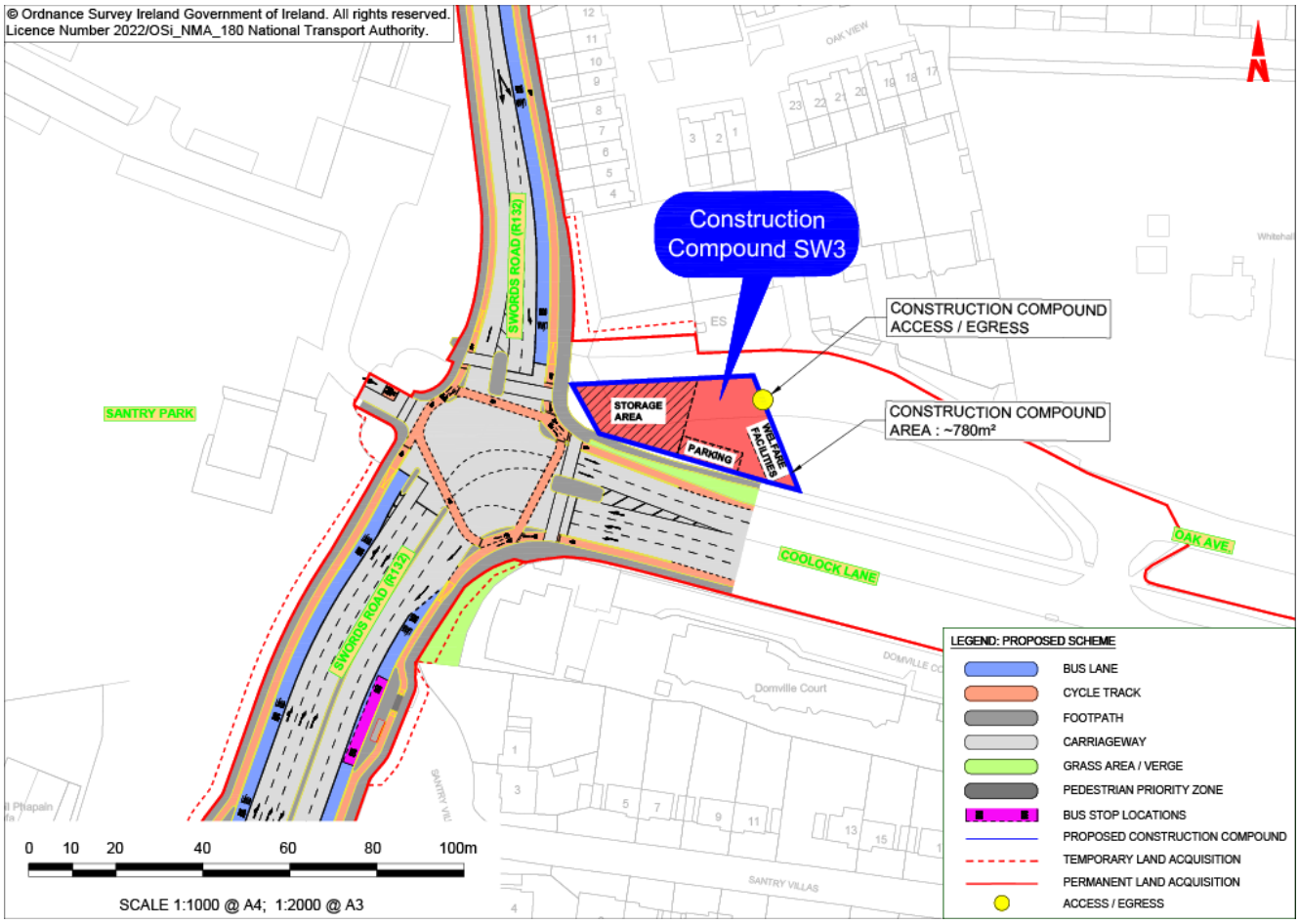

Image 12.3: Location and Extent of Construction Compound SW3

Construction Compound SW4 will be located to the south of Collins Avenue in rough ground, as shown in Image 12.4.

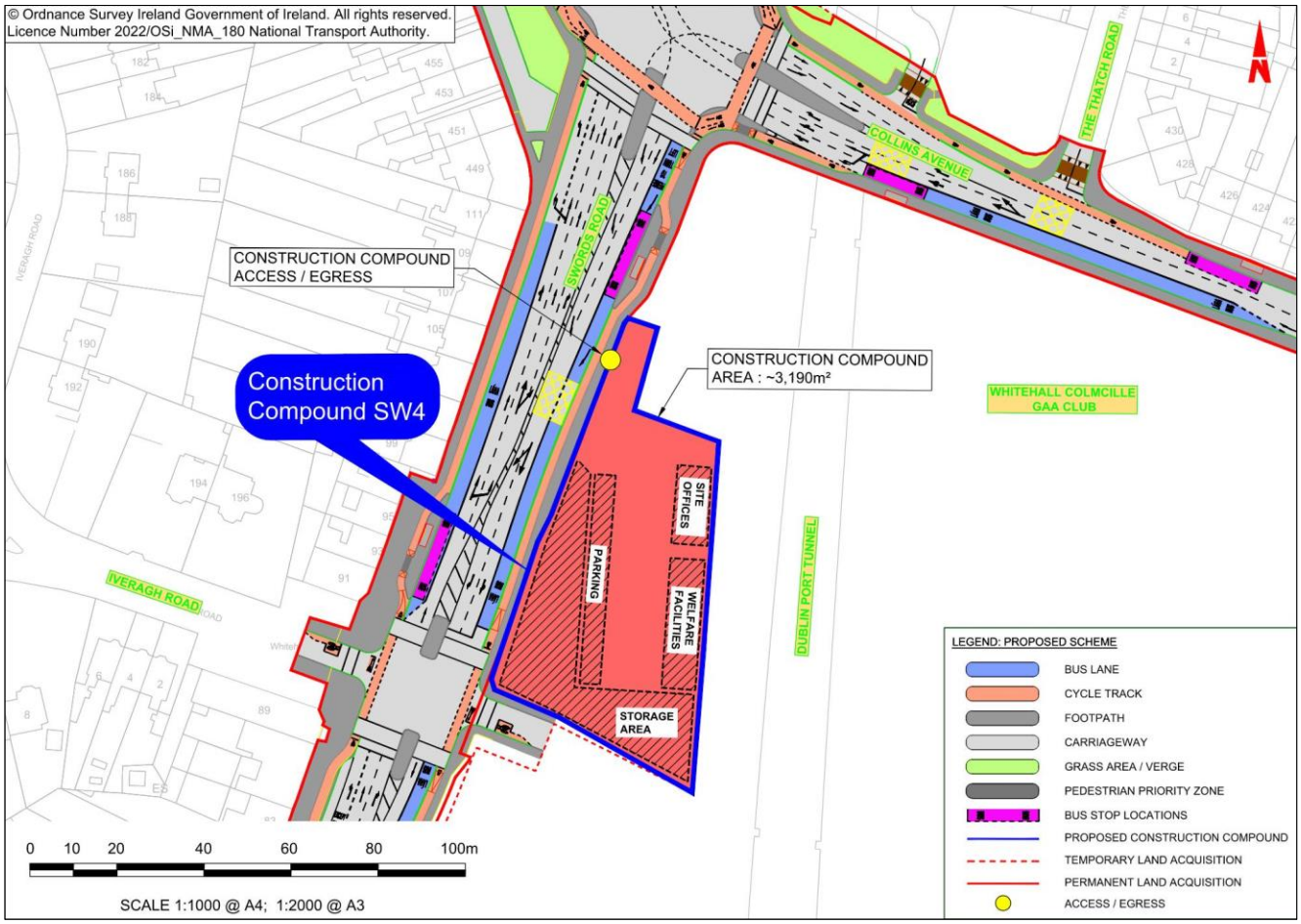

Image 12.4: Location and Extent of Construction Compound SW4

Construction Compound SW5 will be located to the west of Drumcondra (Frank Flood) Bridge, in an area currently occupied by public realm space as shown in Image 12.5.

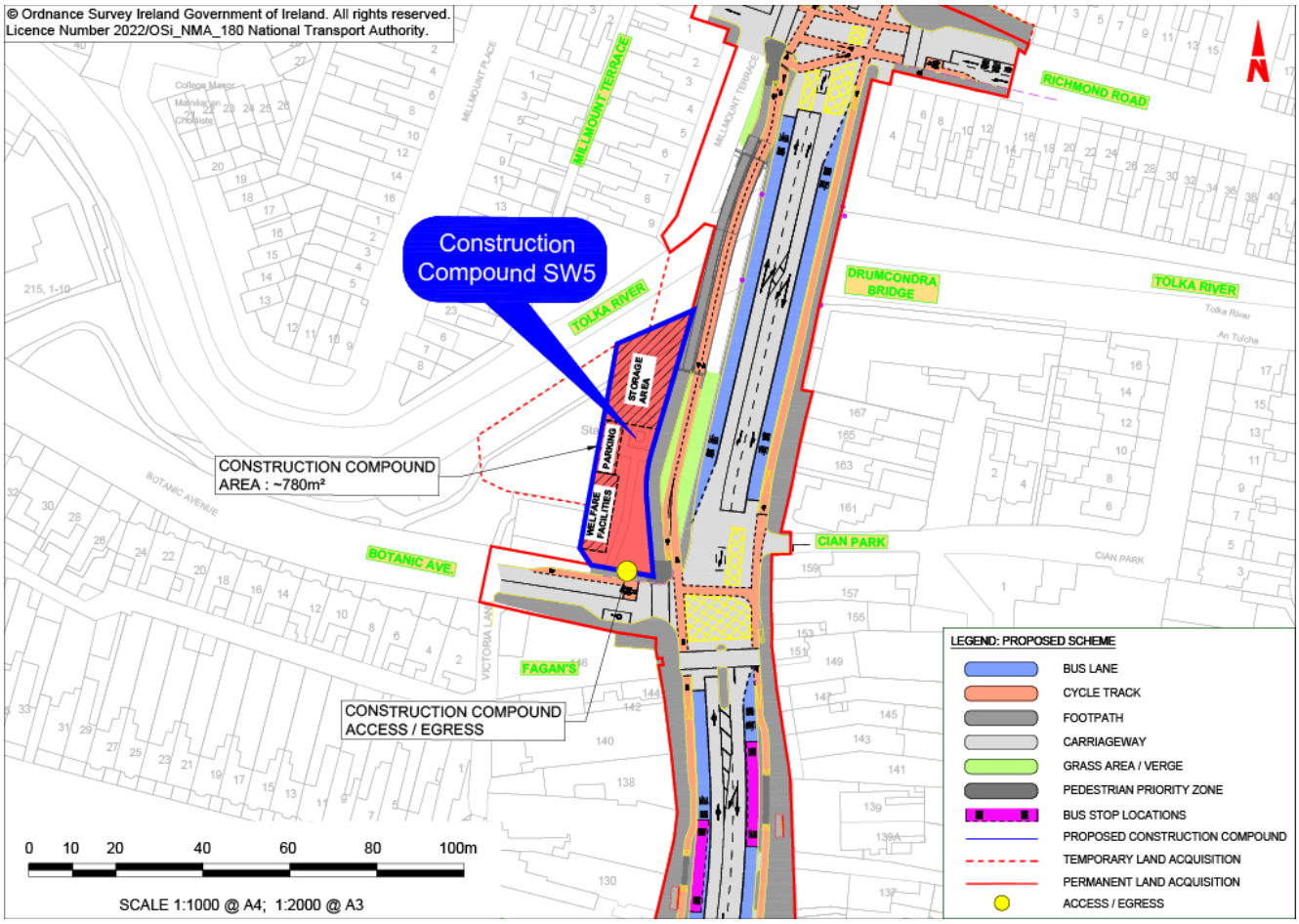

Image 12.5: Location and Extent of Construction Compound SW5

12.4.1.2.8 Estimated Project Duration

The duration of the Construction Phase is estimated to be 36 months.

12.4.1.3 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 to 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 Fingal County Development Plan 2023-2029 and Dublin City Council Development Plan 2022-2028. 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 waterbodies 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 Baseline Environment.

However, any effects on biodiversity are likely to be moderated by the environmental protection policies contained in both the Fingal County Development Plan 2023-2029 (FCC 2023) and Dublin City County Development Plan 2022-2028 (DCC 2022), as well as the overarching pollution control objectives 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 21 (Cumulative Impacts & Environmental Interactions).

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 supporting wetland habitat where identified)), 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 in the NIS, a standalone document supporting the planning application for the Proposed Scheme.

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.

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 as to whether the integrity of any European sites 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.

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 twenty (20) European sites (refer to the NIS which is included as a standalone document in this planning application):

- North Dublin Bay SAC [000206];
- South Dublin Bay SAC [000210];
- Howth Head SAC [000202];
- Malahide Estuary SAC [000205];
- Baldoyle Bay SAC [000199];
- Rockabill to Dalkey Island SAC [03000];
- Ireland's Eye SAC [000203];
- Lambay Island SAC [000204];
- Howth Head Coast SPA 004113[];
- North Bull Island SPA [004006];
- South Dublin Bay and River Tolka Estuary SPA [004024];
- Dalkey Islands SPA [004172];
- Malahide Estuary SPA [004025];
- Baldoyle Bay SPA [004016];
- Rogerstown Estuary SPA [004015];
- Skerries Islands SPA [004122];
- Ireland's Eye SPA [004117];
- Lambay Island SPA [004069].
- Rockabill SPA [004014]; 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 hydrogeological impacts;
- Habitat degradation as a result of introducing / spreading non-native invasive species;
- Habitat degradation as a result of air quality impacts; and
- Disturbance and displacement impacts.

12.4.3.1.1.1 Habitat Loss and Fragmentation

The Proposed Scheme does not physically overlap with any European sites. Therefore, there is no potential for direct habitat loss or fragmentation to occur. The nearest European site to the Proposed Scheme is South Dublin Bay and River Tolka SPA, which is located approximately 2.3km downstream of the proposed crossing point on the River Tolka. Therefore, there is no potential for direct habitat loss and fragmentation to occur. 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 and Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA and the Murrough). The Proposed Scheme will be located in proximity to a number of known inland wintering bird sites (Scott Cawley Ltd 2017). The Proposed Scheme will not, however, result in the loss of any *ex-situ* sites suitable to support breeding gull and wintering bird species. Therefore, there is no potential for impacts on SCI species associated with SPAs to occur as a result of habitat loss / fragmentation.

In summary, there is no potential for impacts on SCI species associated with SPAs to occur as a result of habitat loss / fragmentation.

Annex I habitats and 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.

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

The Proposed Scheme will be hydrologically connected to Dublin Bay via a number of watercourses, as well as a network of interconnecting and established surface or combined sewer/surface water pipes. The potential release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during construction has the potential to affect water quality in the receiving aquatic environment. Such a potential pollution event may include:

- The release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and / or
- The accidental spillage and / or leaks of contaminants (e.g. fuels, oil, chemicals and concrete washings) into receiving waters.

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 downstream waterbodies Dublin Bay, Baldoyle Bay and Malahide Estuary and the Irish Sea within which the following European sites are located: North Dublin Bay SAC, South Dublin Bay SAC, Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, Malahide Estuary SAC, Malahide Estuary SPA, Baldoyle Bay SAC, Baldoyle Bay SPA, Ireland's Eye SAC, Ireland's Eye SPA, Lambay Island SAC, Lambay Island SPA, Rogerstown Estuary SPA, Skerries Islands SPA and Rockabill 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 Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, Howth Head Coast SPA Ireland's Eye SPA, Lambay Island SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Rockabill SPA and The Murrough SPA are undermined.

In a worst-case scenario, in the absence of mitigation measures, the release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during the Construction Phase, has the potential to affect SCI bird species and QI mammal species that commute, forage and loaf in the Lower Liffey Estuary Upper / Lower and areas of 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, 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, Lambay Island SPA, Ireland's Eye SPA, North Dublin Bay SAC, North Bull Island SPA, South Dublin Bay SAC, South Dublin Bay and River Tolka

Estuary SPA, Malahide Estuary SPA, Rogerstown SPA, Baldoyle Bay SPA, Dalkey Islands SPA, Murrough SPA, Rockabill to Dalkey Island SAC and Lambay Island SAC would be undermined.

12.4.3.1.1.3 Habitat Degradation as a result of Hydrogeological Impacts

Groundwater levels in groundwater dependent habitats may be impacted by the removal of a proportion of an aquifer or dewatering activities associated with excavations which can lead to a temporary change in groundwater levels and flow within the aquifer. Likewise, the mobilisation of contaminants into the aquifer either through accidental spillage or disturbance of contaminated ground during excavation may reduce the quality of the groundwater within the aquifer, also resulting in the degradation of groundwater dependent terrestrial ecosystem and any species that they may support.

The potential for hydrogeological impacts are highly variable depending on the nature of the Construction Phase works at specific locations and the receiving environment ground conditions. The unmitigated hydrogeological ZoI of the Proposed Scheme is not considered to extend to any groundwater dependent terrestrial ecosystems linked to European sites, and as such the Proposed Scheme has no potential to result in habitat degradation of the QI / SCI species / habitats of any European site during the Construction Phase of the Proposed Scheme.

In summary therefore, the Proposed Scheme does not have the potential to result in habitat degradation of the Qualifying / Special Conservation Interest species of any European site as the result of hydrogeological impacts.

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

There are twelve (12) areas of Japanese knotweed, giant hogweed and / or Himalayan balsam, all species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, present within, or in proximity to, the Proposed Scheme. 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 habitat areas in European sites downstream in Dublin Bay, Baldoyle Bay and Malahide Estuary (i.e. North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SAC, Baldoyle Bay SPA, Malahide Estuary SAC and Malahide Estuary SPA). This 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 possible that non-native invasive species could spread to aquatic and coastal European sites which are located a significant distance from the outfall locations of the watercourses which are hydrologically connected to the site of the Proposed Scheme (i.e. Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC, Dalkey Islands SPA Ireland's Eye SAC, Ireland's Eye SPA, Lambay Island SAC and Lambay Island SPA), Rockabill SPA, Rogerstown SPA, The Murrough SPA, Skerries Islands SPA) due to the terrestrial largely non-saline conditions in which these invasive species can become established.

As the Proposed Scheme has the potential to result in habitat degradation of the QI / SCI species of the above listed European sites as the result of the spread of invasive species, there is the potential for in combination effects to occur in association with other activities / plans / projects.

12.4.3.1.1.5 Habitat Degradation as a result of Air Quality Impacts

A reduction in air quality within the immediate vicinity of the road, involving emissions from car exhausts, and the deposition of particulate matter and heavy metals produced by engine, brake and tyre wear during the Construction Phase, could possibly contribute to increased deposition of pollutants such as oxides of nitrogen (NOx, NOs), volatile organic compounds (VOCs), particulate matter (PM), heavy metals (HM) and ammonia (NH4) in the vicinity of a road carriageway. This can potentially affect the ecosystems and vegetation present, influencing plant growth rates and species composition, diversity, and abundance.

The unmitigated ZoI for air quality effects arising from the Proposed Scheme has the potential to extend 50m from the Proposed Scheme boundary, and 500m from the construction compounds during the Construction Phase. There are no European sites present within these distances, and as such the Proposed Scheme has no potential to result in habitat degradation of the QI / SCI species / habitats of any European site, as is discussed fully in the NIS.

12.4.3.1.1.6 Disturbance and Displacement Impacts

There are no European sites within the disturbance ZoI of the Proposed Scheme, however, several QI species are known to occur within the vicinity of the Proposed Scheme. Refer to Section 12.4.3.4 and Section 12.4.3.8 for more details with regard to potential construction impacts on QI mammals and fish, respectively.

There are a number of SPAs located relatively close 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, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA, and the Murrough SPA). These species include light-bellied Brent goose, curlew, oystercatcher, black-tailed godwit, blacked-headed gull, herring gull and lesser black-backed gull. Suitable inland foraging / roosting sites, which these bird species utilise, are located within the potential ZoI of the Proposed Scheme. Populations of kingfisher are known to be present in the vicinity of the Proposed Scheme, along the River Tolka and the River Santry. 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[5]. The nearest SPA for which kingfisher has been designated is the River Boyne and Blackwater SPA, which is located in a separate catchment approximately 30km away, therefore kingfisher present in the vicinity of the Proposed Scheme are not associated with an SPA population.

Although no signs of otter were initially recorded during field surveys of the Proposed Scheme, later evidence noted otter activity on the upstream and downstream side of the Frank Flood Bridge that spans the River Tolka at Drumcondra. Furthermore, the Royal Canal, River Liffey, River Tolka, Mayne River and the Ward River are known to support otter, an Annex II and IV mammal species. The nearest SAC to the proposed development site for which otter has been designated is Wicklow Mountains SAC which is located *approximately* 12.8km south. Research carried out by Ó Néill *et al.* (2008) on ranging behaviours of otter on river systems in Ireland found that female otter ranges averaged 7.5km while male otter home ranges varied from 7-19km. While the Proposed Scheme is within the potential home range of male otter, it is located in a different sub-catchment to the Wicklow Mountains SAC, therefore it is not considered likely that the otter present in the vicinity of the Proposed Scheme are associated with the QI populations of any European site.

Although marine mammals associated with European sites may commute and forage within the Liffey Estuary, and the coastal zone running northwards it is considered unlikely that there will be any impacts on these species as a result of the Proposed Scheme whose southern boundary (city Centre) is approximately 2.3km upstream of Dublin Bay, in a highly urbanised environment. Elsewhere the Proposed Scheme does not intersect any coastal waters This is because of the terrestrial nature of the Proposed Scheme along urbanised transport corridor. In addition to this, the scale of works proposed in the vicinity of the Liffey Estuary are considered to be minor. In summary therefore there is potential for the Proposed Scheme to result in disturbance / displacement impacts on SCI wintering bird populations associated with European sites. Refer to Section 12.4.3.5.2 for more details with regard to potential impacts on wintering bird species, which encompass all relevant SCI bird species.

12.4.3.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

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 sixteen pNHAs:

- Skerries Islands NHA [001218];
- Royal Canal pNHA [002103];
- Santry Demesne pNHA [000178];
- Grand Canal pNHA [002104];

[5] RSPB. Kingfisher breeding, feeding and territory webpage. Available from: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kingfisher/breeding-feeding-territory/

- North Dublin Bay pNHA [000206];
- South Dublin Bay pNHA [000210];
- Dolphins, Dublin Docks pNHA [000201];
- Booterstown Marsh pNHA [001205];
- Sluice River Marsh [001763];
- Dalkey Coastal Zone and Killiney Hill pNHA [001206];
- Howth Head pNHA [000202];
- Malahide Estuary pNHA [000205];
- Baldoyle Bay pNHA [000199];
- Rogerstown Estuary pNHA [004015];
- Portraine Shore pNHA [001215];
- Ireland's Eye pNHA [000203]; and
- Lambay Island pNHA [000204];

The locations of these designated areas for nature conservation relative to the Proposed Scheme, are shown on Figure 12.4 in Volume 3 of this EIAR. The potential effects on European sites arising from the Proposed Scheme, described above in Section 12.4.3.1.1 may also negatively affect the pNHA and NHA sites located within the boundaries of these European sites, as these sites 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 and NHA 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. Therefore, potential impacts arising from the Proposed Scheme on these pNHA and NHA sites could result in a likely significant negative effect at a national geographic scale.

The assessment of potential impacts arising from the Proposed Scheme on the Royal Canal pNHA, Santry Demesne pNHA and Sluice River Marsh pNHA is provided in the sections below. The Proposed Scheme will not result in any direct impacts on the Royal Canal pNHA or Sluice River Marsh pNHA as they are located within the Proposed Scheme boundary but not being impacted by construction or approximately 5.1km east of the Proposed Scheme. Potential indirect impacts as a result of negative effects on surface water quality to the Royal Canal and the River Sluice, which forms a hydrological connection between these pNHA and the Proposed Scheme, is dealt with in Section 12.4.3.2. Impacts on Santry Demesne pNHA are also addressed in Section 12.4.3.2

12.4.3.1.2.1 Habitat Loss and Fragmentation

The Proposed Scheme partially intersects the NPWS mapping boundary for Santry Demesne pNHA (North of Morton Stadium along the R132 Swords Road). However, based on a review of aerial photography and the location of the Proposed Scheme footprint largely on existing transport corridor outside the fenced boundary of the pNHA, the territory comprises roadside verge vegetation and built surface- footpaths, road outside the physical boundary of the Demesne with some overhanging trees. Thus, it is assumed that the identified boundary is a legacy discrepancy when the mapping projection 'Cassini projections' have not yet been resolved[6]. Although there are in places overhanging trees, the Proposed Scheme is not altering the integrity of the enclosed pNHAs boundary.

The Proposed Scheme will cross the Royal Canal at Binns Bridge, but there will not be any interference with the canal nor any structural change to the existing canal bridge that would interfere with the habitats is proposed.

The only connectivity with Sluice River pNHA is via hydrological pathway and as such no habitat loss or fragmentation as a result of the Proposed Scheme will occur.

[6] https://dahg.maps.arcgis.com/apps/webappviewer/index.hytml?id=8f7060450de3485fa1c1085536d477ba -NPWS screen popup.

12.4.3.1.2.2 Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and / or an accidental spillage or pollution event directly into the Royal Canal and Sluice River Marsh or any surface water feature, including existing drainage infrastructure, has the potential to have a significant negative effect on water quality and consequently affect aquatic and wetland habitats in the receiving environment, including the Royal Canal pNHA, Santry Demesne pNHA and Sluice River Marsh pNHA. 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 Royal Canal pNHA, Sluice River Marsh pNHA downstream could also be affected. as well as drainage features connecting Santry Demesne 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 is highly variable depending on the nature of the proposed works at specific locations and the receiving environment ground conditions. The Sluice River Marsh pNHA is approximately 5km and lack of groundwater connection from the Proposed Scheme and as such no groundwater impacts have been predicted in respect of the freshwater marsh vegetation. The Proposed Scheme will cross the Royal Canal pNHA at Binns Bridge, but the proposed works do not involve extensive works at this location, as such no groundwater impacts have been predicted in respect of the riparian and aquatic vegetation.

Santry Demesne pNHA is located adjacent to (west of) the Proposed Scheme. There is no proposed excavation in this location, but there remains a risk of pollutants entering the groundwater as a result of spillages or accidents where mitigation measures are not implemented. The magnitude of this impact is considered moderate adverse. The importance of Santry Demesne with associated wetlands and woodland habitats is very high, and the resulting effect is significant.

Therefore, mitigation measures, as described in Section 12.5.1.2.4 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

There are twelve (12) areas of Japanese knotweed, giant hogweed and / or Himalayan balsam, all species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) present within, or in proximity to, the footprint of the Proposed Scheme. In the absence of mitigation, there is potential for these invasive species to spread or be introduced, during construction and / or routine maintenance / management works, to terrestrial habitat areas in nationally-designated sites including the Royal Canal and Sluice River Marsh pNHA downstream in Dublin Bay, Baldoyle Bay and Malahide Estuary. (i.e. North Dublin Bay pNHA and South Dublin Bay pNHA). This 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 invasive species could affect the integrity of the Royal Canal pNHA and Sluice River Marsh pNHA sites in Dublin Bay.

It is not considered possible that non-native invasive species could spread to aquatic and coastal European sites which are located a significant distance from the outfall locations of the watercourses which are hydrologically connected to the Proposed Scheme (i.e. Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA and Baldoyle Bay pNHA) due to the terrestrial (largely non-saline conditions in which these invasive species can become established.

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

12.4.3.1.2.5 Habitat Degradation – Air Quality

In respect of this element the only nationally designated sites identified within the ZoI of the Proposed Scheme (as per the topic criteria identified in Chapter 7 (Air Quality) are the Royal Canal pNHA and Santry Demesne pNHA, both of which will be crossed by or occur adjacent to the Proposed Scheme.

Dust Emissions

Dust emissions associated with construction works could, in extreme circumstances, affect adjoining habitats, potentially burying sensitive habitats (e.g. woodland habitats in Santry demesne pNHA or plant species (e.g. *Groenlandia densa* known from the Royal Canal pNHA). 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).

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). Vehicle-derived air emissions were modelled during the construction phase along the Proposed Scheme at the Royal Canal pNHA (Bins Bridge Crossing) crossing as well as several crossing points outside of the Proposed Scheme, e.g. Royal Canal pNHA (various bridges) as well as Santry Demesne pNHA at two locations Santry Avenue and Swords Road (refer to Section 7.4.2.2.4 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/m3 limit value. In all cases where exceedances are predicted to occur, the baseline environment is already in excess of this value. During the construction year (2024) of the Proposed Scheme, annual mean NOx concentrations are predicted to decrease at the Royal Canal Binns Bridge (123.5 µg/m3 to 140 µg/m3) and decrease at Santry Demesne pNHA (52.6 µg/m^3 to 50.1 µg/m^3). 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 Royal Canal pNHA (Binns Bridge western side) and Santry Demesne pNHA (2 locations). Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Royal Canal pNHA and Santry Woods pNHA. These include canals (FW3), dry meadow / grassy verges (GS2), reed and large sedge swamps (FS1) and tall-herb swamps (FS2), and wetland habitats associated with North Dublin Bay pNHA. Canals (FW3), dry meadow / grassy verges (GS2), reed and large sedge swamps (FS1), tall-herb swamps (FS2) and mixed broadleaved / conifer woodland (WD2). The Grand Canal pNHA site is below the lower critical load of inland and surface water habitats of 5-10 Kg(N)/ha/yr (National Road Authority 2011), while the Liffey Valley pNHA site lies on the lower edge of the range (5.0kg/(N)/h/yr exactly). There is no predicted change in the NO_2 dry deposition rate at the Grand Canal pNHA site as a result of the construction of the Proposed Scheme. The rate is predicted to decrease to 3.9kg(N)/ha/yr at the Liffey Valley pNHA site as a result of construction. Therefore, harmful effects on vegetation within the Liffey Valley pNHA and the Grand Canal pNHA

from NO_2 are not likely, nor will there be any reduction in habitat area of the pNHA habitats, and mitigation is therefore not required.

The Proposed Scheme is located within a highly urbanised locality with a significant level of 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 cause any significant level of 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 pNHA from particulate matter 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 & Fragmentation

The totality of habitat loss across the Proposed Scheme (not considering buildings and other hard standing areas) is approximately 6.29ha during the Construction Phase. This occurs in the form of permanent land required from areas of edge habitats adjacent to the existing road network.

The habitat type canals (FW3) may also be indirectly impacted by the Proposed Scheme and is considered to be of National Importance as it is contained within the boundaries of the Royal Canal pNHA. The Proposed Scheme crosses the Royal Canal at Binns Bridge between Whitworth Place and Portland Place; however, there will be no permanent loss of this habitat type. There will be minimal loss of Royal Canal territory, approximately 0.0155 hectares (of terrestrial built land) so there is no potential for significant effects at any geographic scale.

The habitat type depositing/lowland rivers (FW2) will also be affected by the Proposed Scheme and is considered to be of Local Importance (Higher Value). Watercourses within the vicinity of the Proposed Scheme include : River Sluice, Cuckoo Stream, River Mayne, River Santry, River Tolka, River Ward, Glebe Stream and Gaybrook Stream. Of these watercourses the following will be crossed by the Proposed Scheme: Sluice River, Cuckoo Stream, Mayne River, River Santry and River Tolka. With the exception of along the River Tolka, there will be no permanent loss of this habitat type as a result of the Proposed Scheme. It is proposed in consultation with IFI to install some scour protection on the north-western side of the Frank Flood Bridge to protect against historical scour under the bridge at this point. The full extent of the scour protection is limited to a few metres and will be set against the bank, thus resulting in a minimal loss of FW2 aquatic habitat, which is considered a minor negative effect at the local geographic scale. For the remainder of the watercourses, there is no potential for significant effects at any geographic scale.

Habitat types considered to be of Local Importance (Higher Value) will be lost as a result of the Proposed Scheme. These include areas of drainage ditches (FW4), mixed broadleaved conifer woodland (WD2), immature woodland (WS2), scattered trees and parkland (WD5), hedgerow (WL1) and treeline (WL2) habitats. The overall total area of these habitat types that overlap with the Proposed Scheme boundary and may be directly lost as a result of the construction of the Proposed Scheme is approximately 2.65ha (hectare). The permanent loss of the areas of these habitat types (considered to be of Local Importance (Higher Value)) has the potential to affect the conservation status of each of these habitat types, resulting in a significant negative effect at the local geographic scale.

Whilst the Proposed Scheme is located directly adjacent to (and based on current mapping boundaries) within Santry Demesne pNHA, it will not result in any direct impacts to Santry Demesne pNHA as a consequence of habitat loss or fragmentation (See Section 12.4.3.1.2.1).

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), planted flowers beds (BC4) and ornamental/non-native shrub (WS3), areas of disturbed ground (ED2 and ED3) and scrub (WS1), hard standing (BL3) and dry meadows and grassy verges (GS2) habitat. 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 the Construction Phase of the Proposed Scheme is provided in Table 12.16**.**

The various KER habitat types affected and corresponding total areas which overlap with the Proposed Scheme boundary are summarised in Table 12.16. 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.

It is also proposed to alter a green space (separating car parking spaces for local businesses from Coolock Lane) to include the provision of a bus turning area. This element will result in the partial loss of a strip of ground within the GA2-dominated verge which the local authority has seeded with pollinating plant and reduced the mowing regime. This potential impact will not result in a significant effect at any local geographic scale.

Table 12.16: Extent of Habitat Loss by Type

Habitat Type	Extent of Permanent Habitat Loss	Extent of Temporary Habitat Loss (Tempoary habitat loss and COnstructiob Compounds)
National Importance		
Canals (FW3)	Approximately 0.0155ha	No habitat loss
Local Importance (Higher Value)		
Hedgerows (WL1)	Approximately 0.16ha	Approximately 0.12ha
Treelines (WL2)	Approximately 0.42ha	Approximately 0.27ha
Depositing / lowland rivers (FW2)	Approximately 0.02ha	Approximately 0.01ha
Drainage ditch (FW4)	No habitat loss	Approximately 0ha
Mixed broadleaved woodland (WD1)	Approximately 0.41ha	Approximately 0.34ha
Mixed broadleaved conifer woodland (WD2)	Approximately 0.001ha	Approximately 0.004ha
Scattered trees and parkland (WD5)	Approximately 0.2ha	Approximately 0.21ha
Immature woodland (WS2)	Approximately 0.43ha	Approximately 0.009ha
Local Importance (Lower Value)		
Amenity grassland (GA2)	Approximately 1.23ha	Approximately 0.47ha
Flower beds and borders (BC4)	Approximately 0.001ha	Approximately 0.069ha
Ornamental / Non-native shrubs (WS3)	Approximately 0.01ha	Approximately 0.01ha
Spoil and Bare Ground (ED2)	Approximately 0.02ha	Approximately 0.5ha
Recolonising Bar Ground (ED3)	Approximately 0.07ha	Approximately 0.07ha
Scrub (WS1)	Approximately 0.1ha	Approximately 0.04ha
Buildings and Artificial Surfaces (BL3)	Approximately 36.96ha	Approximately 1.56ha
Dry meadows and grassy verges (GS2)	Approximately 1.43ha	Approximately 0.72ha

Entries highlighted in blue are KER's which will be subject to direct habitat loss as a result of the Proposed Scheme

12.4.3.2.2 Habitat Degradation – Surface Water Quality

During the Construction Phase, 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, estuarine and coastal habitats downstream 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, for the purposes of this EIA to be conducted by An Bord Pleanála (but not the screening for Appropriate Assessment), detailed mitigation measures are proposed and considered to further minimise the risk contaminated surface water runoff and / or an accidental spillage or pollution event of the Proposed Scheme having any perceptible effect on water quality during the Construction Phase.

During the Construction Phase, suspended solids, silt and other harmful materials generated as a result of proposed works could be released into the local drainage infrastructure and travel downstream. 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 geographic scale and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, transitional and coastal habitats downstream, in Dublin Bay, could also be affected.

The construction of the proposed Pedestrian / Cycle bridge over the River Tolka, adjacent to the existing Frank Flood Bridge in Drumcondra and works required for installation of the left bank toe protection, suspended solids arising from the release of sub-surface sediment during works at this location has the potential to enter the River Tolka and travel downstream, including, potentially, into the Tolka Estuary.

Additionally, existing services under the River Tolka (Tolka_060) will be diverted. This includes oil-filled cables. There is evidence (EPA 2020) of leaks occurring from ESB oil-filled cables over the past 20 years; there is a high risk that draining the cables and diverting them through drilled ducts would result in oil contamination of the Tolka_060. Similarly, low voltage oil filled cables are to be diverted on the existing bridge over the river, with similar risks posed. This could result in medium term, adverse, large magnitude impacts which would result in a Profound significance.

Works in proximity to the Royal Canal at Binns Bridge could also result in the release of suspended solids and other such contaminants into the canal. Similarly, in other areas of the Proposed Scheme, any works in proximity to existing drainage infrastructure could potentially result in the release of sediment, and other materials generated during construction works, which could be transferred downstream via this drainage infrastructure. In this way, suspended solids and other materials generated during construction works could be transferred to any watercourses / waterbodies within the ZoI, including the River Ward, River Sluice, Cuckoo Stream, River Mayne, River Santry, the artificial pond in Santry Demesne and River Liffey. 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 any of these watercourses may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, coastal habitats downstream, in Dublin Bay, could also be affected.

Habitat degradation as a consequence of Construction Phase impacts on surface water quality has the potential to affect the conservation status of tidal rivers (CW2) / Annex I habitat estuaries [1130] habitat and therefore, has the potential to result in a significant negative impact at a National scale in the case of the aquatic / wetland Annex I habitats located within the ZoI of the Proposed Scheme. The Liffey Estuary Upper, Liffey Estuary Lower and Tolka Estuary are hydrologically connected to downstream habitats including mudflats and sandflats [1140], Atlantic salt meadows [1330], and reefs [1170] which may also be at risk of habitat degradation as a consequence of potential Construction Phase impacts on surface water quality.

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.

12.4.3.2.3 Habitat Degradation – Hydrological Regime

During Construction and Operational Phases, the Proposed Scheme may have a temporary effect on the local flow and flooding regime from the following sources:

- Change in the natural hydrological regime due to an increase in discharge as a result of dewatering activities (if required) during the Construction Phase. This may alter the groundwater regime and affect the baseflow to a surface water receptor;
- Potential for disrupting local drainage systems due to diversions required to accommodate the Construction Phase works e.g. installation of scour protection; and
- Potential for temporary increase in hard standing areas and / or soil compaction during Construction works which could result in temporary increased runoff rates to waterbodies.

Construction Phase works at the proposed Pedestrian / Cycle bridge over the River Tolka may have a temporary effect on the local flow and flooding regime. None of these are predicted to have any long-term effects that would give rise to a likely significant negative effect on any aquatic habitats or species through effects on the hydrological regime nor give rise to a likely significant negative effect on any aquatic habitats or species (for more detail refer to Chapter 13 (Water)). 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)).

12.4.3.2.4 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.

By virtue of proximity and an assemblage of habitat types including groundwater dependent habitats associated with Santry Demesne pNHA, the resulting effect is considered moderate significant It is predicted that while there may be no direct impact on the groundwater regime as the Proposed Scheme is at grade with minimal excavation required. The risk of pollutants entering the groundwater as a result of spillages or accident where mitigation measures are not in place is predicted to be limited, localised and temporary, the magnitude of this impact is considered negligible.

As detailed in the Construction Environmental Management Plan (CEMP) for the Proposed Scheme (see Appendix 5.1 – CEMP in Volume 3 of this EIAR), an SWMP containing specific controls / mitigation measures, i.e. pollution control plan will be put in place to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase. There are no predicted impacts that could give rise to a likely significant negative impact on any aquatic habitats or species at any time scale (for more detail refer to Chapter 13 (Water)).

12.4.3.2.5 Habitat Degradation – Air Quality

As discussed in Section 7.4.2 of 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. Mitigation measures have been designed to contain dust emissions during construction (see Section 12.5.1).

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.

As discussed previously , NOx concentrations, and deposition rates, were modelled for the Construction 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 potential impacts of the Proposed Scheme 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 is controlled under Article 49 of the European Communities (Birds and Natural Habitats) Regulations 2011; 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 habitats; potentially affecting plant species composition, diversity and abundance over the long-term. This is not only confined to habitats within and 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. Twelve (12) areas of non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 were identified along the Proposed Scheme. Three species were recorded including Japanese knotweed, Himalayan balsam and giant hogweed. The desk study revealed records for the following additional species in proximity to the Proposed Scheme: Canadian waterweed, Nuttall's waterweed, New Zealand pigmyweed and three-cornered garlic. The aquatic survey (July 2022) identified the aquatic species Canadian pondweed (*Elodea canadensis*), Nuttall's pondweed (*Elodea nuttallii*), along the Royal Canal at Phibsborough. Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1.2.6).

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 2022 were recorded within or in proximity to the Proposed Scheme. The desk study revealed historical records for a number of species in the wider vicinity of the Proposed Scheme; opposite-leaved pondweed in the Royal Canal as well as a record for meadow barley at Brackenstown, Swords., Hairy Violet at Santry Demesne. The aquatic survey (October 2020) for the route corridor recorded no presence of Opposite-leaved pondweed or other rare flora but stated that the species (*Groenlandia densa*) is known from this area of the Royal Canal close to the Binns bridge (BEC 2011; NPWS data). It is considered likely that the species is still present, but given it is a dark green, submerged pondweed that often sprawls along the bottom, detection can be difficult.

The remaining terrestrial plants are either species that require specific conditions that are not encountered within the existing transport corridor of the Proposed Scheme or occur in areas beyond the potential footprint of the Proposed Scheme and as such will not be impacted though habitat loss. There is no potential for direct impacts on these protected species (listed in Section 12.3.6) to occur as a consequence of the Proposed Scheme.

12.4.3.3.2 Habitat Degradation – Surface Water Quality

During construction, the potential for temporary disruption to local drainage systems and hydrological regimes have been assessed in relation to the Proposed Scheme. These are not predicted to result any long-term effects that would give rise to a likely significant negative effect on any aquatic habitats (or species contained therein) through effects on the hydrological regime (for more detail refer to Chapter 13 (Water)), which includes site specific mitigation measures in respect of watercourse crossing and the Construction Compounds. In addition, and as detailed in the Construction and Environmental Management Plan (CEMP) for the Proposed Scheme (Appendix A5.1 in Volume 3 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.

12.4.3.4 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. Collinstown Industrial buildings were not surveyed in earlier phases of the Proposed Scheme but was subject to an external visual inspection in April 2023. Owing to the nature of the commercial property, its potential to support roosting bats is considered low and there was relatively little bat activity recorded from adjacent bat activity transects CBC0002 BT0002. Elsewhere, RCSI cottages (CBC0002RI001) was not confirmed as a bat roost following surveys undertaken here in 2020, nor the April 2023 revisit owing to access issues although it was deemed to be suitable to support roosting bats, based on the results of activity earlier surveys (See Section 12.3.8.1.8). Two derelict cottages belonging to the Royal College of Surgeons will be demolished as part of the Proposed Scheme. The potential for bats to be roosting bats in these buildings at the time of building demolition cannot be ruled out and therefore, a precautionary approach has been adopted with regard this potential roost structure. Appropriate mitigation measures to ensure no direct harm comes to individual bats, should they be present, during demolition are included in Section 12.5.1.4.1. The loss of these structures, if they are indeed used by roosting bats, would be significant at the local geographic scale only, given the low number of bats likely to be roosting therein and the relatively open nature of the adjacent urban setting with few areas of large, wooded areas and considerable artificial lighting about.

Several trees which have been identified as being suitable to support roosting bats will be lost as a result of the Proposed Scheme. This includes four London Plane trees along Drumcondra Road Upper between Griffith Avenue and Church Avenue. The Proposed Scheme will not result in the loss of any known breeding / resting sites for any bat species, but it will result in the removal of potential roost sites in the form of the above mentioned PRFs. 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 / commuting bats within the footprint of the Proposed Scheme includes hedgerows and treelines, woodland, canal, 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 12.16 and shown in the Landscape General Arrangement drawings [BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001] in Volume 3 of the EIAR. This is not deemed significant, considering the extent of habitat loss, the location (adjacent to existing artificially lit roads in a generally highly disturbed urban environment) and the quantity of other available suitable habitat that will not be impacted in the local area.

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. A Core Sustenance Zone (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 (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.'*

Notwithstanding the fact that there is evidence of bats foraging and commuting within the study area of the Proposed Scheme, particularly along the River Tolka at the Frank Flood Bridge (CBC0002BT006) and at Santry Demesne (CBC0002BT004), and that all parts of the Proposed Scheme that 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. The proposed Pedestrian / Cycle Bridge over the River Tolka at the Frank Flood Bridge will not result in any barrier effect / habitat fragmentation effect to local bats as it will be located directly adjacent to the existing Frank Flood Bridge, as such any barrier effect already exists and would not be worsened by addition of the new structure.

The loss and / or fragmentation of existing habitat used by commuting / foraging bats could also result in impacts to local 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 site clearance commences and the barrier itself is in the form of the cleared lands. The Proposed Scheme will result in the removal / fragmentation of woodland, treelines and hedgerows (See Table 12.16) 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. (See also Section 12.4.3.4.1.4).

Removal of suitable habitat for foraging and / or commuting bats (e.g. scattered trees and parkland, dry meadows and grassy verges, scrub, mixed broadleaved woodland and treelines / hedgerows) within the footprint of the Proposed Scheme is calculated as 3.20ha on a permanent basis and 1.54ha on a temporary basis. Habitat removal will occur within a highly disturbed urban environment with low numbers of species records. The affected habitats are not considered to provide significant contributions to core sustenance zones of roosts located 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 Geographic level.

12.4.3.4.1.3 Installation of Temporary Working and Site Compound Lighting which may cause Indirect Disturbance of Flight Patterns

Construction Compounds are proposed in the following five locations (see Section 12.4.1.2.7 and the General Arrangement Drawings [BCIDB-JAC-GEO_GA-0002_XX_00-DR-CR-9001] in Volume 3 of this EIAR);

- Construction Compound SW1 Cloghran Roundabout, located in amenity grassland/roadside verge to the north-east of the existing Roundabout;
- Construction Compound SW2 Collinstown Cross in an area of undeveloped rough ground;
- Construction Compound SW3 Coolock Lane in an area of roadside verge amenity grassland;
- Construction Compound SW4 South of Collins Avenue in rough ground; and
- Construction Compound SW5 Drumcondra (Frank Flood) Bridge to the west of Drumcondra (Frank Flood) Bridge, in an area currently occupied by public realm space.

Security lighting will be installed in these Construction Compounds and will be in operation (when on) for the duration of construction (i.e. 36 months) thereby temporarily increasing the level of artificial lighting in these areas. While sensor activated lighting will be used at site compounds, 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 result in abandonment of nearby roosts. Given the urban setting of these proposed site 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.

Construction works will typically be undertaken during normal daylight working hours, and therefore the requirement for lighting to accommodate construction works during night-time, in many areas where existing light levels are low, will be limited. However, owing to the importance of the Drumcondra Road, some night works will be required for some elements of the proposed Pedestrian and Cycle Bridge emplacement alongside the Frank Flood Bridge.

Therefore, the effect of temporary lighting effects associated with the Construction Phase of the Proposed Scheme is considered to be significant at the local level only.

12.4.3.4.1.4 Disturbance / Displacement

In conjunction with any displacement effects associated with habitat loss, increased human presence and / or noise and vibration associated with construction works, particularly in the areas around the River Tolka and Frank Flood Bridge has the potential to displace commuting bats from foraging habitat located beyond the footprint of the Proposed Scheme, given the nature of the works needed for some night-time works.

Disturbance and displacement effects on bats may arise from the presence of the temporary pontoon and thereafter the scaffold under the new bridge, as well as the need for artificial lighting to facilitate safe working alongside the River Tolka. The presence of these construction platforms will result in additional barriers under the upstream side of the Frank Flood Bridge, although bats are highly agile mammals that rely on echolocation to find insect prey. However, the presence of the pontoon followed by the scaffold platform while being temporary in nature and only used by operatives during daylight hours, could result in temporary disturbance of flight paths up and downstream. Although the majority of the Proposed Scheme corridor is already lit artificially, the Construction Phase works may result in the temporary introduction of artificial lighting to previously unlit areas across the Proposed Scheme area, as well as physical impediment under part of the riverine corridor in the Frank Flood Bridge location.

Therefore, lighting associated with the construction phase of the Proposed Scheme as well as the presence of physical impediments and increased noise from night-time works could result in a negative effect on bats, albeit temporary in nature and significant at the local level only.

12.4.3.4.2 Badger

During multi-disciplinary surveys undertaken, evidence of badger was identified at four locations along the footprint of the Proposed Scheme, including badger latrines along the banks of the Tolka River. No badger setts were identified during these surveys. Based on the results of the desk study badger are known to occur in the vicinity of the Proposed Scheme, with recent records for badger existing from Dublin Airport, Dardistown, Santry and Swords.

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 this scenario has been taken into account in the mitigation strategy (refer to Section 12.5.1.4.2).

12.4.3.4.2.1 Loss of Foraging Habitat and Breeding/Rest Sites

There are no badger setts located within the ZoI of the Proposed Scheme; therefore, there is no potential for the permanent loss of any badger set to occur.

Construction may result in the permanent loss of 4.64ha (hectare)of suitable foraging / commuting habitat for badgers (e.g. amenity grassland, scattered trees and parkland, dry meadows and grassy verges, scrub, immature woodland, mixed broadleaved woodland, mixed broadleaved conifer woodland, and treelines / hedgerows). In addition, the provision of Construction Compounds for the duration of the Construction Phase will result in the temporary loss of 0.32ha (hectare) of the following habitats, which could be used by commuting / foraging badgers: dry meadows and grassy verges, immature woodland and amenity grassland.

Permanent habitat removal for the Proposed Scheme will be largely adjacent to pre-existing roads/paths and is limited to approximately 2m linear sections of amenity grassland, existing hard surfaces, scattered trees and parkland and roadside 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 likely significant negative effect, at any geographic scale.

12.4.3.4.2.2 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 result from 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 Construction Phase works 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. Many of the locations proposed for Construction Compounds are composed of suitable foraging or commuting habitat for badger (amenity grassland, dry meadows and grassy verges and immature woodland). 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

It is possible that otter will establish new holt or couch sites within the ZoI of the Proposed Scheme before construction works commence, 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

No otter breeding or resting places, holt or couch sites were identified within the boundary of the Proposed Scheme during field surveys. 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, consisting of a regular otter spraint site, was identified during the aquatic surveys and 2022 site visit. This otter spraint site was located on the downstream bridge apron of the Frank Flood Bridge), while a partial claw print was noted in mud further upstream of the Frank Flood Bridge. The presence of this regular spraint site indicates that otter frequent the vicinity of the Frank Flood Bridge. Furthermore, based on the results of the desk study, otters are known to occur within the vicinity of the Proposed Scheme, with records from the following locations: River Ward in Swords; Tolka River at Griffith Park; along the Royal Canal; Santry Demesne; and Mayne River at Stockhole Lane. The Tolka River is also known to support a local otter population.

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 compound locations are, for the most part, removed from waterbodies and do not consist of suitable habitat for otter. Compound SW5 is proposed to be located alongside the Tolka River near the Frank Flood Bridge. However, the siting of this Construction Compound (SW5) is not predicted to result in any loss of riparian habitat for local otters as the habitats in this location are composed of amenity grassland and treelines, neither of which would be significant habitats for otter.

The proposed Pedestrian / Cycle Bridge over the Tolka River could result in the fragmentation of otter habitat (i.e. Tolka River and surrounding riparian vegetation), during construction. The proposed Pedestrian / Cycle Bridge

will lie immediately adjacent to the existing Frank Flood Bridge and its construction will require some in-stream works. As such, some element of fragmentation of the river and surrounding riparian habitats are likely occur during the Construction Phase due to the presence of the scaffold and the works area extending almost to water's edge with some in-stream works including the emplacement of scour protection and temporary the presence of the scaffolding platform.

The scale of habitat loss through fragmentation is relatively small when compared to the availability of other suitable riparian habitats present in the wider environment of the surface water catchments crossed by the Proposed Scheme. Otters are known to routinely use highly modified habitat within culverts and beneath bridges. Habitat loss arising from the Proposed Scheme would not constitute a significant decline in the extent of available otter habitat and will not affect the local otter population's ability to maintain itself, even in the short-term.

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

12.4.3.4.3.3 Habitat and Food Source Degradation – Water Quality

During construction, contaminated surface water runoff 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 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.

During construction of the proposed Pedestrian / Cycle Bridge over the River Tolka, adjacent to the existing Frank Flood Bridge in Drumcondra, suspended solids arising from the release of sub-surface sediment during works here have the potential to enter the River Tolka and travel downstream, including, potentially, into the Tolka Estuary. Similarly, the emplacement of scour protection will result in sediment disturbance

The works in proximity to the Royal Canal at Binns Bridge, could also result in the release of suspended solids into the canal. Similarly, in other areas of the Proposed Scheme, any works in proximity to existing drainage infrastructure could potentially result in the release of sediment, and other materials generated during construction works, which could be transferred downstream via this drainage infrastructure. In this way, suspended solids and other materials generated during construction works could be transferred to any watercourses / waterbodies within the ZoI, including the River Ward, River Sluice, Cuckoo Stream, River Mayne, River Santry, the artificial pond in Santry Demesne and River Liffey. 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 any of these watercourses may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment, and therefore 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 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 impact, the availability of suitable habitat for otter in the wider vicinity and the abundance of otter across the study area, as revealed in the results of the desk study.

Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1.4.3.4).

12.4.3.4.3.4 Habitat Severance/Barrier Effect

The proposed Pedestrian / Cycle Bridge over the River Tolka, adjacent to the existing Frank Flood Bridge in Drumcondra, could result in a barrier effect to local otter populations. During construction, it is likely that the works involved could act as a barrier to local otters, at least temporarily. In particular, the temporary placement of the scaffolding platform across part of the river channel and increased activity associated with it, as well as the temporary damming of a section of the river to facilitate the emplacement of scour protection. Given that otters are generally nocturnal in habitat and works will typically be carried out during normal daylight working hours, affected otters would be expected to habituate to the altered landscape and any resulting barrier effect would be temporary in nature (see below on disturbance / displacement and the habituation of otters to disturbance).

Overall, the severance / barrier effect of construction works on otter is likely to affect the local population only in the short-term, and is not likely to affect the species conservation status and result in a significant negative effect, at any geographic scale.

Mitigation measures have been designed to minimise habitat severance during construction (see Section 12.5.1.4.3.4).

12.4.3.4.3.5 Disturbance/Displacement

The desk study did not identify any otter holts in proximity to the Proposed Scheme, and the field surveys undertaken did not record any otter holts within the boundary of the Proposed Scheme; however, given that suitable habitat is present, it is reasonable to assume that active otter holts are present along stretches of the River Tolka, Royal Canal and other suitable watercourses in the vicinity of the Proposed Scheme. Increased human presence and/or noise and vibration associated with construction works within the footprint of the Proposed Scheme is unlikely to affect any such holts. However, construction works associated with the Proposed Scheme have the potential to (at least temporarily) displace commuting or foraging otter (see Section 12.4.3.4.3.4).

Construction activities at the proposed Pedestrian / Cycle Bridge over the River Tolka will include: rock armour scour protection to be provided at north-western riverbank; regrading of north-western bank; installation of 3 no. bored reinforced concrete piles; installation of two-span bridge structure; local excavations to the southern bank to accommodate space for inspection; and modification of existing river wall at the northern bank where it abuts the new support beam. Noise and vibration associated with the construction of the proposed bridge, as well as construction works in proximity to the Royal Canal at Binns Bridge, will have the potential to create disturbance and displacement within the vicinity of the works. Noise and disturbance as a result of bridge construction are quantified as between approximately 80 dB (L_{aeq}12hr) to 60dB. As such disturbance of mammals is estimated to potentially reach 100m from the Proposed Scheme. Otters in any active holts outside of this ZoI, disturbance effects from the Proposed Scheme are not expected to be subject to displacement effects leading to abandonment of holts.

Much of the works for the Proposed Pedestrian / Cycle Bridge over the River Tolka will be undertaken along each bank of the river or temporarily from a floating pontoon across the river and thereafter a temporary scaffolding platform (installed and dismantled over two years between July 1 to September 30 as necessary). Otters 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 otters 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 likely 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 construction of the Proposed Scheme 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 sensor activated lighting will be used at Construction Compounds, and that the locations of proposed Construction Compounds are for the most part remote from any watercourses, (with the exception of the Construction Compound proposed near the Frank Flood Bridge), lighting during construction is not considered likely to result in any significant effect to otters in the vicinity.

Mitigation measures have been designed to minimise habitat severance during construction (see Sections 12.5.1.4.3.3 and 12.51.4.3.5).

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 under 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 marine mammals either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

During the Construction Phase of the proposed Pedestrian/ Cycle Bridge over the River Tolka, sediment may be released into the river and be transported downstream to the Tolka Estuary. Other works along the Proposed Scheme (e.g. works to existing pavements and road surfaces, and drainage works) also have the potential to generate silt and sediment, which could be released into the existing drainage network, or the Royal Canal, and transferred downstream to the Liffey Estuary Upper, Liffey Estuary Lower or coastal waters of Dublin Bay. 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), released into waterways may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on food supply for marine mammals.

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 as a result of effects on surface water quality during the Construction Phase 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 potential effect, and the availability of suitable habitat in Dublin Bay.

Mitigation measures have been designed to protect water quality during the Construction Phase (see Section 12.5.1.2.2).

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, hedgehog, pygmy shrew and Irish hare.

12.4.3.4.5.1 Habitat Loss

The construction of the Proposed Scheme will result in the permanent 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. pine marten, red squirrel, hedgehog, pygmy shrew, Irish hare), and the abundance of alternative suitable habitat available locally, the effects of habitat loss associated with Construction Phase 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 would be expected to be greater during the breeding season 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 they are highly mobile species, 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 the Construction Phase 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 likely 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 AA 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 is set out in the NIS and for the reasons detailed therein, it is 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 are provided in Section 12.4.3.2 and tabulated in Table 12.16 for all KER habitat types. These areas comprise a total area of approximately 1.64ha (including mosaics dominated by linear woodland vegetation) of hedgerows and treelines, approximately 0.42ha of mixed broadleaved woodland, approximately 0.001ha of mixed broadleaved / conifer woodland, approximately 0.43ha of immature woodland and approximately 0.2ha of scattered trees and parkland habitats (also KERs). In addition, there are areas of scrub, ornamental/non-native shrub, amenity grassland and dry meadows and grassy verges habitats (approximately 2.79ha in total area) within the footprint of the Proposed Scheme, which are not KERs in their own right due to their limited botanical value, however, may provide nesting and / or foraging habitat for birds. 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:

- Section of mixed broadleaved woodland (WD1) at Cloghran roundabout;
- Treeline (WL2) habitat at various locations along the Swords Road (R132);
- Hedgerow (WL1) habitat outside the Royal College of Surgeons in Ireland (RCSI) sports ground in Dardistown;
- Treeline (WL2) habitat at various locations along the Drumcondra Road Upper;
- Treeline (WL2) habitat at various locations along the Drumcondra Road Lower;
- Scrub (WS1) at the junction between the Swords Road and Collins Avenue;

- Scattered trees and parkland (WD5) at the junction between the Swords Road and Lorcan Road;
- Scattered trees and parkland (WD5) outside Santry Villas;
- Scattered trees and parkland (WD5) outside Morton Stadium;
- Small area of mixed broadleaved / conifer woodland (WD2) at the entrance to Furry Park Industrial Estate off the Swords Road;
- Dry meadows and grassy verges (GS2) outside Whitehall Colmcille GAA Club;
- Dry meadows and grassy verges (GS2) at various locations along the Swords Road (R132);
- Amenity grassland (GA2) at the north-east corner of Botanic Avenue near the Frank Flood Bridge to accommodate a proposed construction compound;
- Amenity grassland (GA2)(and pollinator-rich planting) at the north-east corner of the junction between Coolock Lane and Swords Road to accommodate a bus turning area ;
- Dry meadows and grassy verges (GS2) to the north-east of Stockhole Lane to accommodate a proposed construction compound; and
- Dry meadows and grassy verges (GS2) and immature woodland (WS2) habitat at the south-west corner of the Old Airport Road to accommodate a proposed construction compound.

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 many unquantifiable factors such future land use changes and whether the local habitat resource has currently reached 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.

The habitat areas that will be lost as a result of the Proposed Scheme form a 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 0.3-2km 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 the Ward River Valley Park; River Valley Park Swords; Forrest Little Golf Club; playing pitches such as Na Fianna GAA pitches, DCU playing pitches, Starlights GFC, and Whitehall Rangers pitches; Belcamp Park, Coolock Lane Park, Ellenfield Park, National Botanic Gardens, St. Stephens Green, Iveagh Gardens, Merrion Square and Mountjoy Square Park;
- Wildfowl and waterbird habitat within the Upper and Lower Liffey Estuary and wider Dublin Bay area such as the Tolka Estuary; and
- Sections of the Royal Canal and other watercourses crossed by the Proposed Scheme, 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. Kingfisher are a Birds Directive Annex I species and habitat suitability assessment surveys carried out in September 2020 recorded no evidence of any nest holes within 500m upstream or downstream of the proposed Pedestrian / Cycle Bridge along the Frank Flood Bridge over the River Tolka (i.e. the Frank Flood Bridge). The riverbanks were considered to be unsuitable for nesting kingfisher. Three individual kingfishers were observed along the River Tolka (by sight and sound) during these field surveys, between approximately 700m and 1.2km downstream of the Proposed Scheme. It is therefore likely that kingfisher forage and roost beyond 500m upstream and downstream of the Frank Flood Bridge. However, given the lack of suitable nesting habitat within the vicinity of the Frank Flood Bridge, Construction Phase works associated with the proposed pedestrian / cycle bridge at this location will not result in the loss of any breeding / resting sites for kingfisher. Works may result in the temporary loss of foraging habitat for local kingfisher, as a result of disturbance / displacement impacts associated with the proposed works (see disturbance / displacement section below for more details).

12.4.3.5.1.2 Mortality Risk

In the absence of mitigation measures, 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 (excluding the proposed Pedestrian / Cycle Bridge adjacent to the Frank Flood Bridge over the River Tolka), over what is likely to be a single breeding bird season in terms of completing site clearance works, will probably have a short-term effect on local breeding bird population abundance. If the Construction Phase for the proposed pedestrian / cycle-way bridge over the River Tolka 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 may result in a short-term impact on riparian bird species, assuming construction of the bridge occurs over only one breeding bird season. Given the lack of suitable nesting habitat for kingfisher within 500m upstream and downstream of the Frank Flood Bridge, the impact on this species is likely to be less than other riparia species.

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.

The presence of the temporary scaffold platform towards the late summer could provide as potential new barrier to Kingfisher and hatched young. However, Kingfisher are small, shy and agile species that navigate around impediments on their commuting / forage along their territorial waters. Hence the temporary installation of the scaffold platform is not predicted to provide a significant risk of mortality to the species, rather it may serve as a feeding perch (when no construction activity present) above the watercourse. In the short 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. No mortality of kingfisher as a result of the Proposed Scheme consequently, there will be no significant effect on the conservation status of any of the breeding bird species present within the study area at any geographic scale.

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. However, there is an existing relatively high level of human disturbance within the immediate environment of the Proposed Scheme (e.g. Swords Road (R132), Drumcondra Road Upper and Frank Flood Bridge) 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 Phase activities will have a less pronounced effect than blasting (which is not proposed), in terms of its ZoI, but will be on-going during the year and throughout bird breeding seasons. The Construction Phase of the Proposed Scheme will be completed on a phased basis, over a period of 12 months, although proposed Pedestrian/ Cycle Bridge over the Rive Tolka will be phased across two summer seasons, owing to restriction around instream works on the River Tolka. Areas within the Proposed Scheme, which will be subject to construction activities which generate noise levels greater than 50dB (e.g. piling, rock-breaking etc.), include structural works at Frank Flood Bridge (New pedestrian and cycle bridge and retaining walls). These activities will result in a greater magnitude of effect on the receiving environment, and the aquatic habitats downstream of the works and the riparian habitats along the River Tolka river corridor will be most susceptible to disturbance.

Construction works to the existing Frank Flood Bridge over the River Tolka will include:

- Reinstatement of the existing wrought iron parapets to a height of 1.4m;
- Demolition of the western and eastern parapets;
- Installation of new courses of limestone masonry using period appropriate mortar;
- Reconstruction of the parapets using the existing wrought iron balusters and granite copings/blocks; and

- Installation of Trief kerbs, resurfacing of carriageway and pavements.

To facilitate this initially a floating pontoon followed by the erection of a temporary scaffolding will be required under the newly installed pedestrian /cycle bridge to enable operatives finalise some of its construction. The presence of these temporary working platforms could undoubtedly temporarily impact kingfisher commuting up and downstream of the Proposed works area.

With regard to works associated with the construction of the proposed Pedestrian / Cycle Bridge, the following works will be required: scour protection to be provided at north-west riverbank; regrading of north-west bank, installation of 3 no. bored reinforced concrete piles, installation of two-span bridge structure, local excavations to the south bank to accommodate space for inspection and modification of existing river wall at north bank where it abuts the new support beam. It should be noted that piling here will be via auger method, and as such noise associated with this work is not expected to be significant. However, visual disturbance may still affect breeding birds in the vicinity (i.e. kingfisher, grey wagtail etc.) and such birds are likely to be temporarily displaced either upstream or downstream of the proposed works area. Given the suitability of habitat, particularly in downstream stretches of the River Tolka, the effect of disturbance / displacement on breeding birds at this location is not considered to be significant at any geographic scale.

Although it is not possible to quantify the magnitude of this potential impact (or the potential effect zone) it could potentially extend for several hundred metres from the Proposed Scheme. Given the temporary to short-term nature of the construction works, disturbance or displacement effects will also be over the short-term with suitable habitat available in the wider locality of the Proposed Scheme. As such, the construction works are not likely to affect the conservation status of affected breeding bird species and will not result in a likely significant negative effect, at any geographic scale.

12.4.3.5.1.4 Habitat Degradation – Surface Water Quality

As discussed in Section 12.4.3.2.2 under 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).

However, it is considered unlikely that a pollution event of such a magnitude would occur during the Construction Phase 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.

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 likely significant negative effect, at a local geographic scale.

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 the 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

No direct loss of winter bird feeding habitat is predicted as a result of the Proposed Scheme.

However, 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. Landscaping proposals include the removal of a number of mature trees along the boundary of Plunket College on Swords Road in Whitehall. This substantial treeline currently provides screening to the playing pitches at Plunket College, which is a known site of major importance for foraging light-bellied Brent geese in the winter months. The permanent removal of these trees will increase the visual and noise disturbance to foraging winter birds which use these pitches.

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.

None of the construction activities would be expected to result in any more than a moderate level of disturbance effect on wintering birds at distances beyond 300m. At 300m, 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.

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 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 Upper / Lower 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 Bay Area. Suitable sites are usually composed of open parkland / playing pitches. The following known inland wintering bird feeding sites are known to occur within approximately 300m of the Proposed Scheme, and birds at these locations could be temporarily displaced during construction works:

- Whitehall / Pairc Imearta (Plunket College) (major importance);
- All Hallows DCU Campus (unknown importance);
- Drumcondra / St. Patrick's College (high importance); and
- Drumcondra / Holy Cross College (high importance).

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. Therefore, in consideration of these factors, the loss of suitable foraging 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 likely significant negative effect, at any geographic scale.

12.4.3.5.2.2 Habitat Degradation – Surface Water Quality

As discussed in Section 12.4.3.2.2 under 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 wintering birds 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 construction.

Habitat degradation as a result of effects on surface water quality during construction has the potential to result in a likely 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 3 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 not return records for reptile species protected under the Wildlife Acts within the footprint of the Proposed Scheme or wider surrounding area. However, it cannot be ruled out that these species are not in the wider area.

12.4.3.6.1 Disturbance & Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of, common lizard. Given the 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 likely significant negative effect, at any geographic scale.

12.4.3.6.2 Habitat Severance / Barrier Effect

There is no potential for habitat severance / barrier effect as a result of the Proposed Scheme as there is no suitable habitat for reptile species within the footprint of the Proposed Scheme.

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. vegetated riverbanks, drainage ditches and an area of wet grassland). 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 likely 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 potentially 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 any local amphibian

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 likely significant negative effect to amphibians, at any geographic scale.

12.4.3.7.3 Habitat Degradation – Surface Water Quality

As discussed in Section 12.4.3.2.2 under 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 amphibians 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 construction.

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 likely significant negative effect, at a local geographic scale. Mitigation measures have been designed to protect against habitat degradation during construction (see Section 12.5.1.2).

12.4.3.8 Fish

12.4.3.8.1 Habitat loss / Fragmentation

The Proposed Scheme will result in the permanent loss of river habitat through the installation of scour protection along the north-western edge of the existing bridge. The river edges are already largely modified, and any loss of instream (edge) habitat within the River Tolka will be limited. The results of habitat suitability survey and assessments carried out in July 2022, notwithstanding the low water flows at that time , indicate that good salmonid habitat (salmon and trout) is present in the vicinity of the Frank Flood Bridge, over the River Tolka, in Drumcondra (Triturus Environmental Ltd 2022) (Appendix A12.2 in Volume 3 of the EIAR). Desk study records, as presented in Section 12.3.2 indicated that the River Tolka is known to support populations of Atlantic salmon and brown trout. Habitat loss fragmentation, as a result of construction, has the potential to result in a likely significant effect at the County level on salmonid species, given the important nursery function that the River Tolka provides for such species and their protection under both national and international legislation.

Surveys during July 2022, concluded that the river habitat in the vicinity of the Frank Flood Bridge, consisted of moderate habitat value for lamprey species (Triturus Environmental Ltd 2022). River lamprey are known to occur in the River Tolka, as outlined in the desk study, and suitable nursing habitat occurs upstream of the Proposed Scheme. Habitat loss and fragmentation, as a result of construction, has the potential to result in a likely significant effect at the County level on lamprey species, given the habitat value present and their protection under the Habitats Directive.

Good European eel habitat was present in the vicinity of the Frank Flood Bridge, over the River Tolka, according to the results of surveys conducted in July 2022 (Triturus 2022). The results of the desk study indicated that European eel is known to occur in the River Tolka and Tolka Estuary, and were recorded in the River Tolka as recently as 2017. Habitat loss, as a result of Construction, has the potential to result, despite the declining trend of eel in Irish waters in a likely significant effect above the local geographic scale.

There will also be temporary barrier effect though the installation of the scaffolding platform, with support legs, and installation of the floating pontoon but as this is a temporary requirement (estimated as small number of weeks, across two separate years) this is not considered to result in a likely significant effect at any scale.

12.4.3.8.2 Disturbance / Displacement

Instream works are required as part of the Proposed Scheme along the River Tolka adjacent to the Frank Flood Bridge, which could result in disturbance and or displacement impacts to fisheries. Fish can be sensitive to noise and vibration, and noisy construction activities in the water could cause avoidance reactions and possibly delay fish migration. The proposed works include the installation of a temporary scaffold platform, suspended from the

bridge, but with a number of supporting legs extending into the River Tolka. It is expected to be in place for a limited number of weeks and in a time period, as agreed with the IIF, that is outside the key spawning season. The presence of these posts is not predicted to significantly alter the river channel and as such fish will be able to pass. There have been very few studies on the effects of anthropogenic sounds on the behaviour of wild fish although the installation of the floating pontoon and thereafter the scaffold would be carried out over short duration. Thereafter, workers using the floating pontoon and scaffolding platform could generate noise and overshadow the river thus deterring fish commuting in that area. However, neither the floating pontoon nor the scaffold platform is not predicted to extend the full width of the river and as such fish passage would not be not significantly curtailed.

The emplacement of the scour protection will require that a peripheral part of the River Tolka be dammed so that the works can be safely carried out. As the water drains out / is over pumped from the required working area there will be some disturbance and reduction in potential fish passage. Disturbance / displacement during the Construction Phase is not predicted to affect the conservation status of the local non-migratory fish populations and therefore, will not result in a likely significant negative effect, at any geographic scale.

With regard to all fish species, the effects of habitat degradation as a result of effects on surface water quality during construction have the potential to result in a likely 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.

12.4.3.8.3 Direct Injury / Mortality

During the Construction Phase of the proposed Pedestrian / Cycle Bridge, alongside the Frank Flood Bridge, there will be an workers temporarily operating in stream (across two seasons). The risk of fish injury and mortality is considered extremely low given the nature of the works to prepare the damming and therefore fish will navigate away from areas of human disturbance. Therefore, it is not likely that the installation of the low temporary dam to facilitate the installation of the scour protection will result in pose a significant injury / mortality risk to fish species. Once installed both plant and protection will be done in the dry with no fish present.

During the erection of the temporary scaffold platform, there is a risk that fish may be hit, as the supporting upright poles are installed to make contact with the river bottom. Therefore, there is some albeit limited potential for the construction of scaffold to result in significant injury / mortality effects at an international geographic scale for Atlantic salmon, a national geographic scale for brown trout, lamprey species and European eel, and at a local geographic scale for all other fish species. Mitigation measures have been designed to reduce the risk of injury / mortality of fish (see Section 12.5.1).

12.4.3.8.4 Habitat Degradation – Surface Water Quality

As discussed in Section 12.4.3.2.2 under 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 fish species 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. 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 the Construction Phase.

Habitat degradation, as a result of effects on surface water quality during construction, has the potential to result in a likely significant effect at the County level on salmonid species, given the important nursery function that the River Tolka provides for such species and their protection under both national and international legislation.

Habitat degradation, as a result of effects on surface water quality during construction, has the potential to result in a likely significant effect at the County level on eel, given the presence of suitable habitat and declining trend of eel in Irish waters.

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 likely significant negative effect, at a local to County geographic scale, as described below.

With regard to all other fish species, the effects of habitat degradation as a result of effects on surface water quality during construction have the potential to result in a likely 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.

12.4.3.9 Invertebrates

There were no records of White-clawed crayfish from the desk study and this finding is supported by the results of aquatic surveys carried out by Triturus Environmental Ltd in July 2022 (See Appendix A12.2 in volume 3 of this EIAR), which also found no evidence of white-clawed crayfish in the vicinity of the Frank Flood Bridge over the River Tolka. As such White-clawed crayfish is not considered further in this assessment.

As indicated from the desk study, two red-listed freshwater molluscs, Mauge's shelled slug and moss chrysalis snail, are known to historically occur in the wider vicinity of the Proposed Scheme. However, as the records are historic in nature these species are not deemed to currently occur within the ZoI of the Proposed Scheme and therefore no impacts upon them are predicted.

12.4.3.10 Summary of Potential Construction Phase Impacts

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 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 geographic scale
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international 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 geographic scale
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international 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 geographic scale
Baldoyle Bay SPA / SAC Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international 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 geographic scale
Malahide Estuary SPA / SAC Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale
Ireland's Eye SPA / SAC 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

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
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 geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Dalkey Island SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
The Royal Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species, Air quality)	Likely significant effect at the national geographic scale
Santry Demesnes pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species, Air quality)	Likely significant effect at the national geographic scale
Sluice River Marsh pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species, Air quality)	Likely significant effect at the national geographic scale
Habitats (outside of designated areas for nature conservation)			
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
mixed broadleaved conifer woodland (WD2)	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
(Mixed) broadleaved woodland (WD1)	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
Depositing/lowland rivers (FW2)	County (River Tolka) to Local Importance (Higher Value)	Habitat loss degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the local geographic scale (River Tolka) to no significant effect at any geographic scale.
Canals (CW2)	National Importance	*See Royal Canal pNHA above*	*See Royal Canal pNHA above*
Drainage ditches	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Rare / Protected Plant Species			
Opposite-leaved Pondweed	National Importance	Habitat degradation (hydrology; disturbance/displacement)	Likely significant effect at the local to national geographic scale
Non-native Invasive Plant Species			
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

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Fauna Species			
Bats	Local Importance (Higher Value)	Roost Loss; 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; disturbance/displacement)	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
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Disturbance / displacement	Likely significant effect at the local geographic scale
SCI bird species	International Importance	*See SPAs above*	*See SPAs above*
Kingfisher (Non-SCI population	National Importance	Habitat degradation (hydrology; disturbance/displacement)	Likely significant effect at the local geographic scale
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)	Mortality risk; Disturbance / Displacement; 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
Annex fish species (Atlantic salmon, river lamprey)and European eel)	International to Natiioonal Importance	Habitat Degradation (hydrology)	Likely significant effect at the County geographic scale
All other fish species	Local Importance (Higher Value)	Habitat Degradation (hydrology)	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), which is included as a standalone document in the planning application.

Refer to Section 12.4.4.5.2 with regard 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 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 containments (e.g. fuel and oils) into receiving waters.

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 environment (i.e. Dublin Bay), within which a number of European sites are located. 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 QI habitat and / or species and 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, Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, Malahide Estuary SPA, Rogerstown Estuary SPA and The Murrough SPA are 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 the Operation Phase, also has the potential to affect mobile 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 Estuary SPA, Dalkey Islands SPA, The 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 within downstream 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 and QI populations.

12.4.4.1.1.3 Habitat Degradation as a result of Hydrogeological Impacts

Groundwater levels in groundwater dependent habitats may be impacted by the removal of a proportion of an aquifer or dewatering activities associated with excavations which can lead to a temporary change in groundwater levels and flow within the aquifer. Likewise, the mobilisation of contaminants into the aquifer either through accidental spillage or disturbance of contaminated ground during excavation may reduce the quality of the groundwater within the aquifer, also resulting in the degradation of groundwater dependent terrestrial ecosystem and any species that they may support.

As the Proposed Scheme has the potential to result in habitat degradation of the QI species / SCI supporting habitat of a European site as the result of hydrogeological impacts there is potential for in combination effects to occur in that regard.

12.4.4.1.1.4 Habitat Degradation as a result of Introducing / Spreading Non-native Invasive Species

There are 12 areas of Japanese knotweed, giant Hogweed and Himalayan balsam, a species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 present within, or in proximity to, the Proposed Scheme. In addition, records of invasive species in the vicinity of the Proposed Scheme were returned from the desk study. Therefore, there is potential for invasive species to spread or be introduced, during routine maintenance / management works, to terrestrial habitat areas in European sites downstream in Dublin Bay, Baldoyle Bay and Malahide Estuary. (i.e. North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SAC, Baldoyle Bay SPA, Malahide Estuary SAC and Malahide Estuary SPA). The introduction and / or spread of these invasive species to downstream European sites could potentially result in the degradation of existing habitats present, in particular coastal habitats not permanently or regularly inundated by seawater. These species may outcompete other native species present, negatively impacting the species composition, diversity and abundance and the physical structural integrity of the habitat. This in turn may result in the degradation of the existing habitats and therefore undermine the conservation objectives of these European sites. It is considered unlikely that invasive species could spread to European sites that are located a significant distance from the outfall locations of the watercourses that will be hydrologically connected to the Proposed Scheme (i.e. Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC, Dalkey Islands SPA Ireland's Eye SAC, Ireland's Eye SPA, Lambay Island SAC and Lambay Island SPA and The Murrough SPA).

12.4.4.1.1.5 Habitat Degradation as a result of Air Quality Impacts

A reduction in air quality within the immediate vicinity of the road, involving emissions from car exhausts, and the deposition of particulate matter and heavy metals produced by engine, brake and tyre wear during the Operational Phase, can contribute to increased deposition of pollutants such as oxides of nitrogen (NOx, NOs), volatile organic compounds (VOCs), particulate matter (PM), heavy metals (HM) and ammonia (NH4) 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 unmitigated ZoI for air quality effects arising from the Proposed Scheme has the potential to extend up to 200m the Proposed Scheme boundary during the Operational Phase. There are no European sites present within this distance.

12.4.4.1.1.6 Disturbance and Displacement Impacts

There are no European sites within the disturbance ZoI of the Proposed Scheme, but several QI species are known to occur within the vicinity of the Proposed Scheme. Refer to Section 12.4.3.4 and Section 12.4.3.8 for more details with regard to potential construction impacts on QI mammals and fish, respectively.

The potential for impacts on SCI bird populations for which SPAs are designated has been provided in the NIS. Refer to Section 12.4.3.5.2 with regard to potential impacts on wintering bird species, which encompass all relevant SCI bird species.

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 in Section 12.4.3.1.1, may also negatively affect National 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, Rockabill Island 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 12.8. 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 with the exception of Air Quality impacts to the Royal Canal pNHA. Potential impacts arising from the Proposed Scheme on the Royal Canal pNHA, Santry Demesne pNHA, and River Sluice pNHA could result in a likely significant negative effect at a national geographic scale in respect of air quality and surface water quality draining into the pNHA.

The assessment of potential impacts arising from the Proposed Scheme on the Royal Canal pNHA, Santry Demesne pNHA, and River Sluice pNHA include habitat degradation as a result of surface water quality and the spread of invasive species (see Section 12.4.5.2).

12.4.4.2 Habitats

12.4.4.2.1 Habitat Degradation – Surface Water Quality

There will be drainage outfalls during the Operational Phase of the Proposed Scheme. Surface water runoff from the Proposed Scheme could contain harmful compounds such as hydrocarbons, heavy metals and particulate matter, which would be derived from the internal combustion engines of vehicles using the route. These harmful compounds could affect the water quality of the waterbodies within the ZoI of the Proposed Scheme, as well as affecting aquatic flora and fauna located therein.

Where there is an increase in impermeable surface area, the drainage design principles ensure that there will be no net increase in the surface water flow discharged to these receptors (See Chapter 4 (Proposed Scheme Description) for more detail on drainage design). There is also risk of pluvial flooding along the entire Swords Scheme. This is a function of the capacity of the existing surface water network, which is typically designed to contain a 20% AEP storm.

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the ZoI of the Proposed Scheme include the Ward River, River Sluice, Cuckoo Stream, River Mayne, River Santry, River Tolka and River Liffey.

For the Proposed Scheme, there will be a net increase of 21,860m^2 in the overall impermeable area ultimately discharging to Dublin Bay. This increase in impermeable area will be being managed for the Proposed Scheme through a combination of attenuation tanks (and ponds) swales and oversized pipes, filter drains and 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 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. These SuDS measures allow a level of treatment and / or attenuation to be provided before discharge to the network, reducing the impact on water quality as well as preventing an increase in runoff rates. 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.

In respect of the traffic modelling, several areas were identified to result in AADT >10,000 as per Section 13.4.5.3 of Chapter 13 (Water). However, all were deemed not significant in terms of impacts on habitats and supporting biodiversity features.

In respect of the WFD assessment, taking into consideration the anticipated impacts of the Proposed Scheme on the biological, physico-chemical and hydromorphological quality elements, following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving Good Ecological Status (GES) or cause a deterioration of the overall Good Ecological Potential (GEP) of any of the water bodies that are in scope as per Section 13.6.2 in Chapter 13 (Water). Therefore, the Proposed Scheme does not require assessment under Article 4.7.

During Operation, water runoff from the Proposed Scheme will discharge to the existing surface water drainage network. SuDS), including grass surface water channels, swales and bio-retention areas / rain gardens, filter drains, tree pits and oversized pipes are proposed in suitable locations along the Proposed Scheme (e.g., in the central median and along road verges). The inclusion of these SuDS systems 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 effects of habitat degradation as a result of impacts to surface water quality are not considered to be significant at any geographic scale. The Proposed Scheme will not exacerbate the existing surface water quality conditions. It will, in fact, result in a beneficial imperceptible impact on surface water quality in receiving water bodies due to the inclusion of SuDS, where appropriate. SuDS measures will reduce the volume of surface water runoff and concentrations of harmful compounds, such as hydrocarbons, heavy metals and particulate matter that would be derived from the internal combustion engines of vehicles using the route, being discharged into receiving waterbodies. Furthermore, it is anticipated that there will be a small beneficial impact on discharges to receptors due to the predicted traffic reduction and treatment of runoff. This impact will be permanent; however, the predicted reduction in car use is small (less than 1.0% modal shift). As such, the impact would be beneficial, long-term and imperceptible (See Chapter 13 (Water) for more details). Habitat degradation, as a consequence of operational effects on surface water quality, is therefore not likely to be significant at any geographic 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 likely 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 – Groundwater

The Operational Phase has the potential to result in occasional accidental leakage of oil, petrol or diesel, allowing contamination of the surrounding environment still be the potential for accidental spillages as with the Do Nothing scenario, there the magnitude of the impact in negligible. However, in respect of Nationally designated sites, the significance of the potential impact is considered imperceptible.

12.4.4.2.4 Habitat Degradation- Non-native Invasive Plant Species

There were 12 areas of invasive plant species, as listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, identified within the Proposed Scheme during the field surveys (See Table 12.10). 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) have the potential to result in a significant negative effect, at geographic scales ranging from local to international.

12.4.4.2.5 Habitat Degradation- Air Quality

As discussed in Section 7.4.2.1 of Chapter 7 (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 form the Proposed Scheme (refer to Chapter 7 (Air Quality) for details). The results from the air quality modelling deem the Proposed Scheme would be neutral overall in the study area. Therefore, there will be no significant negative effect on habitats due to deterioration in air quality, at any geographic scale.

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 2022 were recorded within the Proposed Scheme during field surveys undertaken, however, the desk study returned historical records for a number of species including opposite-leaved pondweed within the Royal Canal. 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 Royal Canal and affect populations of opposite-leaved pondweed which they are present in the vicinity of the Proposed Scheme.

Operational impacts on the terrestrial species can be excluded as they are not located within the footprint of the Proposed Scheme, or immediately adjacent to it. Therefore, it can be concluded that there is no potential for the operation of the Proposed Scheme to result in any significant effects on rare and protected plant species. In the absence of mitigation, habitat degradation of the Royal Canal as a consequence of operational effects on surface water is likely to be significant at the national level.

As discussed in Section 12.4.3.2.2 under Habitat Degradation – Surface Water Quality, 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 rare and protected plan species 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 proposed road drainage system incorporates a variety of drainage measures including, kerb and gully drainage, carrier drains, tree pits, sealed pipes, swales / carrier drains, filter drains, attenuation areas and pollution control as required in accordance with TII design standards. Pollution Control will be achieved during the conveyance of the road runoff to the attenuation features along the gullies and pipes to grassed swales / carrier drains and filter drains where the drainage is allowed filter through the vegetation and filter medium. The attenuation ponds will include a forebay and oil / petrol interceptor at each outfall location. Any section of drainage where there are no swales or filter drains will also have an oil / petrol interceptor installed at the outfall. The oil / petrol interceptors will be designed as per DMRB HD 33/15 (TII 2015b) and CIRIA 142 (CIRIA 1994). A minimum class 2 bypass interceptor will be installed where required. Where there is treatment by filtration in a swale, tree pit or filter drain an oil / petrol interceptor will not be required. Details of SuDS measures are described in Chapter 4 (Proposed Scheme Description).

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the ZoI of the Proposed Scheme include the Ward_040 (Swords Glebe); Sluice_010 (River Sluice); Mayne_10 (River Mayne); Mayne_010 (Cuckoo Stream); Santry_010 (River Santry); Tolka_060 (River Tolka); Tolka Estuary; Royal Canal (Royal Canal Main Line (Liffey and Dublin Bay)); and Liffey Estuary Upper 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 Mammals

12.4.4.4.1 Bats

12.4.4.4.1.1 Indirect Disturbance of Flight Patterns Due to Operational Lighting

Bat activity was recorded at all locations surveyed. 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 / or abandoning nearby roosts. Given the urban 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 along existing road networks are not considered to be significant at any geographic scale. This is because the lighting strategy involves the use and upgrade of 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 for the majority of the Proposed Scheme is therefore not considered to be significant at any geographic scale.

The exception to this is the area of the River Tolka to the south of St. Mobhi Drive. At this location, additional lighting is proposed along the amenity grassland area to the south of St. Mobhi Drive, with proposed lighting located closer to the River Tolka than existing lighting, which is located along the road itself. The additional lighting here could result in displacement effects on bats foraging along the river corridor through light spill. This impact would be considered significant at the local level only, given the discrete location over which effects in local bats would be felt.

12.4.4.4.2 Badger

Evidence of badger was recorded in four locations adjacent to but outside of the Proposed Scheme, including latrines along the banks of the River Tolka. Furthermore, based on the results of the desk study, badger are known to occur within the wider vicinity and therefore impacts on this species cannot be excluded and are discussed below.

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 its 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 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, there is some need for additional new lighting or relocation of existing lighting to be installed as part of the Proposed Scheme, which will result in the introduction of artificial lighting to previously unlit areas at an amenity grassland area to the south of St. Mobhi Drive, close to the River Tolka. 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 network or at residential properties. There are no badger setts, or areas of high badger activity, within or in beyond the Proposed Scheme boundary that are located within the modelled light spill zone for the Proposed Scheme.

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

12.4.4.4.3 Otter

Evidence of otter, consisting of a regular otter spraint site, was identified during the aquatic surveys. This otter spraint site was located on the bridge apron of the Frank Flood Bridge, on the downstream side (south bank). The presence of this regular spraint site indicates that otter frequent the vicinity of the Frank Flood Bridge. Furthermore, based on the results of the desk study, otters are known to occur within the vicinity of the Proposed Scheme, with records from the following locations existing; Ward River in Swords; River Tolka at Griffith Park; along the Royal Canal; River Santry within Santry Demesne; and Mayne River at Stockhole Lane. The River Tolka is also known to support a local otter population. Therefore, impacts on this species cannot be excluded.

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 across the landscape and the Proposed Scheme will neither exacerbate nor improve the barrier effect already in existence. The proposed Pedestrian / Cycle Bridge adjacent to the Frank Flood Bridge over the River Tolka is the only proposed additional infrastructure relevant to otter, given its location on the River Tolka. This proposed clear-span bridge, during Operation, will not result in habitat severance or a barrier effect to populations of local otter, which will still be able to utilise the aquatic environs surrounding the bridge for commuting and foraging purposes. 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

The provision of the proposed Pedestrian / Cycle Bridge adjacent to the Frank Flood Bridge is likely to result in increased human presence in this area of the River Tolka. However, populations of otter associated with the River Tolka in the vicinity of the Proposed Scheme are likely to be habituated to certain degree of human disturbance. Therefore, it is considered that there may be temporary significant effects on otter at a local scale, until such a time that they have habituated to the increased levels of human disturbance.

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 corridor, 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. Previously unlit areas, which will be artificially lit as a result of the Proposed Scheme including an amenity grassland area to the south of St. Mobhi Drive, close to the River Tolka and the proposed Rive Tolka Pedestrian / Cycle Bridge. It is considered that there may be temporary significant effects on otter at a local scale, until such a time that they have habituated to the new levels of artificial lighting.

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

12.4.4.4.3.3 Habitat and Food Source 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 waterbodies. 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).

These harmful compounds could be transferred to waterbodies that support populations of otter such as the River Tolka, the Royal Canal and the Liffey Estuary Lower. This could affect water quality in these areas and therefore have a negative effect on otter as a result of direct contact with pollutants or a reduction in food supply.

In respect of the traffic model and WFD assessment please refer to the summary in Section 12.4.4.2.1 of this EIAR Chapter.

Habitat degradation as a consequence of Operational effects on surface water is therefore, likely to be significant at the local geographic scale level.

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 its Operational Phase. This is because the Proposed Scheme is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The proposed Pedestrian / Cycle Bridge adjacent to the Frank Flood Bridge is the only proposed additional infrastructure relevant to otter, given its location on the River Tolka. This Bridge may be accessible to otter however, as it is a Proposed Pedestrian / Cycle Bridge crossing point there is a negligible mortality risk associated with it. The Operation of 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 Impacts & Prey Abundance

As discussed in Section 12.4.3.2.2, 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 result of effects on surface water quality during operation has the potential to affect the conservation status of marine mammals 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 impact, the availability of suitable habitat for marine mammals in the wider vicinity and the relative abundance of marine mammals across the wider environment, as demonstrated in the results of the desk study.

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 desk study, other protected terrestrial mammals (See Section 12.3.8.5) are known to occur within the wider vicinity and therefore impacts on these species cannot be excluded.

12.4.4.4.5.1 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 mammals is not considered to be significant at any geographic scale. The existing infrastructure itself 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 all of the Proposed Scheme Corridor; 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. Previously unlit areas, which will be artificially lit as a result of the Proposed Scheme include an amenity grassland area to the south of St. Mobhi Drive, close to the River Tolka at the proposed Pedestrian /Cycle Bridge. It is considered that there may be temporary significant effects on mammals at a local scale, until such a time that they have habituated to the new levels of artificial lighting.

The lighting design of the Proposed Scheme controls light emission 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, it will not affect the species conservation status in that regard and will not result in a likely 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 may 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 mating 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 are 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.

Disturbance effects on breeding birds will most likely be of greater impact at the River Tolka in Drumcondra, than along the remainder of the Proposed Scheme. The provision of the proposed Pedestrian / Cycle Bridge adjacent to the Frank Flood Bridge is likely to result in increased human presence in this area of the river. This is likely to result in the displacement of nesting riparian birds from the area immediately surrounding the proposed Pedestrian / Cycle Bridge. The area of increased disturbance forms a relatively small part of larger expanses of similar habitat along the River Tolka. It is therefore considered that there may be temporary significant effects on breeding riparian 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 likely significant negative effect, at any geographic scale.

12.4.4.5.1.2 Habitat Degradation - Surface Water

As discussed in Section 12.4.3.2.2, 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 quality during operation has the potential to affect the conservation status of breeding birds 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 impact, the availability of suitable habitat for breeding birds in the wider vicinity and the relative abundance of breeding birds across the wider environment, as demonstrated in the results of the desk study.

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). A full assessment is provided in the NIS which accompanies the planning application.

12.4.4.5.2.1 Disturbance / Displacement

During Operation, the Proposed Scheme has the potential to disturb and displace wintering bird species from habitat near the Proposed Scheme boundary due to an increase in noise, human activity and visual disturbance associated with increased human presence and increased bus flow. Although the extent of area affected by operational disturbance / displacement effect cannot be quantified with precision it is be 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 are 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 habitats immediately adjacent to the Proposed Scheme. No known winter bird feeding sites occur within the footprint of the Proposed Scheme, although one known feeding site (i.e. Plunket College) occurs immediately adjacent to it. The amenity grassland in Plunket College is utilised by foraging winter birds and is a known inland feeding site of major importance for winter populations of light-bellied Brent geese. As any Operational Phase noise increases are not likely to alter the existing baseline noise effect on wintering birds in the locality, noise disturbance at this known feeding site can also be excluded.

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

12.4.4.5.2.2 Habitat Degradation – Surface Water

As discussed in Section 12.4.3.2.2, 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).

The drainage design for the Proposed Scheme incorporates pollution control measures in areas where the impermeable surface area is being increased (e.g. oversized piper, bioretention areas and tree pits). 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, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

In respect of the traffic model and WFD assessment please refer to the summary in Section 12.4.4.2.1 of this EIAR Chapter.

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of wintering birds 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 impact, the availability of suitable habitat for wintering birds in the wider vicinity and the relative abundance of wintering birds across the wider environment, as demonstrated in the results of the desk study.

12.4.4.6 Reptiles

No evidence of any protected reptile species, such as common lizard, was identified along the Proposed Schemed during surveys undertaken. Some suitable breeding and hibernating habitat for common lizard was identified within the study area, however, and therefore impacts on this protected species cannot be excluded.

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, drainage ditches and constructed wetlands 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 its 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 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 Section12.4.3.2.2, 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).

The drainage design for the Proposed Scheme incorporates pollution control measures in areas where the impermeable surface area is being increased (e.g. oversized piper, bioretention areas and tree pits). 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, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

In respect of the traffic model and WFD assessment please refer to the summary in Section 12.4.4.2.1 of this EIAR Chapter

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 likely 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 amphibians in the wider vicinity and the relative abundance of amphibians across the wider environment, 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 12.4.3.2.2, 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 (all within the Grand Canal) 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 (e.g. oversized piper, bioretention areas and tree pits). 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, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

In respect of the traffic model and WFD assessment please refer to the summary in Section 12.4.4.2.1 of this EIAR Chapter.

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of fish species and result in a likely significant negative effect, at a Local to County geographic scale. This is in consideration of the temporary nature and scale of the potential impact.

12.4.4.8.2 Habitat Severance / Barrier Effect

The proposed Pedestrian/ Cycle bridge over the River Tolka has been designed in consultation with IFI and the design criteria set out in Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (National Roads Authority 2008d) and the Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016). The proposed Pedestrian / Cycle Bridge is clear-span in nature and will not require any in-stream works. This will maintain fish passage during the operation of the Proposed Scheme and therefore, will result in a neutral impact to fish species.

12.4.4.9 Invertebrates

As revealed in the desk study, two red-listed freshwater molluscs, Mauge's shelled slug and moss chrysalis snail, are known to historically occur in the wider vicinity of the Proposed Scheme. However, as these records are historic in nature, these species are not deemed to be in the ZoI of the Proposed Scheme. Therefore, no impacts are predicted.

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)	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	No significant residual effect
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
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)	No significant residual effect
Baldoyle Bay SPA / SAC Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	No significant residual effect
Malahide Estuary SPA /SAC Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Ireland's Eye SPA / SAC Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Dalkey Island SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
The Royal Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Santry Demesne pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species, air quality)	Likely significant residual effect at the national geographic scale in respect of Air Quality. No significant residual effect for all other
Sluice River Marsh pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	No significant residual effect
Habitats (outside of designated areas for nature conservation)			
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
mixed broadleaved conifer woodland (WD2)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	No significant residual effect
Depositing/lowland rivers (FW2)	County (River Tolka) to Local Importance (Higher Value)	Habitat loss degradation (hydrology; air quality; non-native invasive plant species)	No significant residual effect
Canals (CW2)	National Importance	*See Royal Canal pNHA above*	*See Royal Canal pNHA above*
Drainage ditches	Local Importance (Higher Value)	Habitat loss	No significant residual effect
Rare / Protected Plant Species			
Opposite-leaved Pondweed	National Importance	Habitat degradation (hydrology; disturbance/displacement)	Likely significant effect at the local to national geographic scale
Non-native Invasive Plant Species			
Non-native invasive plant species	N/A	Spread at expense of other Habitats, Habitat Degradation (hydrology)	No significant residual effect
Fauna Species			
Bats	Local Importance (Higher Value)	Disturbance / displacement	Likely significant effect at the local geographic scale
Otter	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Marine mammals	National 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*
Kingfisher (Non-SCI population	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	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
Annex fish species (Atlantic salmon, river lamprey)and European eel)	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the County geographic scale
All other fish species	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Freshwater molluscs	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national 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 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; and
- Measures to prevent the spread of non-native invasive species to downstream European sites.

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 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 pNHAs and NHAs 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.

In respect of the Royal Canal pNHA, Sluice River Marsh pNHA, and Santry Demesne pNHA, which are not aligned with any European site, the mitigation strategy in relation to potential impacts includes habitat degradation as a result of surface water quality effects and the spread of invasive species (See Section 12.5.1.2), effects on rare and protected plant species (See Section 12.5.1.3), and negative effects on the protected fauna species with these sites (See Sections 12.5.1.4 and 12.5.1.5).

12.5.1.2 Habitats

12.5.1.2.1 Habitat Loss & Fragmentation

Where practicable, areas of vegetation, including habitats of Local Importance (Higher Value), such as mixed broadleaved woodland, mixed broadleaved conifer woodland, scattered trees and parkland, immature woodland, treeline and hedgerow habitat types) which lie within the footprint, or along the boundary of the Proposed Scheme, will be retained. 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 (BCIDB-JAC-ENV-LA-0002_XX-DR-LL-9001.pdf) 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 the loss of habitat, proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor. This planting is listed below and displayed on the Landscaping General Arrangement drawings BCIDB-JAC-ENV-LA-0002_XX-DR-LL-9001.pdf in Volume 3 of this EIAR.

- 91 street trees will be planted;
- 1,160m^2 woodland trees will be planted;

- 758m of proposed hedgerow;
- 14479m^2 of proposed species rich grassland;
- 1789m^2 of proposed ornamental planting;
- 1159m^2 of proposed native planting; and
- 31,460m^2 of proposed amenity grass planting.

In addition, the local authority has recently replanted new trees along unaffected areas along Drumcondra Road Lower.

The partial loss of a local authority pollinator-rich strip within a GA2-dominated verge at the intersection of Coolock Lane and the R132 Swords Road, which will be reinstated with species rich grassland in the area not being constructed as a Bus terminus.

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 Appendix A5.1 CEMP, 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.

Scheme Specific Measures which the appointed contractor will implement in relation to surface water quality at the following locations, namely the Construction Compounds and in the vicinity Frank Flood Bridge, which is sensitive owing to its crossing of the River Tolka (and downstream connectivity with coastal European sites). The following measures, as detailed in Chapter 13 (Water) have been identified to minimise and avoid impacts to these areas:

<u>Construction Compounds</u>

- In respect of Construction Compounds SW1, SW2 and SW3, the appointed contractor will ensure that site fencing will include a silt fence for the perimeter of the site to prevent overland flows. Surface water drains at access points will be covered by the appointed contractor;
- In respect of Construction Compound SW4, the appointed contractor will ensure that the surface water drain on Collins Avenue at the entrance to Construction Compound SW4 will be covered; and.
- In respect of Construction Compound SW5, the measures detailed below for the Frank Flood Bridge will be applicable. Fuel will be stored as far from the water body as is reasonably practicable within the site and be on an impervious base. Where any spillages of oil onto permeable ground occur, the appointed contractor will ensure that any contaminated ground will be removed and disposed of off-site by a licensed carrier.

<u>Frank Flood Bridge</u>

A temporary platform / pontoon will be erected within the river channel to facilitate construction. The platform / pontoon will be located immediately upstream of the existing bridge. To ensure no increased in flood risk, the following mitigation measures will be put in place:

- Works will be undertaken from 1st July to 30th September when flows are expected to be at their lowest. This restriction also aligns with ecological restrictions on the works due to Salmon and Kingfisher habitats; and
- The platform (which will be required for two seasons between 1st July and 30th September) will be designed so that it can be removed from the channel at short notice in the event of prolonged heavy rainfall or a flood warning. .

Historical records from the existing gauging station at Drumcondra (ref 9019) will be reviewed to identify potential rate of change of flows in the river to inform the design of the Pontoon and the methods required to remove it in the event of a flood.

Bridge abutments will be installed from the north and south banks of the water body and from the pontoon. Specific measures to protect the water body will be implemented as follows:

- Diversion away from working areas using sandbags (or similar) of flow into the middle and northern or southern channel of the existing bridge (depending on which bank is being worked on), allowing a dry space within which works can be carried out on the embankment.
- Install a silt fence across the northern or southern channel to ensure no silty water runoff downstream in the event of rain.

In-channel and riverbank working general principles will apply:

- All necessary consents will be obtained from the environmental regulator (such as Inland Fisheries Ireland (IFI), Office of Public Works (OPW) or the local authority) as appropriate. Bank stabilisation and erosion protection will be designed in consultation with the FI), OPW and NPWS;
- All construction machinery operating within proximity to any water body will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be cleaned and checked prior to commencement of works;
- The area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of the structure;
- Any dewatering flows will be directed to the settlement pond (or other) treatment system;
- Any banks affected during construction works near a watercourse will be reinstated back to pre-development conditions as far as practicable, recognising the re-profiling of the banks in this location;
- Any bank-side clearance in the immediate area of the crossing will be kept to a minimum and adequate measures will be put in place to control or minimise the risk of siltation. This may include such measures as:
    - bunding and diversion of site runoff to settlement ponds,
    - stripping of topsoil. See Soils in A Guide to Landscape Treatments for National Road Schemes in Ireland (National Roads Authority 2005), and where necessary, surfacing of site with granular material; and
    - covering of temporary stockpiles.

Concrete Piling

Monitoring of the alkalinity of water downstream by testing the PH levels will be implemented concurrently to the works to check for impacts of concrete 'washout' or spills.

For the Horizontal Directional Drilling (HDD) under the Tolka_060 to install three ducts for the diversion of services:

- A drilling Slurry Management Plan will be implemented by the Appointed Contractor and all additives proposed will be biodegradable, chemically inert and non-hazardous to aquatic life;
- A slurry recirculation unit will be utilised, and careful monitoring and management of such a unit can determine if any loss of slurry volume is experiences during the works; and
- The Slurry Management Plan will include an Incident Response Plan to be implemented in the event of a loss of drilling fluids.

For the diversion of ESB oil-filled cables:

The section of existing oil filled cables along the length of the proposed HDD duct installation will be cut at each end, capped and left as redundant cables in situ by ESB following commissioning of the replacement cables (in consultation with the NTA and the appointed Contractor). New electrical cables will be installed in the new ducts beneath the river between two joint bays and transition joints used to join the oil filled cables to the new electrical cables. A new standalone oil line will be installed in the duct with the new electrical cables to allow the oil to continue to perform its function in cooling the remaining existing oil filled cables at either side of the new river crossing. The ducting installed by HDD will be continuous welded HDPE which provides protection to the water body should any leak arise.

For the existing cables either side of the water body, a ground investigation, where construction works are to take place near to the ESB oil-filled cables will be carried out prior to construction commencing. Following this appropriate mitigation measures will be confirmed and deployed, which could for example result in the removal of all contaminated material from site as outlined in Chapter 14 (Land, Soils, Geology & Hydrogeology). Any hazardous material to be removed from site will be removed in accordance with measures detailed in Chapter 18 (Waste & Resources).

12.5.1.2.3 Habitat Degradation – Hydrological Regime

With the exception of the temporary installation of the scaffold platform to enable works to be undertaken on the newly installed Frank Flood bridge structure and the installation of the scour protection, no direct instream works are proposed. Any impacts to habitat degradation due to changes in hydrological regime of the River Tolka, would be temporary in nature (estimated at approximately 3 months in respect of all in-stream works, across two years) and imperceptible during the Construction Phase of the Proposed Scheme. Thus, apart from the timing of works that is required along the River Tolka, no additional mitigation is proposed other than good site practices including those detailed in Chapter 14 (Land, Soils, Geology & Hydrogeology) and as outlined in CEMP, Appendix A5.1 in Volume 4 of this EIAR.

12.5.1.2.4 Habitat Degradation – Groundwater

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

- Good construction management practices as outlined in the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams *et al.* 2001) will be employed by the appointed contractor to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater. The construction management of the site will take account of these recommendations to minimise as far as possible the risk of soil, groundwater and surface water contamination.;
- 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 shall be considered in the design of all Construction Compounds. 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;
- All concrete mixing and batching activities will be located in areas away from watercourses and drains;
- 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 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 Section 14.5.1 in Chapter 14 (Land, Soils, Geology & Hydrogeology) and Appendix A5.1 CEMP in Volume 4 of this EIAR. This includes control measures for the loss or damage of topsoil, and the pollution of soil and groundwater.

12.5.1.2.5 Habitat Degradation – Air Quality

The mitigation measures relating to the containment of dust emissions during construction are outlined in Section 7.5.1 of 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 the Construction Compound, water misting / spraying, vehicle coverings, and hoarding (2.4m in height) around the Construction Compounds and noise sensitive receptors.

12.5.1.2.6 Habitat Degradation – Non-Native Invasive Plant Species

The NTA will ensure that a confirmatory pre-construction invasive species survey will be undertaken by a suitably qualified specialist to confirm the absence and/or extent of all Third Schedule invasive species within the footprint of the Proposed Scheme. Where an infestation is confirmed / identified within he footprint of the Proposed Scheme, this will require the implementation of an Non-Native Invasive Species Management Plan (ISMP) (refer to the Plan contained in Appendix A5.1 - CEMP 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 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, will include calculations of volumes of infested soils to be excavated.
- The ISMP will be finalised 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; and standard, (TII 2020a; 2020b) and other species-specific guidance documents including those listed in the ISMP, as necessary; and
- 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 Proposed Scheme non-native ISMP

12.5.1.3 Rare and Protected Plant Species

No protected plant species listed on the Flora (Protection) Order 2022, were recorded during the field surveys within or in close proximity to the Proposed Scheme. Therefore. no species-specific mitigation is proposed.

Nonetheless, as a precautionary general measures in respect of opposite-leaved pondweed known to be present in the Royal Canal, the mitigation measures relating to the protection of water quality in receiving watercourses during construction will be applied by the appointed contractor (see Section 12.5.1.3.1).

12.5.1.3.1 Habitat Degradation- Surface Water Quality

In terms of general mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in Appendix A5.1 – CEMP 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 Protection of Bats during Vegetation Clearance

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

- Wildlife Acts;
- 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. 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.

While no active roosts were identified during the multidisciplinary surveys within the footprint of the Proposed Scheme there were 12 no. trees identified within the multidisciplinary surveys from within the Proposed Scheme footprint (permanent and temporary landtake) with potential roost features (PRFs) (see Figure 12.8.2. in Volume 3 of this EIAR). 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:

- Retained trees with PRFs will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches, or root system of the tree which could disturb roosting bats. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist;
- Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it;
- The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) or concrete washout areas will not be undertaken within 10m of any retained trees, hedgerows and treelines;
- A qualified arborist engaged by the appointed contractor will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Scheme footprint but whose RPA is impacted by the works;
- Where works are required within the RPA, 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) will be implemented; and
- There will be no additional lighting within 5m of the PRF 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, twelve number of trees with Potential Roost Features (PRFs) will be removed during the Construction Phase, however 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.

PRF Re-appraisal (First Step of Pre-Construction 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 PRFs by a suitably qualified ecologist engaged by the NTA as part of the preconstruction surveys. The survey will:

- Confirm that previously identified PRF's 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 PRF in the intervening period between the original surveys and grant of planning.

Preconstruction Survey

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

- In advance of any clearance all trees deemed to be PRF which are subject to felling / clearance will be checked for the presence of bats by a suitably qualified / licensed 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 NPWS 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 licensed 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 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 and in public spaces managed by the local authority as close as possible to areas of the PRF 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 3m to 5m and firmly fixed to the 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 >3.5m;
- There will be a 1m clearance (e.g. no overhanging branches or ivy encroachment near the installed box) around each bat box opening; and
- Installed bat boxes will be labelled and data (reference number, GPS location and photographic record) will be supplied to Bat Conservation Ireland (BCI), the Local Authority Biodiversity Officer and the NPWS.

12.5.1.4.1.3 Protection of Bats during Demolition of Collinstown Industrial Buildings and cottages at RCSI Sport Grounds

In addition to the measures outlined above, the following are in respect of the removal of the structures which have been identified as being potentially suitable to support roosting bats:

Owing to the fact that the internal areas of these structures could not be surveyed, bats could occupy suitable roosting features at any time prior to the commencement of works. Therefore, there is an inherent risk that bats could be affected by the proposed demolition works. The following mitigation procedures will be followed:

- The existing commercial property at Collinstown Industrial Estate and the two cottages at the roadside boundary of the RCSI Sports Grounds will be re-surveyed prior to demolition to ensure there are no potential for roosting bats present. The appointed contractor will ensure a suitably qualified and experienced ecologist will carry out internal (for which safe access must be arranged) and external inspections of the building as well as a minimum of one bat emergence survey and one bat re-entry survey during the active bat season (generally taken as mid-April-mid-September inclusive); and
- Where a bat roost is encountered in the cottages, all works on the structure and in the immediate vicinity of the roost will cease and an application for a derogation licence must be submitted by the suitably qualified/ licensed bat specialist for the removal of the roost.

12.5.1.4.1.4 Habitat Loss & Fragmentation

Where practicable, habitats of importance to bats such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, will be retained. These areas will be protected for the duration of the construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on the Landscaping General Arrangement drawings (BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001) 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 Landscape General Arrangement drawings (BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

- 91 street trees planted; and
- 758m of proposed hedgerow.

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.

12.5.1.4.1.5 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 / peri-urban 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 Compound 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 Compound 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 practicable, due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- column heights to be considered to minimise light spill; and
- accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed.

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 out adjacent to watercourses e.g. the River Tolka with known bat activity).

12.5.1.4.2 Badgers

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 Disturbance / Displacement

Although there were no signs of badger recorded during field surveys from within the Proposed Scheme footprint, there was evidence of badger activity east of the Frank Flood Bridge and 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 Guideline for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2005b).

12.5.1.4.2.2 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, all 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.

12.5.1.4.2.3 Lighting

Refer to Section 12.5.1.4.1.5 for lighting mitigation measures.

12.5.1.4.3 Otter

Otters are listed on Annex II and Annex IV of the EU Habitats Directive. Otters 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). In particular, otters are known to occur along the River Tolka, in the vicinity of the Proposed Scheme and there was evidence of activity up and downstream of the Frank Flood bridge. Given the ecological sensitivity of the River Tolka in particular;

- The appointed contractor will engage a suitably qualified and/or licensed ecologist(s) to oversee and advise works at watercourse crossings;
- Where a new or reactivated holt is encountered, within 150 metres (up and downstream) of the watercourse crossing, the qualified ecologist(s) will consult with the NPWS in conjunction with the NTA and appointed contractor;
- The qualified ecologist will review method statements, oversee works, provide advice to the appointed contractor(s), deliver toolbox talks and temporarily halt works, if, and as, necessary, having conferred with the NTA;
- To protect otters 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; and

- Fencing requirements as per the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006c) will be erected around the Construction Compound and other working areas which are in close proximity to significant watercourses and have suitable roaming territory for otter Where mammal-proof fencing cannot for practical reasons be installed to delineates the works area from the riparian zone, the use of physical hoarding 2.4m tall (as specified in the Appendix A5.1 CEMP in Volume 3 of the EIAR) is acceptable given the proposed working time and duration of the works.

12.5.1.4.3.1 Loss of Breeding / Resting Sites

Although there were no signs of otter habitation recorded during field surveys, otter could potentially establish new holt or couch sites within the ZoI of the Proposed Scheme. The NTA will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed within 12-month period prior to any construction works commencing.

As instream works are proposed for the River Tolka across two years (within the previously approved Inland Fisheries Ireland timeframe of July to September) an additional preconstruction survey will be required prior to the temporary re-installation of the scaffold and floating pontoon to enable finalising the installation of the Pedestrian / Cycle Bridge on the River Tolka.

Any new holt / couch sites identified 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 Measures to Prevent Injury / Mortality Impacts

As detailed above in Section 12.5.1.4.3, 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).

To protect otters 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.

Fencing requirements as per the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2006b) will be erected around the Construction Compound, in particular Construction Compound SW5 and other working areas which are in close proximity to significant watercourses and have suitable roaming territory for otter. Where mammal-proof fencing cannot for practical reasons be installed to delineates the works area from the riparian zone, the use of physical hoarding 2.4m tall (as specified in the Appendix A5.1 CEMP in Volume 3 of the EIAR) is acceptable given the proposed working time and duration of the works.

12.5.1.4.3.3 Measures to Prevent Disturbance / Displacement

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 otter activity).

Site set up near watercourse crossings shall be undertaken in a timely manner to reduce impacts to otter. The works area will be delineated from the watercourse with hoarding by the appointed contractor to obscure the site from otter and prevent access. The construction works will commence following confirmation from the suitably qualified ecologist that no otter holt is located within 150m of Frank Flood Bridge and the area for the proposed Pedestrian / Cycle Bridge. Should an otter holt be found to be present, the suitably qualified ecologist will advise, in discussion with the NTA and the appointed contractor on the appropriate actions to be taken.

The appointed contractor will provide site hoarding of 2.4m height between the construction site and the watercourse to mitigate potential impacts associated with protected species (Otter and Kingfisher). The hoarding will be installed to retain as far as is practical, a narrow riparian corridor for use by otter.

In respect of the scaffold structure, the working platform will be above water level with only a limited number of supporting anchor posts into river bed. The scaffold structure and floating pontoon will be in place for a period during July to September. These will be removed before the closure on instream works as required by IFI and reinstated as necessary in year two of the Construction as necessary.

While they represent an above water barrier for otter, it will not obstruct river flows and works on the platform will be carried out during daylight hours and when the platform is unmanned should not present a significant obstacle to otter. Indeed, evidence from the River Liffey has an otter holt adjacent to a floating pontoon which serves a moored restaurant (Macklin *et al.* 2019).

The appointed contractor will ensure that the partial damming of the watercourse to enable the emplacement of scour protection should not represent a significant impediment to otter commuting. Works to install the scour protection will be undertaken in daylight hours.

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 Appendix A5.1 CEMP 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 and works around the Frank Flood Bridge described in Section 12.5.1.2.2 and Chapter 13 (Water).

12.5.1.4.3.5 Lighting

Some night-time works are required which will undoubtedly result in additional lighting over the upstream side of the Frank Flood Bridge. Refer to Section 12.5.1.4.1.5 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 Appendix A5.1 -CEMP, 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 Section 12.5.1.2.2 and 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 likely significant negative effect, at any geographic scale.

However, in respect of water quality, a Surface Water Management Plan (SWMP) has been prepared (provided in Appendix A5.1 - CEMP, 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 Section 12.5.1.2.2 and Chapter 13 (Water).

12.5.1.5 Birds

12.5.1.5.1 Breeding Birds

12.5.1.5.1.1 Habitat Loss and Fragmentation

Where possible, habitats of importance to breeding birds such as scattered trees and parkland, treeline and hedgerow and scrub - 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 to be retained is shown on the Landscaping General Arrangement Drawings (BCIDB-JAC-ENV_LA-002_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 (BCIDB-JAC-ENV_LA-002_XX_00-DR-LL-9001)) in Volume 3 of this EIAR for locations.

Many bird 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.

In respect of Kingfisher, there will be no loss of habitat. The emplacement of some scour protection may provide some limited future perching habitat for kingfisher. However, the proposed works and the installation of the scaffold platform will present a temporary partial barrier across the River Tolka to the commuting route. Although kingfisher are typically low flying birds, they are agile and it is predicted that they can avoid the scaffold and thus will not be excessively disturbed.

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 the NPWS.

There was no suitable kingfisher nesting habitat within the vicinity of the Proposed works at the Frank Flood Bridge. Thus, there will be no loss of habitat. However, in terms of minimising potential for mortality, the scheduling of the works for August / September (to minimise impacts to other KERs e.g. fisheries and otter) is beyond the early breeding season and young would already be on the wing and thus considered as agile as adults[7].

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.

[7] https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kingfisher/breeding-feeding-territory/

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. This will include the use of 2.4 metre hoarding around the Construction Compound SW5 at the Frank Flood Bridge and areas delineating the working area from the River Tolka. 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.

Although no suitable nesting features were recorded in respect of Kingfisher within the survey areas up and downstream of the Frank Flood Bridge structure, they are known to commute along the River Tolka. A number of potential construction-related impacts could result in disturbance to and displacement of kingfisher commuting, in particular the presence of the increased activity in proximity to the River Tolka at this point and the presence of the scaffold platform. Kingfisher, as shy birds would be expected to avoid the immediate vicinity of the construction works or reduce their territorial commute where noise and human activity is greatest. While the riverside construction areas will be screened off from works as far as is practical, it is not possible to wholly mitigate the impact of the scaffold platform and floating pontoon which will be across a part of the watercourse. Furthermore, the scheduling of the works between 1st July and 30st September (over two years as necessary) (to minimise impacts to other KERs e.g. fisheries and otter) is beyond the early breeding season and young would already be on the wing and thus considered as agile as adults and likely avoid the scaffold platform when no works activity ongoing.

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 Appendix A5.1 -CEMP 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 Section 12.5.1.2.2 and Chapter 13 (Water).

12.5.1.5.2 Wintering Birds

12.5.1.5.2.1 Measures to Reduce Mortality and Disturbance / Displacement Impacts to SCI birds due to Vegetation Loss during Construction

Where practicable, the removal of screening or overhanging vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will be undertaken outside of the breeding bird season (01 March to the 31 August) and before the arrival of the wintering birds. Therefore, clearance works if required at Plunkett College along the Swords Road will commence in September and be concluded before the start of October.

However, where the construction programme does not allow these seasonal restrictions to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to clearance. Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken.

12.5.1.5.2.2 Measures to Prevent Disturbance and Displacement Impacts during Construction

The following mitigation measures will be put in place at Construction Compound SW5 adjacent Frank Flood Bridge by the appointed contractor to minimise disturbance to SCI bird species:

- The appointed contractor will undertake the establishment of the Construction Compound outside of the wintering bird season (October to March), where practicable. However, where the construction programme does not allow this seasonal restriction to be observed, then the construction compound

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 contractor, advise how works will be appropriately undertaken;

- Hoarding of the Construction Compound 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 design of the lighting will ensure that light-spill will not occur over the River Tolka (as a far as is practical). The use of lighting 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 12.5.1.4.1.5 the lighting column heights will be considered by the appointed contractor, so as not to act as an obstacle to birds.

12.5.1.5.2.3 Habitat Degradation – Water Quality

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the Appendix A5.1 - CEMP, 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 Section 12.5.1.2.2 and 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 likely 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; however, suitable amphibian habitats were noted along the Proposed Scheme as noted in Section 12.3.11.

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 in 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 the 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 will 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 tAppendix A5.1 CEMP 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 Section 12.5.1.2.2 and Chapter 13 (Water).

12.5.1.8 Fish

12.5.1.8.1 Habitat Loss and Fragmentation

Minor instream construction is required as part of the Proposed Scheme. A scaffold platform will be put in place to enable the appointed contractor to undertake finishing works to the underside of the newly constructed Frank Flood Bridge structure. Although there may be temporary disturbance in terms of a wholly unimpeded fish passage due to the scaffold poles extending down to ground level in the River Tolka, there will be no loss of aquatic habitat nor alteration of potential spawning grounds as a result of its use.

Instream works (floating pontoon, erection of Scaffold or Installation of scour protection) cannot occur between October and June. As per IFI agreement through consultation, instream works will occur in July, August and September. This will decrease disturbance impacts on fisheries but also otter and kingfisher etc. There is a requirement for the floating pontoon and temporary scaffold to be uninstalled before the end of the permitted instream working seas. It will be reinstated in a similar manner in year two of the construction programme to enable the finalisation of the proposed Pedestrian / Cycle Bridge to be completed.

The appointed contractor will be cognizant of the IFI guidance (Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters, IFI 2016) in the design and placement of the scaffold platform. The appointed contractor will liaise with a suitably qualified ecologist and the NTA (after which the consultation with the IFI may be undertaken regarding the placement.

The design of the structure will require the installation of scour protection, which could result in some habitat loss along the edge of the watercourse. No spawning territory was noted there during aquatic surveys. Following the installation of scour protection, no further mitigation is proposed in respect of the physical alteration of watercourses.

12.5.1.8.2 Habitat Degradation – Surface Water Quality

In terms of mitigation, a SWMP has been prepared (provided in Appendix A5.1 CEMP 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 Section 12.5.1.2.2 and Chapter 13 (Water).

12.5.1.9 Invertebrates

While no rare or protected invertebrate species were recorded to be within the ZoI of the Proposed Scheme, a SWMP has been prepared (provided in Appendix A5.1 – CEMP 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 in respect of aquatic invertebrates 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 Section 12.5.1.2.2 and 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 re-establish vegetation in a timely manner; and
- Measures to prevent the spread of non-native invasive species to downstream European sites.

12.5.2.1.2 National sites

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on pNHAs and NHAs within the ZoI are as set out for European sites as the boundaries of the pNHAs and NHAs often follow those of the SACs and SPAs. Therefore, the mitigation measures outlined in Section 12.5.1.1.1, 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 strategy in relation to potential Operational impacts arising from the Proposed Scheme on the Royal Canal pNHA, River Sluice pNHA and Santry Demesne pNHA, which are not aligned with any European site, includes habitat degradation as a result of surface water quality effects and the spread of invasive species effects on rare and protected plant species, and negative effects on the protected fauna species associated with the sites, as well as habit loss/fragmentation air quality impacts.

12.5.2.1.2.1 Habitat Loss / Fragmentation

Notwithstanding the legacy boundary mapping issue (see Section 12.4.3.1.2.1), there will be no change to Santry Demesne pNHA woodlands vegetation and as such no specific mitigation is required.

The same applies to the Royal Canal pNHA for which an existing roadbridge at Binns Bridge will have surface road modifications.

12.5.2.1.2.2 Habitat Degradation – Surface Water Quality

The proposed SuDS drainage system, as shown in the Proposed Surface Water Drainage Works drawings (BCIDB-JAC-DNG_RD-02_XX_00-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 filtration 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 engineering 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 (DDC 2005).

Once the Proposed Scheme is in operation, the maintenance regime for these SuDS will be carried out by the local authorities and will be subject to their management procedures. No additional mitigation is required

12.5.2.1.2.3 Habitat Degradation – Non-Native Invasive Plant Species

Once the Proposed Scheme is in operation, the control of non-native invasive species will be subject to the local authorities management procedures. No additional mitigation is required.

12.5.2.2 Habitats

12.5.2.2.1 Habitat Degradation – Surface Water Quality

Refer to Section 12.5.2.1.2.2.

12.5.2.2.2 Habitat Degradation – Groundwater

Given the existing corridor and implementation of the proposed surface water measures, no significant effects on habitats owing to impacts from groundwater changes are predicted during the Operational Phase of the Proposed Scheme. Therefore, no additional mitigation is required.

12.5.2.2.3 Habitat Degradation – Non-Native Invasive Plant Species

For mitigation to avoid the effects of non0native invasive species on habitats, please refer to Section 12.5.2.1.2.3.

12.5.2.2.4 Habitat Degradation- Air Quality

As discussed in Chapter 7 (Air Quality) the Proposed Scheme will have a generally neutral impact on air quality in respect of Biodiversity and general habitats and no specific Operational Phase mitigation measures are 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 on rare and protected flora, please refer to Section 12.5.2.1.2.2.

12.5.2.4 Mammals

12.5.2.4.1 Bats

12.5.2.4.1.1 Habitat Loss and Loss of Breeding / Resting Sites

The operation of the Proposed Scheme is not predicted to result in any significant effects to bats in the vicinity of the Proposed Scheme, particularly given that the bulk of the corridor is characterised by streetscape planting which offers limited roosting potential. There are a number of areas characterised by mixed age / mature planting adjacent to the Proposed Scheme and these areas are directly avoided by retaining them and their connectivity to the wider landscape and suitable potential bat foraging territory is largely maintained. Notwithstanding this, mitigation which has been proposed as part of the bat mitigation strategy and may be implemented dependent on

the outcome of survey and / or licensed compensatory requirements will continue into Operational Phase of the Proposed Scheme for some time.

Replanting by the appointed contractor will be as per detailed in Section 12.5.1.2.1.

In line with the maintenance contract the appointed contractor will carry out annual post construction monitoring, over a two-year period to ensure the successful re-establishment of vegetation within the Proposed Scheme.

12.5.2.4.1.2 Barrier / Severance / Displacement Effects

Although the construction of the new Pedestrian / Cycle Bridge across the River Tolka is in an area where considerable bat activity was recorded, its design and location alongside the existing masonry bridge is such that it is not predicted that there will be any significant effects on local population of bats in this area. Thus, there are no significant effects on bats predicted during the Operational Phase of the Proposed Scheme. Therefore, no mitigation is required.

12.5.2.4.1.3 Indirect Disturbance of Flight Patterns Due to Operational Lighting

The operation of the Proposed Scheme is not predicted to result in any impacts to bats in the vicinity of the Proposed Scheme. Therefore, no mitigation is proposed.

Excess light spill from the Proposed Scheme may result in avoidance behaviour from bats within the vicinity of the Proposed Scheme. Where feasible, operational lighting will be kept to a minimum and light spill avoided.

There are no significant effects on bats predicted during the Operational Phase of the Proposed Scheme. It is recognised that installed or relocated lighting may in certain areas and owing to the removal of vegetation result in changes to lighting dispersal, potentially into areas previously where no significant light spill was present. However, the lighting design is such that there are no areas where considerable new lighting required. Therefore, no mitigation is required.

12.5.2.4.1.4 Monitoring of Bat Boxes

Where bat boxes are installed as part of the Construction Phase of the Proposed Scheme, monitoring is required under best practice guidance (e.g. Marnell *et al.* 2022). The level of post-installation monitoring will be dependent on the roost type and the number of bats present. A precautionary approach will be assumed on the basis that bats using these PRFs reflect species that were typically noted during the activity surveys and are occasionally identified from urban transport corridors.

The NTA will ensure that annual inspections of installed bat boxes will be undertaken for 2 years or as advised by a suitably qualified ecologist, to confirm occupancy.

Where no occupancy is noted in year 1, the boxes will be relocated to another mature tree and details communicated with the BCI, local authority Biodiversity Officer and the NPWS.

12.5.2.4.2 Monitoring of Confirmed roosts

Were the RCSI cottage structures and the Collinstown industrial buildings are confirmed to have a roost between the interim of the bat surveys and commencement of construction (See Section 12.5.1.4.1.3), a mitigation strategy devised by the appointed ecologist and submitted in support of a Derogation issued by the NPWS would be applicable. All measures listed therein would be applicable including the need to monitor any mitigation/compensatory roosts for a specified number of years post construction.

12.5.2.4.3 Badgers

The operation 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.

12.5.2.4.4 Otter

12.5.2.4.4.1 Disturbance / Displacement

There are no significant effects on otter predicted during the Operational Phase of the Proposed Scheme. Light levels will not be significantly different from current levels during the Operational Phase of the Proposed Scheme. No significant effects on otter species are predicted during the Operational Phase of the Proposed Scheme. Therefore, no specific mitigation is required.

12.5.2.4.4.2 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on otter, please refer to Section 12.5.2.1.2.2.

12.5.2.4.5 Marine Mammals

12.5.2.4.5.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on marine mammals, please refer to Section 12.5.2.1.2.2.

12.5.2.4.6 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 on breeding birds, please refer to Section 12.5.2.1.2.2.

12.5.2.6 Wintering Birds

12.5.2.6.1 Disturbance / Displacement

During operation, the Proposed Scheme has the potential to disturb and displace wintering bird species from their habitat near the Proposed Scheme boundary due to an increase in noise, human activity and visual disturbance associated with increased human presence and increased bus flow. Although the operational disturbance / displacement effect cannot be quantified it would be expected to be much less than the 300m ZoI associated with construction works. Most species of wintering birds are likely to habituate to the increased traffic flows and human presence along cycle tracks etc. Any Operational Phase 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 habitats immediately adjacent to the Proposed Scheme. The nearest known wintering bird feeding site is Plunkett's College, which is immediately adjacent to the Proposed Scheme and Clonliffe College, which lies greater than 30m from the Proposed Scheme at Clonliffe Road (downstream of the Frank Flood Bridge). The playing pitches at these locations are utilised by foraging wintering birds and are recognised as being of major importance for winter populations of light-bellied Brent geese associated with Dublin Bay.

Wintering birds disturbed during Operational Phase would revert to suitable sites in the surrounding environment, and therefore impacts are not considered to be significant beyond the local level. Therefore, in consideration of these factors, and the fact that there is no loss of suitable foraging 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 likely significant negative effect, at any geographic scale.

12.5.2.6.2 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on wintering bird species, please refer to Section 12.5.2.1.2.2.

12.5.2.7 Reptiles

The Operational Phase of the Proposed Scheme is not predicted to result in any significant effects to reptiles in the vicinity of the Proposed Scheme. Therefore, no mitigation is proposed.

12.5.2.8 Amphibians

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 on amphibians, please refer to Section 12.5.2.1.2.2.

12.5.2.9 Fish

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 on fish, please refer to Section 12.5.2.1.2.2.

12.5.2.10 Invertebrates

No rare or protected freshwater mollusc species were recorded from the ZoI of the Proposed Scheme. However, precautionary design measures will ensure that surface waters will not impact and potential downstream along watercourse or the Royal Canal aquatic invertebrates.

12.5.2.10.1 Habitat Degradation - Surface Water

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on freshwater molluscs, please refer to Section 12.5.2.1.2.2.

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
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	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
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species); Disturbance and Displacement	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); Disturbance and Displacement)	Likely significant effect at the international to national geographic scale	No significant residual effect
Baldoyle Bay SPA / SAC Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA / SAC Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA / SAC Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	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); Disturbance and Displacement)	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); Disturbance and Displacement)	Likely significant effect at the international geographic scale	No significant residual effect
Dalkey Island 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); Disturbance and Displacement)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rockabill SPA Rockabill Island pNHA	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); Disturbance and Displacement)	Likely significant effect at the international to national geographic scale	No significant residual effect
The Royal Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Santry Demesne pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Sluice River 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)				
Depositing / lowland rivers (FW2);	County to Local Importance (Higher Value)	Habitat loss Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Canals (FW3)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Drainage ditches (FW4)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Wet grassland (GS4)	Local Importance (Higher Value)	Habitat loss; Habitat degradation (hydrology	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
Mixed broadleaved / conifer woodland (WD2)	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

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
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
Immature woodland (WS2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Rare and Protected Plant Species				
Opposite-leaved Pondweed	National Importance	Habitat degradation (hydrology	Likely significant effect at the local geographic scale	No significant residual effect
Non-native Invasive Species				
Various	N/A	Spread at expense of other Habitats, Habitat Degradation (hydrology)	Likely significant effect at the local to national 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 loss / Habitat degradation (hydrology; disturbance/displacement)	Likely significant effect at the local geographic scale	No significant residual effect
Marine mammals	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
SCI bird species	International Importance	*See SPAs*	*See SPAs*	*See SPAs*
Kingfisher (Non-SCI population)	International Importance	Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
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)) Likely significant residual effect at the local geographic scale (Habitat Loss; Mortality risk; Disturbance / Displacement)
All other wintering 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
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Annex fish species (Atlantic salmon, river lamprey)and European eel)	International to 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 Loss / Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

12.6.2 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 during the Operational Phase above the local scale on the KERs identified. Table 12.20 provides a summary of Operational Phase Significant Residual Impacts.

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 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 geographic scale	No significant residual effect
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international 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 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 geographic scale	No significant residual effect
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species); Disturbance and Displacement	Likely significant effect at the international 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); Disturbance and Displacement)	Likely significant effect at the international geographic scale	No significant residual effect
Baldoyle Bay SPA / SAC Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement	Likely significant effect at the international geographic scale	No significant residual effect
Malahide Estuary SPA / SAC Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	Likely significant effect at the international geographic scale	No significant residual effect
Ireland's Eye SPA / SAC Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	Likely significant effect at the international 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 geographic scale	No significant residual effect
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	Likely significant effect at the international geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	Likely significant effect at the international 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)
Dalkey Island SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	Likely significant effect at the international geographic scale	No significant residual effect
Rockabill SPA Rockabill Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale	No significant residual effect
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology); Disturbance and Displacement)	Likely significant effect at the international geographic scale	No significant residual effect
The Royal Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species,	Likely significant effect at the national geographic scale	No significant residual effect
Santry Demesne pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species,	Likely significant effect at the national geographic scale	No significant residual effect
Sluice River 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)				
Depositing/ lowland rivers (FW2);	County to Local Importance (Higher Value)	Habitat loss Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Canals (FW3)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Drainage ditches (FW4)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Wet grassland (GS4)	Local Importance (Higher Value)	Habitat loss; Habitat degradation (hydrology	Not Likely significant effect at any local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Not Likely significant effect at any local geographic scale	No significant residual effect
Mixed broadleaved / conifer woodland (WD2)	Local Importance (Higher Value)	Habitat loss	Not Likely significant effect at any local geographic scale	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Not Likely significant effect at any local geographic scale	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Not Likely significant effect at any local geographic scale	No significant residual effect
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Not Likely significant effect at any local geographic scale	No significant residual effect
Immature woodland (WS2)	Local Importance (Higher Value)	Habitat loss	Not Likely significant effect at any local geographic scale	No significant residual effect

Rare and Protected Plant Species				
Opposite-leaved Pondweed	National Importance	Habitat degradation (hydrology	Likely significant effect at the local geographic scale	No significant residual effect
Non-native Invasive Species				
Various	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)	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	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
SCI bird species	International Importance	*See SPAs*	*See SPAs*	*See SPAs*
Kingfisher (non-SCI population	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology)	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
Annex fish species (Atlantic salmon)	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Non-Annex fish species (e.g. brown trout, European eel)	Local Importance (Higher Value)	Habitat Loss/ Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

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