Chapter 12
Biodiversity

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12. Biodiversity

12.1 Introduction

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

The likely significant effects of the Proposed Scheme on biodiversity during both the Construction Phase and Operational 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, road realignments and the provision of new / replacement structures. The assessment undertaken for the Proposed Scheme identified numerous key ecological receptors (KERs) within the study area that could potentially be impacted by the Proposed Scheme. These KERs are examined in detail in this Chapter.

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

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

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

12.2 Methodology

In accordance with the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (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 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 2013a), Article 2 of the Convention on Biological Diversity (CBD), gives the following formal definition of biodiversity:

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

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

This Chapter also refers to the Appropriate Assessment Screening Report (hereafter referred to as the AA Screening Report) and the Natura Impact Statement (hereafter referred to as the NIS) which have also been prepared on behalf of the National Transport Authority (NTA) and submitted with the application for approval, so

as to enable An Bord Pleanála (the Board), as competent authority, to carry out the assessments required pursuant to Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as the Habitats Directive).

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

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

12.2.1 Ecological Survey Study Area

The Proposed Scheme extents are illustrated in the General Arrangement Drawings (BCIDB-JAC-GEO_GA-0013_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Ecological surveys were carried out for each of the biodiversity receptors listed in Table 12.1, within a specific study area (as described in Table 12.1), and focused on assessing potential impacts within the Zone of Influence (ZoI) of the Proposed Scheme. The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (hereafter referred to as the CIEEM Guidelines) (CIEEM 2018) define the ZoI for a development 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) or 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	The area within or immediately adjacent to the Proposed Scheme footprint where habitats could be directly or indirectly affected during construction and operation. The extent of the study area for habitats is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Rare and/or Protected Flora	The area within or immediately adjacent to the Proposed Scheme footprint where rare and/or protected flora could be directly or indirectly affected during construction and operation. The extent of the study area for rare and/or protected flora is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Fauna species other than those listed below (includes badger, otter, other protected mammal species, amphibians, and reptiles)	The area within or immediately adjacent to the Proposed Scheme footprint where fauna species could be directly or indirectly affected during construction and operation. The extent of the study area for fauna species (other than bats and breeding birds) is illustrated in Figure 12.7.3 Volume 3 of this EIAR.
Bats	The area suitable for roosting, foraging and/or commuting bats (e.g., bridges, hedgerows, treelines, woodland and watercourses) within or immediately adjacent to the Proposed Scheme footprint where bats could be directly or indirectly affected during construction and operation. The extent of the study area for bats is illustrated in Figure 12.1.1 in Volume 3 of this EIAR.
Wintering Birds	The area suitable for wintering birds within or immediately adjacent to the Proposed Scheme footprint where wintering birds could be directly affected during construction and operation. The extent of the study area for wintering birds 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 2022a);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013a);

- The CIEEM Guidelines (CIEEM 2018);
- National Roads Authority (NRA) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. (NRA, 2005a);
- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. (NRA 2005b);
- 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, 2006b);
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2008a);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide. National Roads Authority (NRA 2008b);
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (NRA 2009);
- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (Transport Infrastructure Ireland (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. 3rd Edition. (Mitchell-Jones and McLeish 2004);
- Bat Mitigation Guidelines for Ireland V2. Irish Wildlife Manuals No. 134 (Marnell *et al*., 2022);
- The Irish Bat Monitoring Programme 2015 – 2017. Irish Wildlife Manuals 103. (Aughney *et al*., 2018);
- United Kingdom Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) (UKHA 2001a; UKHA 2001b; UKHA 2005);
- National Parks and Wildlife Service (NPWS) Circular NPW 1 / 10 & PSSP 2 / 10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities (NPWS 2010);
- Circular Letter NPWS 2 / 07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species / applications for derogation licences (NPWS 2007a);
- Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites (NPWS 2007b); and
- All-Ireland Pollinator Plan 2021-2025, National Biodiversity Data Centre [NBDC] Series No. 25, Waterford March 2021 (NBDC 2021).

It should be noted that in some instances standard survey methodology described in some of the guidance documents listed above was modified for practical reasons. Owing to the nature of the Proposed Scheme, being largely within an urban transport corridor, a practical approach was adopted to capture likely presence of protected species and or likely impacts arising as a result of the Construction and Operation of the Proposed Scheme. Thus, in respect of badger, the NRA 2005b guidance recommends surveys up to 150m beyond corridor boundaries corridor. This is not feasible for much of the existing urban corridor. Similarly, the guidance in respect of bat surveys (NRA 2006b) advocates surveys up to 1km from the route corridor. For similar reasons this is not considered practical and the focus of the 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:

- National Biodiversity Plan 2017 – 2021 (Department of Culture, Heritage and the Gaeltacht 2017);
- Dublin City Development Plan 2022 – 2028 (Dublin City Council (DCC) 2022);
- Dublin City Biodiversity Action Plan 2021 – 2025 (DCC 2021);
- Dún Laoghaire-Rathdown County Development Plan 2022-2028 (Dún Laoghaire-Rathdown County Council (DLRCC) 2022);

- Dún Laoghaire-Rathdown Biodiversity Action Plan 2021-2025 (DLRCC 2021);
- Wicklow County Development Plan 2022 – 2028 (Wicklow County Council (WCC) 2022); and
- County Wicklow Biodiversity Action Plan 2010-2015 (WCC 2010).

Legislation:

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

12.2.3 Data Collection and Collation

12.2.3.1 Desk Study

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

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

- Online data available on European sites and on Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the NPWS (NPWS Online Database 2023 – April 2023);
- Online data records available on National Biodiversity Data Centre Database (NBDC) (NBDC Online Database 2023);
- Ordnance Survey Ireland (OSI) orthophotography (from 1995 to 2012) for the Proposed Scheme study area;
- Bus Connects Drone Imagery, surveyed 2020 (NTA 2020);
- Records of rare and/or protected species for the 10km (kilometre) grid squares O12, O13, O21 and O22, 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 2022b);
- 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 *Branta bernicla hrota* inland feeding sites (Scott Cawley Ltd. 2017).

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

A desk study was carried out to identify any potential suitable inland feeding and/or roosting sites for wintering birds located within or directly adjacent to the Proposed Scheme. This included a review of recent aerial photography and known inland feeding sites for the Special Conservation Interest (SCI) bird species light-bellied Brent goose *Branta bernicla hrota* (Scott Cawley Ltd. 2017). The initial desk study identified sites in which significant suitable foraging and/or roosting habitat which would be directly temporarily lost as a consequence of the Proposed Scheme, for further wintering bird surveys. However due to design changes to the Proposed Scheme site boundary at a later stage, these sites are no longer located within the red line boundary of the Proposed Scheme, albeit they are located within its immediate vicinity.

A desk study was carried out to identify all hydrological crossing points within the footprint of the Proposed Scheme. No aquatic surveys, suitability assessments for nesting birds, or dedicated otter surveys were undertaken at the proposed crossing points as no instream works or modifications to banks or significant disturbance (i.e., piling, rock breaking techniques) are proposed in proximity to watercourses in the vicinity of the Proposed Scheme.

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 August 2022 Limited survey around Woodbrook Side Lodge - March 2023	Scott Cawley Ltd.
Mammal surveys (excluding bats)	June to August 2018 August 2020 April 2022 Limited survey around Woodbrook Side Lodge - March 2023	Scott Cawley Ltd.
Bat surveys	Walked transect activity surveys June to August 2018 September and October 2019 May 2020 July 2020 July to August 2021 Identification of potential roost features (PRFs) June to August 2018 August 2020 March 2022 March 2023 Building Inspection January 2023 (external) March 2023 (internal and external)	Scott Cawley Ltd.
Wintering bird survey	November 2020 to March 2021 October 2021 to April 2022	Scott Cawley Ltd.
Amphibian habitat suitability assessment	June to August 2018 August 2020 March 2022	Scott Cawley Ltd.
Reptile habitat suitability assessment	June to August 2018 August 2020 March 2022	Scott Cawley Ltd.

12.2.3.3 Habitat Survey

Habitat surveys were carried out by Scott Cawley Ltd., between June and August 2018, August 2020, and again in May and August 2022 to capture design changes to the Proposed Scheme. An additional limited confirmatory survey was undertaken in lands around Woodbrook Side Lodge in March 2023. All habitats located within or immediately adjacent to the Proposed Scheme footprint were surveyed and mapped to level three of the Heritage Council's A Guide to Habitats in Ireland habitat codes, after Fossitt (Fossitt 2000) and in accordance with Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.,* 2011). The level of field data quality (as per Smith *et al*., 2011) was also recorded. Plant species present that were either representative of a habitat or considered to be of conservation interest (i.e., those listed on the Flora Protection Order or listed in the 'Threatened' category or higher on the Ireland Red List No. 10 Vascular Plants (Wyse Jackson *et al*., 2016) and the Ireland Red List No. 8 Bryophytes (Lockhart *et al.,* 2012)) were recorded, along with their relative abundances. Non-native invasive plant species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations were also recorded. The habitat's extent was mapped onto an aerial photograph, with Global Positioning System (GPS) points taken where a habitat's extent could not be clearly identified from the aerial photograph. Vascular plant nomenclature follows that of the New Flora of the British Isles Fourth Edition (Stace 2019).

12.2.3.4 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, in August 2020 and again in April 2022. A discrete survey around the grounds of Woodbrook Side Lodge was undertaken in March 2023 which checked for presence of terrestrial mammals. The presence or 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 setts and otter holts. Where present, any evidence of use was recorded.

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

12.2.3.5 Bats

The following sections describe the methodologies employed to carry out the various bat surveys undertaken in 2018, 2019, 2020, 2021, 2022 and 2023 to inform the EIAR. The bat surveys were carried out under the following licences, issued by the NPWS:

- DER / BAT 2019-02 (amended) – Derogation licence to disturb bat roosts throughout the State;
- DER / BAT 2020-67 (amended) – Derogation licence to disturb bat roosts throughout the State;
- DER / BAT 2021-01 (amended) – Derogation licence to disturb bat roosts throughout the State;
- DER / BAT 2022-02 (amended) – Derogation licence to disturb bat roosts throughout the State; 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 ten locations along the Proposed Scheme. Between 2018 and 2020, transect routes were located adjacent to:

- RTÉ, R138 Stillorgan Road (referred to as CBC0013BT001);
- UCD, R138 Stillorgan Road (referred to as CBC0013BT002);
- R112 Fosters Avenue (referred to as CBC0013BT003);
- St. John of God, N11 Stillorgan Road (referred to as CBC0013BT004);
- Seaview Park, R837 Dublin Road (referred to as CBC0013BT005);

- R119 / Shankill / Dublin Road roundabout (referred to as CBC0013BT006);
- Olcovar Residential Development, R119 Dublin Road (referred to as CBC0013BT007);
- Wilford Roundabout, R119 Dublin Road (referred to as CBC0013BT008);
- R761 Dublin Road / Upper Dargle Road (referred to as CBC0013BT009); and
- Fran O'Toole Bridge, R761 Main Street Bray (referred to as CBC0013BT010).

Three additional transects were surveyed in 2021: CBC0013BT011 (UCD) and CBC0013BT013 (Stonebridge Lane Cycle Way), while CBC0013BT008 (Wilford Roundabout) was shortened and referred to as CBC0013BT012 during the 2021 surveys. 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 the three seasons of autumn, spring and summer as guided by Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2016) (see Table 12.2 for specific dates). Surveys were conducted in June to August 2018, September and October 2019, May 2020, July 2020 and August 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 a handheld ultrasound bat detector (Elekon Batlogger M) to record any bat species present.

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 – Building Inspection

Owing to design changes necessitating the demolition and rebuilding of a historic property (Woodbrook Side Lodge), south of the Wilford Junction Roundabout, heading into Bray, to facilitate the Proposed Scheme, a revisit of the property was undertaken in January 2023 and March 2023. The Woodbrook Side Lodge building was examined both internally (March 2023) and externally (January and March 2023) for its potential to support roosting bats. Potential access / egress points were recorded, where present, and a general assessment of the building's suitability for roosting bats was undertaken. The house had previously been internally examined as part of an earlier road scheme and it was confirmed during those surveys that it was not a bat roost (Keeley, B 2008 – Appendix 3 of EI3 2008 for Dublin Road Improvement Scheme, (PH McCarthy 2008)).

12.2.3.5.3 Bats – Tree Surveys

Trees located within the footprint of the Proposed Scheme were assessed for their potential to support roosting bats (i.e., Potential Roost Features (PRFs)) as part of the multidisciplinary walkover surveys carried out between June and August 2018, August 2020, March 2022 and March 2023 to capture design changes and confirm the condition of the identified PRFs.

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

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

12.2.3.6 Wintering Birds

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

The initial desk study identified two sites along or adjacent to the Proposed Scheme with potential for wintering birds that would be subject to direct habitat loss. These sites were located at Allies River Road, off R119 Dublin Road (referred to as CBC0013WB001) and within the Shanganagh Park on R119 Dublin Road (referred to as

CBC0013WB002) (refer to Figure 12.1.2 in Volume 3 of the EIAR). The CBC0013WB001 site was surveyed nine times in total during the wintering bird survey season 2020/21 and was not surveyed again during the 2021/22 survey season due to a change to the Proposed Scheme and it no longer forming part of the land intake. The CBC0013WB002 site was surveyed from October 2020 to March 2021, and October 2021 to March 2022 on a fortnightly basis. Additional wintering bird surveys were not carried out at the above listed transects, owing to the absence of any direct impact by land take and also, by virtue of the results that were recorded over the two year survey periods across the years 2020 to 2022.The results of the desk study and field surveys have informed the assessment of potential impacts on wintering bird species arising from the Proposed Scheme.

The approach for wintering bird surveys was a 'look-see' methodology (based on Gilbert *et al.*, 1998). All birds present within a site were identified with reference to Collins Bird Guide (Svensson 2010) to confirm identification (where necessary) and were recorded using the British Trust for Ornithology (BTO) species codes. The total flock size of birds present, their general location within the site and any activity exhibited were also recorded. Bird droppings were recorded along walked transect lines.

12.2.3.7 Reptiles

The suitability of habitats, located within and immediately adjacent to the Proposed Scheme, were assessed for breeding and/or hibernating reptile species common lizard *Zootoca vivipara*, as part of the multidisciplinary walkover surveys undertaken between June and August 2018, August 2020 and again in March 2022.

12.2.3.8 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 multidisciplinary walkover surveys undertaken between June and August 2018, August 2020 and again in March 2022.

12.2.4 Appraisal Method for the Assessment of Impacts

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

- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- The EPA Guidelines (EPA 2022a);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Union 2013a);
- CIEEM Guidelines (CIEEM 2018); and
- Guidelines for Assessment of Ecological Impacts of National Roads 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 Roads 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 a Stage Two NIS 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 Roads Schemes (NRA 2009), biodiversity features within the ZoI of the Proposed Scheme which are '*both of sufficient value to be material in decision making and likely to be affected significantly'* are deemed to be KERs. These are the biodiversity receptors which may be subject to likely significant impacts from the Proposed Scheme, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of Local Importance (Higher Value) or greater.

12.2.4.2 Characterising and Describing the Impacts

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

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

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

*The following terms / definitions for describing the duration of impacts are provided in the EPA Guidelines (EPA 2022a): 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 Roads 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; affecting the nature, extent, structure and functioning of component habitats; and/or affecting the population size and viability of component species.

12.2.4.3.2 Conservation Status

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

- For natural habitats, conservation status means the sum of the influences acting on the natural habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species, at the appropriate geographical scale; and
- For species, conservation status means the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations, at the appropriate geographical scale.

An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status.

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

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

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

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

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

12.3 Baseline Environment

The Proposed Scheme has an overall length of approximately 18.5km from the junction of Leeson Street Lower, and St. Stephen's Green in Dublin city centre, to the Dargle River Crossing (Fran O'Toole Bridge) in Bray. It will commence at the junction of Leeson Street Lower and St. Stephen's Green. The Proposed Scheme will run along Leeson Street Lower and Upper including the existing one-way system on Sussex Road. It will continue on Morehampton Road and Donnybrook Road through Donnybrook Village, and on to the Stillorgan Road. It will intersect with the Belfield / Blackrock to City Centre CBC at Nutley Lane and include the University College Dublin (UCD) Bus Interchange at the entrance to UCD. It will continue south on Stillorgan / Bray Road as far as the Loughlinstown Roundabout. The route will then proceed along the Dublin Road through Shankill and on to Bray through the Wilford Roundabout (M11 Access Roundabout), Dublin Road, and Castle Street. The Proposed Scheme will terminate at the Dargle River Crossing (Fran O'Toole Bridge).

Habitats present at St. Stephen's Green include treelines, buildings and artificial surfaces, typical of the city streetscape. Amenity grassland, treelines, scattered trees / parkland and ponds are habitats found within St.

Stephen's Green Park. As the Proposed Scheme extends southwards along R138 Leeson Street Lower and Upper, traversing the Grand Canal and the River Dodder, the dominant habitat type is residential development and buildings and artificial surfaces. Linear treelines border road verges and footpaths, with intermittent areas of stone walls and other stonework.

A combination of residential development, and buildings and artificial surfaces, continues to dominate as the Proposed Scheme continues in a south-easterly direction along the N11, while pockets of amenity grassland, mixed broadleaf woodland, and scattered trees and parkland occur sporadically along the roadside. Amenity grassland forms roadside landscaping along with some hedgerows and treelines.

The Proposed Scheme diverges from the N11 / M11 after the Shanganagh River crossing, by Loughlinstown Woods pNHA (N11 Loughlinstown Roundabout) and continues south-eastwards along the R837 Dublin Road towards Bray. Residential developments continue to dominate the roadside throughout Shankill. The Proposed Scheme continues through Shankill village and follows the western boundary of Shanganagh Park and Shanganagh Cemetery along the R119 Dublin Road. These areas provide substantial amenity grassland, mixed broadleaf woodland, and treeline habitat. The Proposed Scheme continues south-eastwards, traversing the Crinken / Rathmichael Stream and areas of current residential development on the northern outskirts of Bray before terminating at the River Dargle.

12.3.1 Zone of Influence (ZoI)

The ZoI, or distance over which a likely significant effect may occur, will differ across the KERs, depending on the predicted impacts and the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken have established the habitats and species present along the alignment of the Proposed Scheme. The ZoI is then informed and defined by the sensitivities of each of the ecological receptors present, in conjunction with the nature and potential impacts associated with the Proposed Scheme. In some instances, the ZoI extends beyond the study area as described in Section 12.2.1 and 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 or Poor Bedrock Aquifer. These types of aquifers are associated with low permeability which decreases with depth. An upper shallow zone of higher permeability may exist in the top few metres and is associated with relatively short flow paths. Therefore, any influence on the groundwater as a result of the proposed works will be localised and will not extend to any groundwater dependent habitats, which are all located over 1.5km 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 a Construction Compound during the Construction Phase, and up to 200m from the Proposed Scheme boundary or local road networks experiencing a change in Annual Average Daily Traffic flows greater than 1,000 during the Operational Phase (refer to Chapter 7 (Air Quality) for more detail).

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

As such, the potential ZoI for aquatic plant and animal species includes all estuarine habitats located downstream of where the Proposed Scheme will drain to the proposed crossing points listed in Table 12.4 and the marine environment of Dublin Bay. The ZoI for impacts to aquatic fauna species, such as Atlantic salmon *Salmo salar* and lamprey species *Lampetra* spp., is limited to those watercourses that will be crossed by the Proposed Scheme or water bodies to which runoff from the Proposed Scheme could drain during construction and operation.

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

Waterbody Name	Connectivity to the Proposed Scheme
Grand Canal Main Line (Liffey and Dublin Bay)	Crossed by the Proposed Scheme at Eustace Bridge (Leeson Street Bridge).
Dodder_050	Crossed by the Proposed Scheme at Anglesey Bridge in Donnybrook. The River Dodder discharges into the Liffey Estuary Lower.
Brewery Stream_010	Crossed by the Proposed Scheme at Stillorgan Road, immediately west of St. John of God Hospital and Belfield Road, immediately north of UCD campus The Brewery Stream discharges into the Liffey Estuary Lower.
Dublin Bay	Located approximately 1.25km downstream and east of the Proposed Scheme.
Kill of the Grange_010	Located approximately 200m west of the Proposed Scheme. The Kill of the Grange discharges into Dublin Bay.
Carrickmines Stream_010	Located approximately 20m east of the Proposed Scheme. The Carrickmines Stream discharges into the South-western Irish Sea at Killiney Bay via the Shanganagh River.
Shanganagh_010	Crossed by the Proposed Scheme by the Loughlinstown Woods pNHA. The Shanganagh River discharges into the Irish Sea at Killiney Bay.
Dargle_040 (Rathmichael Stream)	Crossed by the Proposed Scheme at Woodbrook College / R119. The Rathmichael Stream discharges into the Irish Sea Killiney Bay.
Dargle_040 (River Dargle)	The Proposed Scheme ends on the northern bank of the River Dargle at Fran O'Toole Bridge at Bray. The River Dargle discharges into the Dargle Estuary.
Dargle Estuary	Located approximately 620m east of the Proposed Scheme at Bray Harbour.
South-Western Irish Sea – Killiney Bay	Located approximately 820m east of the Proposed Scheme.

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

The ZoI of potential effects to bat roosts would not be expected to exceed approximately 200m 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 or decrease from this distance accordingly. Given the large foraging ranges for some species, the ZoI of potential landscape scale impacts, such as habitat loss and severance, could extend for several kilometres from the Proposed Scheme but the most significant effects are likely to occur within 1km of important roost sites (e.g., maternity roosts). Leisler's bats *Nyctalus leisleri* have been recorded foraging up to 13km from maternity roost sites (Shiel *et al.,* 1999).

The ZoI of the Proposed Scheme in relation to likely significant effects on most breeding bird species is generally limited to habitat loss within the footprint of the Proposed Scheme, and disturbance / displacement during construction and disruption in territorial singing due to noise during operation. Disturbance effects may extend for several 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 presented in Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance (Cutts *et al.,* 2009) and Exploring Behavioural Responses of Shorebirds to Impulsive Noise (Wright *et al*., 2010). In terms of construction noise, levels below 50dB (decibels) would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds (i.e., birds becoming alert and some behavioural changes (e.g., reduced feeding activity)), but birds are expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity (British Standard (BS) 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites - Part 1: Noise (hereafter referred to as BS 5228–1) British Standards Institution (BSI) 2009)) are generally below 60dB or, in most cases, are approaching the 50dB threshold.

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

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

12.3.2 Desk Study

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

12.3.3 Biodiversity Areas

The Dublin City Biodiversity Action Plan 2021 – 2025 (DCC 2022) highlights a number of areas considered to be of biodiversity value present within the boundaries of DCC. These areas that are located within the ZoI of the Proposed Scheme are provided below:

- Dublin City's Green Infrastructure Network. Habitats within the Proposed Scheme which are considered to contribute to the Green Infrastructure Network include semi-natural calcareous grassland, hedgerows, treelines and woodlands, which support a range of species and act as ecological links / corridors across the wider landscape. Dublin City's network of parks and public green spaces, such as the Phoenix Park support a variety of species and is considered to be a valuable biodiversity resource;
- Dublin City's network of rivers, streams and riparian zones. The Proposed Scheme traverses the River Dodder. Watercourses within the administrative boundary of DCC, such as the River Dodder, support several rare or protected fauna associated with riverine habitats, including bat species, otter (which has been recorded in 11 of the city's rivers), kingfisher *Alcedo atthis*, and migratory fish. The Liffey Estuary and River Dodder is downstream of the Proposed Scheme and is noted as being the city's most important river for legally-protected fish species supporting Atlantic salmon and brown trout *S. trutta*, the 'Critically Endangered' European eel *Anguilla anguilla,* brook lamprey *Lampetra planeri*, river lamprey *L. fluviatilis* and the 'Endangered' white-clawed crayfish *Austropotamobius pallipes;* and
- The Grand Canal is contained within the ZoI of the Proposed Scheme. It is designated as a pNHA. It is noted that this waterway forms an important ecological corridor for both aquatic and terrestrial species (including otter) and allow for the dispersal of a range of flora and fauna, which is particularly vital in an urban environment. It supports coarse fish species, including pike *Esox lucius*, rudd *Scardinius erythrophthalmus,* bream *Abramis brama* and tench *Tinca tinca*, and also contains 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*.

The Dún Laoghaire-Rathdown Biodiversity Action Plan 2021-2025 (DLRCC 2021) highlights a number of areas considered to be of biodiversity value present within the DLRCC administrative boundary. These areas that are located within the ZoI of the Proposed Scheme are provided below:

- Habitats considered to form part of Locally Important Biodiversity Sites (LIBS) and/or wildlife corridors such as watercourses, riparian habitats, hedgerows, treelines and other associated habitats, such as scrub and woodland;
- Loughlinstown Woods pNHA, which contains important native woodland; and
- Network of parks and public green spaces, such as Shanganagh Park, which support a variety of species and habitats and is considered to be a valuable biodiversity resource and a LIBS.

The County Wicklow Biodiversity Action Plan 2010-2015 (WCC 2010) highlights a number of areas considered to be of biodiversity value present within the WCC administrative boundary. These areas that are located within the ZoI of the Proposed Scheme are provided below:

- Habitats considered to be of importance, such as hedgerows and woodlands, which support a range of species and act as important ecological links / corridors across the wider landscape;
- Bray Head SAC / pNHA is a coastal site situated in the north-east of Co. Wicklow between the towns of Bray and Greystones. Bray Head consists of a plateau of high ground, with sea cliffs with a maximum height of 241m. The Annex I habitat of the Habitats Directive, dry heath, is the principal habitat over much of Bray Head and it occurs on the dry slopes above the sea cliffs. Rocky sea cliffs, another Annex I habitat of the Habitats Directive, form most of the seaward boundary at this site and extend for approximately 2km. Bray Head also has an important seabird colony, supporting peregrine falcon, an Annex I species of the Birds Directive;
- Wicklow Mountains SAC / SPA is important as a complex, extensive upland site located in Counties Wicklow and Dublin. The vegetation provides examples of typical upland habitats with heath, blanket bog and upland grassland covering large, relatively undisturbed areas. The site has been designated for 12 habitats listed on Annex I of the Habitats Directive, as well as otter, an Annex II species of the Habitats Directive. In addition, the site is of high ornithological importance as it supports nationally important populations of peregrine falcon and merlin, both Annex I species of the Birds Directive. Furthermore, several rare and/or protected plant and animal species occur, adding further to its value; and
- The Murrough SPA / The Murrough Wetlands SAC / The Murrough pNHA comprises the largest coastal wetland complex found on the east coast of Ireland. Although much affected by drainage, it still contains a wide range of coastal and freshwater habitats, including six listed on Annex I of the Habitats Directive, some of which contain threatened plants. Areas on the site contain a rich invertebrate fauna, including several rarities. It is an important site for both wintering and breeding birds and supports a variety of species listed on Annex I of the Birds Directive.

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 to the Proposed Scheme is South Dublin Bay and River Tolka Estuary SPA, which is located approximately 900m away. The nearest European sites with a direct hydrological connection to the Proposed Scheme are South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC, which are located approximately 1.38km downstream of the Proposed Scheme, via the Elm Park Stream (Brewery Stream_010) at UCD.

There are nineteen (19) European sites located in Dublin Bay and beyond that are hydrologically connected and downstream of the Proposed Scheme. These European sites are South Dublin Bay SAC, Bray Head SAC, Rockabill to Dalkey Island SAC, North Dublin Bay SAC, Wicklow Mountains SAC, Howth Head SAC, Lambay

Island SAC, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, North Bull Island SPA, Baldoyle Bay SPA, The Murrough SPA, Howth Head Coast SPA, Ireland's Eye SPA, Malahide Estuary SPA, Rogerstown Estuary SPA, Lambay Island SPA, Skerries Islands SPA and Rockabill SPA. European sites will be hydrologically connected to the Proposed Scheme via the following watercourses: Grand Canal, River Dodder (Dodder_050), Elm Park Stream, Booterstown Stream, Priory Stream and Brewery Stream (all segments of the Brewery Stream_010), Kill of The Grange Stream (Kill of The Grange Stream_010), Cabinteely Stream and Carrickmines Stream (both segments of the Carrickmines Stream_010 water body), Shanganagh River (Shanganagh_010), Rathmichael Stream and River Dargle (both segments of the Dargle_040 waterbody), and the Ringsend Wastewater Treatment Plant (WwTP).

There are nine SPAs designated for SCI species that are known to forage and/or roost at inland sites across Dublin City. These are South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, Baldoyle Bay SPA, The Murrough SPA, Ireland's Eye SPA, Malahide Estuary SPA, Rogerstown Estuary SPA, Lambay Island SPA and Skerries Islands SPA.

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

There are 30 no. European sites (SACs or SPAs) located within the vicinity of the Proposed Scheme, of which 19 no. are located within the ZoI. Each site, their distance to the Proposed Scheme and their designations (qualifying interests (QIs) and SCIs) are listed in Table 12.5, and illustrated in Figure 12.3 in Volume 3 of this EIAR. Sites within the ZoI are highlighted in blue in Table 12.5.

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

Table 12.5: European Sites (SACs and SPAs) Located Within the ZoI (Highlighted in Light Blue), and Those in the Wider Area of the Proposed Scheme Boundary

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
SAC		
South Dublin Bay SAC [000210]	Approximately 1.1km east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • Annual vegetation of drift lines [1210]; • *Salicornia* and other annuals colonising mud and sand [1310]; and • Embryonic shifting dunes [2110]. *S.I. No. 525/2019 – European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019* Source: Conservation Objectives: South Dublin Bay SAC 000210. Version 1. (NPWS 2013a)
Bray Head SAC [002193]	Approximately 1.7km south 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. 620/2017 - European Union Habitats (Bray Head Special Area of Conservation 000714) Regulations 2017* Source: Conservation objectives: Bray Head SAC [000714]. Version 1. (NPWS 2017a)
Ballyman Glen SAC [000713]	Approximately 1.9km south of the Proposed Scheme	Annex I Habitats • Petrifying Springs with Tufa formation (Cratoneurion)* [7220]; and • Alkaline fens [7230] *S.I. No. 92/2019- European Union Habitats (Ballyman Glen Special Area of Conservation 000713) Regulations 2019* Source: Conservation objectives: Ballyman Glen SAC [000713]. Version 1. (NPWS 2019d)

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
Rockabill to Dalkey Island SAC [003000]	Approximately 2.6km 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 2013b)
Knocksink Wood SAC [000725]	Approximately 3.9km south of the Proposed Scheme	Annex I Habitats: • Petrifying Springs with Tufa formation (Cratoneurion)* [7220] • Old Sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]; and • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* [91E0]. *S.I. No. 93/2019- European Union Habitats (Knocksink Wood Special Area of Conservation 000725) Regulations 2019* Source: Conservation objectives for Knocksink Wood SAC [000725]. Version 1. (NPWS 2021a)
North Dublin Bay SAC [000206]	Approximately 5.6km north of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • Annual vegetation of drift lines [1210]; • *Salicornia* and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]; • Mediterranean salt meadows (Juncetalia maritimi*)* [1410]; • Embryonic shifting dunes [2110]; • Shifting dunes along the shoreline with *Ammophila arenaria* (‘white dunes’) [2120]; • Fixed coastal dunes with herbaceous vegetation (‘grey dunes’) [2130]*; and • Humid dune slacks [2190]. Annex II Species: • Petalwort *Petalophyllum ralfsii* [1395]. *S.I. No. 524/2019 – European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019* Source: Conservation Objectives: North Dublin Bay SAC 000206. Version 1. (NPWS 2013c)
Wicklow Mountains SAC [002122]	Approximately 7km south-west 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)

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
Glen of the Downs SAC [000719]	Approximately 6.9km south of the Proposed Scheme	Annex I Habitat: • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]. *S.I. No. 178/1980 - Nature Reserve (Glen of the Downs) Establishment Order, 1980.* Source: Conservation Objectives: Glen of the Downs SAC 000719. Version 1. (NPWS (2020n)
Howth Head SAC [000202]	Approximately 10.4km north-east of the Proposed Scheme	Annex I Habitats: • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and • European dry heaths [4030]. *S.I. No. 524/2021 - European Union Habitats (Howth Head Special Area of Conservation 000202) Regulations 2021* Source: Conservation Objectives: Howth Head SAC 000202. Version 1. (NPWS 2016)
Baldoyle Bay SAC [000199]	Approximately 10.9km north-east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (Glauco - Puccinellietalia maritimae) [1330]; and • Mediterranean salt meadows (Juncetalia maritimi) [1410]. *S.I. No. 472/2021 - European Union Habitats (Baldoyle Bay Special Area of Conservation 000199) Regulations 2021* Source: Conservation Objectives: Baldoyle Bay SAC 000199. Version 1. (NPWS 2012)
Glenasmole Valley SAC [001209]	Approximately 11.1km south-west of the Proposed Scheme	Annex I Habitats: • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]; • *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]; and • Petrifying springs with tufa formation (Cratoneurion) [7220]*. *S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021* Source: Conservation objectives for Glenasmole Valley SAC [001209]. Version 1.0. (NPWS 2021b)
Carriggower Bog SAC [000716]	Approximately 11.3km south of the Proposed Scheme	Annex I Habitat: • 7140 Transition mire and quaking bogs [7140]. *S.I. No. 293/2018 - European Union Habitats (Carriggower Bog Special Area of Conservation 000716) Regulations 2018* Source: Conservation Objectives: Carriggower Bog SAC 000716. Version 1. (NPWS 2019e)
Malahide Estuary SAC [000205]	Approximately 14km north of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • *Spartina* swards (Spartinion maritimae) [1320]; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]; • Mediterranean salt meadows (Juncetalia maritimi) [1410]; • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]; and • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]*. *S.I. No. 91/2019 – European Union Habitats (Malahide Estuary Special Area of Conservation 000205) Regulations 2019* Source: Conservation Objectives: Malahide Estuary SAC 000205. Version 1. (NPWS 2013d)

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
Ireland's Eye SAC [000203]	Approximately 14.3km north 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 2017c)
Rye Water Valley / Carton SAC [001398]	Approximately 15.7km north-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 001398) Regulations 2018* Source: Conservation Objectives for Rye Water Valley / Carton SAC [001398]. Version 1.0. (NPWS 2021c)
Rogerstown Estuary SAC [000208]	Approximately 18.5km 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 2013e)
Lambay Island SAC [000204]	Approximately 22.4km north-east of the Proposed Scheme	Annex I Habitats • Reefs [1170]; and • Vegetated Sea cliffs of the Atlantic and Baltic coasts [1230]. Annex II Species • Grey seal *Halichoerus grypus* [1364]; and • Harbour seal *Phoca vitulina* [1365]. *S.I. No. 294/2019 – European Union Habitats (Lambay Island Special Area of Conservation 000204) Regulations 2019* Source: Conservation Objectives: Lambay Island SAC 000204. Version 1. (NPWS 2013f)

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
SPA		
South Dublin Bay and River Tolka Estuary SPA [004024]	Approximately 975m 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 2020a)
Dalkey Islands SPA [004172]	Approximately 3.9km south-east of the Proposed Scheme	• Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and • Arctic Tern *Sterna paradisaea* [A194]. *S.I. No. 238/2010 – European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172)) Regulations 2010* Source: Conservation Objectives for Dalkey Islands SPA [004172]. First Order Site -specific Conservation Objectives Version 1.0. (NPWS 2022a) and Natura 2000 – Standard Data Form (NPWS 2020b)
North Bull Island SPA [004006]	Approximately 5.5km north-east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Teal *Anas crecca* [A052]; • Pintail *Anas acuta* [A054]; • Shoveler *Anas clypeata* [A056]; • Oystercatcher *Haematopus ostralegus* [A130]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141]; • Knot *Calidris canutus* [A143]; • Sanderling *Calidris alba* [A144]; • Dunlin *Calidris alpina* [A149]; • Black-tailed Godwit *Limosa limosa* [A156]; • Bar-tailed Godwit *Limosa lapponica* [A157]; • Curlew *Numenius arquata* [A160]; • Redshank *Tringa tetanus* [A162]; • Turnstone *Arenaria interpres* [A169]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; and • Wetlands and Waterbirds [A199]. *S.I. No. 211/2010 – European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006) Regulations 2010* Source: Conservation Objectives: North Bull Island SPA 004006. Version 1. (NPWS 2015b) and Natura 2000 – Standard Data Form (NPWS 2020c)

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
Wicklow Mountains SPA [004040]	Approximately 7.4km south-west 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. (NPWS 2022b) and Natura 2000 – Standard Data Form (NPWS 2020d)
Baldoyle Bay SPA [004016]	Approximately 11km north of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Ringed Plover *Charadrius hiaticula* [A137]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141]; • 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. (NPWS 2013g) and Natura 2000 – Standard Data Form (NPWS 2020e)
The Murrough SPA [004186]	Approximately 12km south of the Proposed Scheme	• Red-throated Diver *Gavia stellata* [A001]; • Greylag Goose *Anser anser* [A043]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Wigeon *Anas penelope* [A050]; • Teal *Anas crecca* [A052]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; • Herring Gull *Larus argentatus* [A184]; and • Little Tern *Sterna albifrons* [A195]. *S.I. No. 298/2011 – European Communities (Conservation of Wild Birds (The Murrough Special Protection Area 004186)) Regulations 2011* Source: Conservation Objectives: The Murrough SPA 004186. First Order Site -specific Conservation Objectives Version 1.0. (NPWS 2022c) and Natura 2000 – Standard Data Form (NPWS 2020f)
Howth Head Coast SPA [004113]	Approximately 12.2km north of the Proposed Scheme	• Kittiwake *Rissa tridactyla* [A188]. *S.I. No. 185/2012 – European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012* Source: Conservation objectives for Howth Head Coast SPA [004113] First Order Site -specific Conservation Objectives Version 1.0. (NPWS 2022d) and Natura 2000 – Standard Data Form (NPWS 2020g)
Ireland's Eye SPA [004117]	Approximately 14.1km north 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. (NPWS 2022e) and Natura 2000 – Standard Data Form (NPWS 2020h)

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
Malahide Estuary SPA [004025]	Approximately 14.1km north 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 2013h) and Natura 2000 – Standard Data Form (NPWS 2020i)
Rogerstown Estuary SPA [004015]	Approximately 18.7km 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. (NPWS 2013i) and Natura 2000 – Standard Data Form (NPWS 2020j)
Lambay Island SPA [004069]	Approximately 22.2km north-east of the Proposed Scheme	• Fulmar *Fulmarus glacialis* [A009]; • Cormorant *Phalacrocorax carbo* [A017]; • Shag *Phalacrocorax aristotelis* [A018]; • Greylag Goose *Anser anser* [A043]; • Lesser Black-backed Gull *Larus fuscus* [A183]; • Herring Gull *Larus argentatus* [A184]; • Kittiwake *Rissa tridactyla* [A188]; • Guillemot *Uria aalge* [A199]; • Razorbill *Alca torda* [A200]; and • Puffin *Fratercula arctica* [A204]. *S.I. No. 242/2010 – European Communities (Conservation of Wild Birds (Lambay Island Special Protection Area 004069)) Regulations 2010* Source: Conservation objectives for Lambay Island SPA [004069]. First Order Site -specific Conservation Objectives Version 1.0. (NPWS 2022f) and Natura 2000 – Standard Data Form (NPWS 2020k)

Site Name	Distance	Designation – QIs or SCIs (*=priority Annex I habitats)
Skerries Islands SPA [004122]	Approximately 28.1km north of the Proposed Scheme	• Cormorant *Phalacrocorax carbo* [A017]; • Shag *Phalacrocorax aristotelis* [A018]; • Brent Goose *Branta bernicla hrota [*A046]; • Purple Sandpiper *Calidris maritima [*A148]; • Turnstone *Arenaria interpres* [A169]; and • Herring Gull *Larus argentatus* [A184]. *S.I. No. 245/2010 – European Communities (Conservation of Wild Birds (Skerries Islands Special Protection Area 004122)) Regulations 2010.* Source: Conservation Objectives: Skerries Islands SPA 004122. First Order Site -specific Conservation Objectives Version 1.0. (NPWS 2022g) and Natura 2000 – Standard Data Form (NPWS 2020l)
Rockabill SPA [004014]	Approximately 28.7km north 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. (NPWS 2013j) and Natura 2000 – Standard Data Form (NPWS 2020m)

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

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

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

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

The Loughlinstown Woods pNHA and Grand Canal pNHA are the closest pNHAs to the Proposed Scheme and lie immediately adjacent to it or are crossed by it. Booterstown Marsh pNHA is the next nearest pNHA to the Proposed Scheme. It is located approximately 910m east of the Proposed Scheme.

The Grand Canal, which is located within the Dublin City Development Plan 2022-2028 administrative boundary is hydrologically connected to the Proposed Scheme and is traversed by the Proposed Scheme via an existing bridge – Eustace Bridge on Leeson Street. Loughlinstown Woods pNHA lies within the administrative boundary of the Dún Laoghaire-Rathdown County Development Plan 2022-2028 and is intersected by the Proposed Scheme and there is hydrologically connected to the Proposed Scheme via surface water drainage network. However, there is an apparent legacy mapping issue as the north-western boundary of the pNHA, which is shown as partially overlapping with the long-established road, does not support any features of the pNHA and will not be directly result in loss of pNHA territory.

There are seven pNHAs that are located downstream of the Proposed Scheme in Dublin Bay and Killiney Bay. These pNHAs are Booterstown Marsh pNHA, South Dublin Bay pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Bray Head pNHA, North Dublin Bay pNHA, Dolphins, Dublin Docks pNHA and Howth Head pNHA. These sites will be hydrologically connected to the Proposed Scheme via the Grand Canal, River Dodder, Brewery Stream, Shanganagh River, Rathmichael Stream and River Dargle as well as Ringsend WwTP. These pNHAs lie within the administrative boundaries of the Dublin City Development Plan 2022-2028 (DCC 2016), South Dublin County Development Plan 2022-2028 (SDCC 2022), Dún Laoghaire-Rathdown County Development Plan 2022-

2028 (DLRCC 2022), Wicklow County Development Plan 20222028 (WCC 2022) and/or Fingal Development Plan 2023-2029 (Fingal County Council 2023).

There is one NHA and ten pNHAs within the ZoI of the Proposed Scheme containing SCI species that are known to forage and/or roost at inland sites across Dublin. These include Skerries Island NHA, South Dublin Bay pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, North Dublin Bay pNHA, The Murrough pNHA, Baldoyle Bay pNHA, Malahide Estuary pNHA, Ireland's Eye pNHA, Portraine Shore pNHA, Rogerstown pNHA and Lambay Island pNHA.

There is one NHA and 40 pNHAs located in the wider area of the Proposed Scheme. These are listed in Table 12.6 and illustrated in Figure 12.4 in Volume 3 of this EIAR. Table 12.6 lists these sites, their distance from the Proposed Scheme, and the ecological features for which the sites are designated / proposed. Nineteen of these are located within the ZoI of the Proposed Scheme (see Table 12.6).

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

Table 12.6: NHA and pNHAs Located Within the ZoI of the Proposed Scheme Boundary (Highlighted in Light Blue), and Those in the Wider Area of the Proposed Scheme Boundary

Site Name	Distance	Description
NHAs		
Skerries Island NHA [001218]	Approximately 28.1km north-east of the Proposed Scheme	See Table 12.5 under Skerries Island SPA
pNHAs		
Loughlinstown Woods pNHA [001211]	The pNHA is directly adjacent to the Proposed Scheme	Demesne-type woodland.
Grand Canal pNHA [002104]	The pNHA is crossed by the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
Booterstown Marsh pNHA [001205]	Approximately 975m east of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
South Dublin Bay pNHA [000210]	Approximately 1.1km east of the Proposed Scheme	See Table 12.5 under South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	Approximately 1.1km east of the Proposed Scheme	Good example of a coastal system with habitats ranging from sub-littoral to coastal heath. Flora is well developed and includes some scare species. The islands are important bird sites. See also Table 12.5 under Rockabill to Dalkey Island SAC and Dalkey Islands SPA
Royal Canal pNHA [002103]	Approximately 1.6km north of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa.*
Bray Head pNHA [000714]	Approximately 1.7km north of the Proposed Scheme	See Table 12.5 under Bray Head SAC.
Ballyman Glen pNHA [000713]	Approximately 1.9km north of the Proposed Scheme	See Table 12.5 under Ballyman Glen SAC.
Dingle Glen pNHA [001207]	Approximately 2.7km south of the Proposed Scheme	Variety of habitat present, including woodland.
North Dublin Bay pNHA [000206]	Approximately 2.8km east of the Proposed Scheme	See Table 12.5 under North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA
Fitzsimon's Wood pNHA [001753]	Approximately 2.9km south of the Proposed Scheme	Birch woodland, which is very rare in County Dublin.
Dargle River Valley pNHA [001754]	Approximately 2.9km south of the Proposed Scheme	See Table 12.5 under Knocksink Wood SAC.
Dolphins, Dublin Docks pNHA [000201]	Approximately 3.4km east of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA.
Knocksink Wood pNHA [000752]	Approximately 3.9km south of the Proposed Scheme	See Table 12.5 under Knocksink Wood SAC.
Powerscourt Woodland pNHA [001768]	Approximately 4.2km south of the Proposed Scheme	The site is designated for its woodland and for the rich flora on the banks of the River Dargle which flows through it. Presence of rare Myxomycete fungus, *Didymium clavus*.

Site Name	Distance	Description
Great Sugar Loaf pNHA [001769]	Approximately 4.3km south of the Proposed Scheme	The site is designated for its ecological and geological features of interest, such as upland plant communities and rich geology. It also a prominent feature in the landscape of north Co. Wicklow.
Kilmacanoge Marsh pNHA [000724]	Approximately 4.6km south of the Proposed Scheme	Diversity of species-rich wetland habitats within a relatively small area and presence of some rare invertebrates, including *Oxycera falleni*, *Oxycera morrisii* and *Parhelophilus consimilis*.
Ballybetagh Bog pNHA [001202]	Approximately 4.9km south-east of the Proposed Scheme	Marshland.
Liffey Valley pNHA [000128]	Approximately 6.5km north-east of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, rare Red List plant species green figwort *Scrophularia umbrosa* and yellow archangel *Lamiastrum galeobdolon* and the diversity of habitat present.
Santry Demesne pNHA [000178]	Approximately 6.8km north-east of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, and woodland.
Dodder Valley pNHA [000991]	Approximately 6.9km south of the Proposed Scheme	The last remaining stretch of natural riverbank vegetation on the River Dodder in the built-up Greater Dublin Area.
Glen of the Downs pNHA [000719]	Approximately 6.9km south of the Proposed Scheme	See Table 12.5 under Glen of the Downs SAC.
Glencree Valley pNHA [001755]	Approximately 7.1km south-east of the Proposed Scheme	Good example of a deciduous woodland and diversity of habitats including upland river and boggy flushes.
Powerscourt Waterfall pNHA [001767]	Approximately 7.8km south of the Proposed Scheme	The site is designated for its waterfall which is one of the most spectacular ones found in Ireland, as well as its good exposure of schist and granite. Presence of scarce and rare flowering plants, lichens, bryophytes and mosses.
The Murrough pNHA [000730]	Approximately 10.2km south of the Proposed Scheme	See Table 12.5 under The Murrough SPA.
Howth Head pNHA [000202]	Approximately 10.4km north-east of the Proposed Scheme	See Table 12.5 under Howth Head SAC and Howth Head Coast SPA.
Baldoyle Bay pNHA [000199]	Approximately 10.9km north-east of the Proposed Scheme	See Table 12.5 under Baldoyle Bay SAC and Baldoyle Bay SPA.
Glenasmole Valley pNHA [001209]	Approximately 11.1km south of the Proposed Scheme	See Table 12.5 under Glenasmole Valley SAC.
Carriggower Bog pNHA [000716]	Approximately 11.1km south of the Proposed Scheme	See Table 12.5 under Carriggower Bog SAC.
Feltrim Hill pNHA [001208]	Approximately 11.6km north-east of the Proposed Scheme	Good example of knoll-reef phenomenon. Previously known to contain two rare plant species, namely spring squill *Scilla verna* and long-stalked crane's-bill *Geranium columbinum.*
Sluice River Marsh pNHA [001763]	Approximately 11.8km north-east of the Proposed Scheme	Freshwater marsh.
Lugmore Glen pNHA [001212]	Approximately 12.1km south of the Proposed Scheme	Presence of the rare Red Data Book species yellow archangel *Lamiastrum galeobdolon*.
Vartry Reservoir pNHA [001771]	Approximately 13km south of the Proposed Scheme	The site is designated for its wintering waterfowl, its diversity of habitats, as well as for the presence of some plant species that are relatively rare in eastern Ireland.
Malahide Estuary pNHA [000205]	Approximately 14km north-east of the Proposed Scheme	See Table 12.5 under Malahide Estuary SAC and Malahide Estuary SPA.
Ireland's Eye pNHA [000203]	Approximately 14.3km north of the Proposed Scheme	See Table 12.5 under Ireland's Eye SAC and Ireland's Eye SPA.
Slade Of Saggart And Crooksling Glen pNHA [000211]	Approximately 14.6km east of the Proposed Scheme	Good example of a wooded river valley and a small wetland system. Presence of rare plant and invertebrate species and a variety of wildfowl species
Royal Canal pNHA [002103]	Approximately 1.6km north-east of the Proposed Scheme	The site is designated for its canal which is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Tarmonbarry. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.
Portraine Shore pNHA [001215]	Approximately 18.3km north of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA.
Rogerstown Estuary pNHA [000208]	Approximately 18.4km north of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA.

Site Name	Distance	Description
Lambay Island pNHA [000204]	Approximately 22.4km north of the Proposed Scheme	See Table 12.5 under Lambay Island SAC and Lambay Island SPA.

12.3.4.3 Other Designated Sites

Other designations recognised in the Greater Dublin area including Ramsar wetlands sites and UNESCO Dublin Bay Biosphere are considered in terms of the European and National sites assessment, whilst the three Special Area Amenity Order sites are local to specific Bus Connects corridors but are nonetheless captured in the overall EIAR biodiversity assessment and NIS 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 2nd February 1971 in the Iranian city of Ramsar. The official name of the treaty 'The Convention on Wetlands of International Importance Especially as Waterfowl Habitats' reflects the emphasis on the protection of wetlands primarily as habitat for waterbirds.

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

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

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

12.3.4.3.2 UNESCO Dublin Bay Biosphere

Dublin Bay was initially recognised by the United Nations Education, Scientific and Cultural Organisation (UNESCO) for its rare and internationally important habitats and species of wildlife. 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 300km^2 of marine and terrestrial habitat encompassing North Bull Island and ecologically significant habitats such as the Tolka and Baldoyle Estuaries, Howth Head, Dalkey Island, Killiney Hill and Booterstown Marsh. Over 300,000 people live within the newly enlarged Biosphere.

While the Biosphere designation does not strictly add any specific new legal protection, it greatly enhances the many legal protections that already exist by improving the coordination and management of its functions in a holistic and integrated way. In this respect the biodiversity assessment for the EIAR and the AA for the Proposed Scheme collectively addresses the key biodiversity elements of the Biosphere designation, and no further discussion is provided.

12.3.4.3.3 Special Amenity Area Order

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

A number of Special Amenity Area Orders have been recognised in Ireland, many of them in the Greater Dublin Area including Wicklow, and can cross local authority administrative boundaries. They include:

- North Bull Island;

- Howth Head;
- Liffey Valley; and
- Bray 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.

12.3.5 Habitats

12.3.5.1 Overview

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

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

- Arable crops (BC1);
- Flower beds and borders (BC4);
- Buildings and artificial surfaces (BL3);
- Tidal rivers (CW2);
- Spoil and bare ground (ED2);
- Recolonising bare ground (ED3);
- Depositing / lowland rivers (FW2);
- Canals (FW3);
- Reed and large sedge swamps (FS1);
- Amenity grassland (improved) (GA2);
- Dry meadows and grassy verges (GS2);
- Residential;
- (Mixed) broadleaved woodland (WD1);
- Scattered trees and parkland (WD5);
- Hedgerows (WL1);
- Treelines (WL2);
- Wet willow-alder-ash woodland (WN6);
- Scrub (WS1);
- Immature Woodland (WS2); and
- Ornamental / non-native shrub (WS3).

The habitat type tidal rivers (CW2) corresponds with the Annex I habitat ‘Estuaries [1130]’ and is present in the Liffey Estuary Upper, downstream of the Proposed Scheme. The dry meadows and grassy verges (GS2) habitats located within the Proposed Scheme does not correspond with the Annex I habitat ‘lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510]’. The wet willow-alder-ash woodland (WN6) which corresponds with the Annex I priority habitat ‘*alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae) (91E0)’ is located approximately 5m (at its closest point) east and downgradient of the Proposed Scheme at the Loughlinstown Woods pNHA.

12.3.5.2 Arable crops (BC1)

This habitat type refers to agricultural land that is cultivated and managed for the production of arable crops, generally cereals (wheat, barley, oats, maize). It was recorded at two locations across the Proposed Scheme,

namely lands to the immediate south of St. James Church on the Dublin Road (opposite Woodbrook Downs) and north of Allies River Road, Shankill.

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

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 two locations across the Proposed Scheme, the largest areas of this habitat type are located at UCD Veterinary Hospital, comprising planted beds lining the car park, and at the junction of R138 Sussex Road and Leeson Street Upper, on the road median comprising raised planted beds at a commercial property.

Ornamental species present at this habitat included ornamental non-native species including butterfly-bush *Buddleja davidii*, cabbage palm *Cordyline* spp., cotoneaster species *Cotoneaster* spp., eucalyptus *Eucalyptus gunnii* and New Zealand broadleaf *Griselinia littoralis*.

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

This habitat type is of Local Importance (Lower Value) due to its fragmented nature and as it is typically characterised by a high portion of non-native species.

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: amenity grassland (improved) (GA2), and ornamental / non-native shrub (WS3).

This habitat type is of Local Importance (Lower Value) due to it being devoid of vegetation and its artificial nature.

12.3.5.5 Tidal rivers (CW2)

This habitat type refers to lower reaches of rivers or streams, and any artificial watercourses that are tidal and where there are regular fluctuations in salinity and turbidity, and in the rate and direction of flow. It was present at one location along the Proposed Scheme, at its southern end point at Fran O'Toole Bridge in Bray, which crosses the Dargle River Estuary (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Dargle River at this location is classified as *'*Good*'* status for the period 2016 to 2021 and is deemed 'Not at Risk' of failing to meet its requirements under Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (hereafter referred to as the Water Framework Directive or WFD). The estuary has been assigned 'Moderate' status and its risk status is currently under WFD review.

The Dargle River Estuary overlaps with the favourable reference range of this Annex I habitat as presented in 'The Status of EU Protected Habitats and Species in Ireland Article 17' report (NPWS 2019b). This habitat type refers to the Annex I habitat Estuaries (1130) and overlaps with the favourable reference range of this Annex I habitat (NPWS 2019b). The current trend for this habitat at a national scale is assessed as being 'Stable', with both its range and area in a 'Favourable' condition. Future prospects for the habitat are deemed as 'Inadequate' based on its 'Poor' structure and functions. Therefore, its overall conservation status is deemed as 'Inadequate' (NPWS 2019b).

This habitat type corresponds with the Annex I habitat 'Estuaries [1130]' and is of National Importance.

12.3.5.6 Spoil and bare ground (ED2)

This habitat type was present at three locations across the Proposed Scheme during the surveys, at, a driveway adjacent to Wilford Roundabout; Shanganagh Park Playground (two areas); lands at Stonebridge Road near Rathmichael Parish National School, and on a road median along the R138 Stillorgan Road at Airfield Park (as well two area in the RTE campus adjacent to but outside the Proposed Scheme Red Line Boundary). 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. It is recognised that this habitat classification, given its nature can change over relatively short time frame, owing to management and/or development of vegetative cover.

Plant species recorded within this habitat include horsetail species *Equisetum* spp. and winter heliotrope *Petasites pyrenaicus*.

This habitat type is of Local Importance (Lower Value) due to its poor species diversity and disturbed nature.

12.3.5.7 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 where vegetation cover is now greater than 50%. This habitat type was identified in three locations including along the road medians each side of R116 Cherrywood Road, an area north-west of Cherrywood Luas stop and within Loughlinstown Woods pNHA.

Most of the vegetation recorded were ruderal species commonly found in this habitat type. Species included butterfly-bush, coltsfoot *Tussilago farfara,* creeping buttercup *Ranunculus repens,* dandelion *Taraxacum officinale* agg., field bindweed *Convolvulus arvensis*, forget-me-not species *Myosotis* spp., geranium species *Geranium* spp., hoary willowherb *Epilobium parviflorum*, hogweed *Heracleum sphondylium,* ribwort plantain *Plantago lanceolata*, smooth sow-thistle *Sonchus oleraceus* and thistle species *Cirsium* spp.

This habitat type was found in a mosaic with wet willow-alder-ash woodland (WN6) within Loughlinstown Woods pNHA.

This habitat type is of Local Importance (Lower Value) due to its highly disturbed nature and poor species diversity.

12.3.5.8 Depositing / lowland rivers (FW2)

This habitat type refers to the River Dodder (Dodder_050), Brewery Stream (Brewery Stream_010), Shanganagh River (Shanganagh_010) and Rathmichael Stream (Dargle_040) which are classified as depositing / lowland rivers. These habitats are present at multiple locations across the Proposed Scheme and/ or hydrologically connected to it and are discussed individually below.

The Proposed Scheme crosses the River Dodder at Anglesey Bridge, Donnybrook (illustrated in Figure 12.2 in Volume 3 of this EIAR). The River Dodder is classified as having 'Moderate' ecological status for the period 2016-2021 and is deemed to be 'At Risk' of failing to meet its requirements under the Water Framework Directive.

Riparian vegetation identified along the River Dodder banks at Anglesey Bridge include Alexanders *Smyrnium olusatrum,* bramble *Rubus fruticosus* agg., butterfly-bush, common reed *Phragmites australis*, crack willow *Salix fragilis.* elder *Sambucus nigra,* field bindweed, hogweed, and ivy *Hedera helix*. Non-native invasive species observed included gunnera *Gunnera* spp., Himalayan balsam *Impatiens glandulifera*, Japanese knotweed *Reynoutria japonica* and winter heliotrope. Adjacent bankside habitat types consisted of (Mixed) broadleaved woodland (WD1) and scrub (WS1).

The Proposed Scheme crosses the Brewery Stream at St. John of God Hospital on the N11 Stillorgan Road (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Brewery Stream is culverted under the N11 Stillorgan Road. The Brewery Stream is classified as having 'Poor' ecological status for the period 2016-2021 and its risk status is currently under review under the Water Framework Directive.

The Proposed Scheme crosses the Shanganagh River north of St. Columcille's Hospital on the N11 Bray Road adjacent to Loughlinstown Woods pNHA (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Shanganagh

River is culverted under the N11 Bray Road at this location. The Shanganagh River is classified as having 'Good status' for the period 2016-2021 and is deemed to be 'Not at Risk' of failing to meet its requirements under the Water Framework Directive.

The Proposed Scheme crosses the Rathmichael Stream at Woodbrook College, on the Dublin Road north of Wilford Roundabout (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Rathmichael Stream is culverted under the Dublin Road. The Rathmichael Stream is classified as having 'Good' ecological status for the period 2016-2021 and is deemed to be 'Not at Risk' of failing to meet its requirements under the Water Framework Directive.

This habitat type is of Local Importance (Higher Value) as it is not common in the surrounding area. Although many of the watercourses within this habitat type are highly modified through culverting, the River Dodder is a fine example of a depositing / lowland river (FW2) and brings this valuation to a higher value.

12.3.5.9 Canals (FW3)

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

Adjacent bankside habitat types consisted of amenity grassland (improved) (GA2) and treelines (WL2) to the east of the bridge. Species recorded along the canal banks include common reed, flag iris *Iris pseudacorus,* redshank *Persicaria maculosa* and shepherds' purse *Capsella bursa-pastoris.*

The legally protected Flora Protection Order species opposite-leaved pondweed *Groenlandia densa* is recorded at several areas throughout the Grand Canal. The desk study returned records for this species within the 2km Grid Square O13R adjacent to the Proposed Scheme.

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

12.3.5.10 Reed and large sedge swamps (FS1)

Reed and large sedge swamps was present at one location along the Grand Canal, South Dock, located between Wilton Terrace and Mespil Road. This habitat is predominantly dominated by a small group of herbaceous species, commonly by large grasses and reeds such as common reed and floating sweet grass *Glyceria fluitans*, and forbs species including greater bindweed *Calystegia sepium,* gypsywort *Lycopus europaeus*, hoary willowherb, mare's-tail *Hippirus vulgarus,* meadowsweet *Filipendula ulmaria,* water mint *Mentha aquatica* and wild angelica *Angelica sylvestris.*

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

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 12.2 in Volume 3 of this EIAR). The largest areas of this habitat comprised linear strips along the road medians of the N11 Bray Road / Stillorgan Road, as well as land east of R119 Wilford Roundabout, sports pitches at St. Laurence College, Shanganagh Park, St. Brigid's Rugby Club, Cabinteely Athletic Club, Loughlinstown Pitch and Putt Club, St James Church Church, St. Anne's Church, Castlefarm, Rathmichael School, St. John of God Hospital and Coláiste Eoin playing fields.

Grass species present included annual meadow grass *Poa annua*, cock's-foot *Dactylis glomerata* perennial ryegrass *Lolium perenne*, wall barley *Hordeum murinum* and Yorkshire-fog *Holcus lanatus*, while forb species present included common bird's-foot-trefoil *Lotus corniculatus,* broad-leaved dock *Rumex obtusifolius,* common knapweed *Centaurea nigra,* common ragwort *Jacobaea vulgaris,* common thistle *Cirsium vulgare,* creeping cinquefoil *Potentilla reptans,* creeping thistle *Cirsium arvense,* daisy *Bellis perennis,* dandelion, greater plantain *Plantago major,* hawksbeard *Crepis* spp., herb-Robert *Geranium robertianum,* hogweed, Irish spurge *Euphorbia hyberna*, nettle *Urtica dioica*, red clover *Trifolium pratense,* redshank, rosebay willowherb *Chamaenerion angustifolium*, ribwort plantain, smooth sow-thistle, traveller's-joy *Clematis vitalba,* tufted vetch *Vicia cracca,* white

clover *T. repens,* willowherb species *Epilobium* spp., winter heliotrope, yarrow *Achillea millefolium* and yellow oxeye daisy *Buphthalmum salicifolium*.

This habitat type often occurred in mosaics with buildings and artificial surfaces (BL3), hedgerows (WL1), scrub (WS1), scattered trees and parkland (WD5) and treelines (WL2).

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

12.3.5.12 Dry meadows and grassy verges (GS2)

This habitat type comprises unmanaged grassland areas including areas of parkland following a low maintenance regime and roadside verges. This habitat type was recorded in four areas across the Proposed Scheme including along the boundary of Loughlinstown Woods pNHA and Loughlinstown Pitch and Putt Club, roadside verges at St. Laurence College and at Maple Manor Cabinteely (illustrated in Figure 12.5 in Volume 3 of this EIAR).

Grass species present included cock's-foot, perennial ryegrass and Yorkshire-fog, while forb species present included bramble, broad-leaved dock, butterfly-bush, common bird's-foot trefoil, common knapweed, common ragwort, common thistle, common valerian *Valeriana officinalis,* creeping buttercup, creeping cinquefoil, creeping thistle, curled dock *Rumex crispus*, dandelion, flag iris, giant hogweed *Heracleum mantegazzianum* (a Third Schedule non-native invasive species), hogweed, horsetail species, red clover, ribwort plantain, rose species *Rosa* spp., rosebay willowherb, silverweed *Anserina anserina*, tormentil *Potentilla erecta*, winter heliotrope and yarrow.

This habitat type also occurred in mosaics with scattered trees and parkland (WD5).

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

12.3.5.13 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 / non-native shrub (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) due to poor species diversity, as well as its artificial nature.

12.3.5.14 (Mixed) broadleaved woodland (WD1)

This habitat was identified at 21 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 along the R119 Dublin Road from Wilford Roundabout to Shanganagh Park, Shankill; St. Columcille's Hospital; Cabinteely Athletic Club; on the N11 Bray Road from Clonkeen Road to Beech Park Road; and the N11 Stillorgan Road from Stillorgan Park to Trees Road. Other areas of this habitat type were recorded at Cornelscourt, R138 Morehampton Road, N11 at Shrewsbury Lawn, R138 Stillorgan Road at UCD and RTÉ campuses.

Tree species recorded at these locations include alder *Alnus glutinosa,* ash *Fraxinus excelsior*, beech *Fagus sylvatica,* birch species *Betula* spp., cherry laurel *Prunus laurocerasus*, cherry species *Prunus Kanzan,* crack willow, elder, elm species *Ulmus* spp., maple species *Acer* spp., hazel *Corylus avellana*, hawthorn *Crataegus monogyna*, holly *Ilex aquifolium*, horse chestnut *Aesculus hippocastanum*, Leyland cypress *Cupressus* × *leylandii*, oak species *Quercus* spp., pine species *Pinus* spp., rowan *Sorbus aucuparia*, Scots pine *Pinus sylvestris,* small-leaved lime *Tilia cordata,* sycamore *Acer pseudoplatanus*, willow species *Salix* spp. and yew *Taxus baccata*.

Where present, understorey and field layer / ground flora species include Alexanders, annual meadow grass, bramble, barren brome grass *Bromus sterilis,* burdock *Arctium* spp., bush vetch *Vicia sepium,* butterfly-bush, cabbage palm, cleavers *Galium aparine*, cock's-foot, common ragwort, common thistle, common valerian, cotoneaster species, dandelion, dogwood species *Cornus* spp., field bindweed, herb-Robert, hogweed, ivy,

Japanese rose *Rosa rugosa,* lady's bedstraw *Galium verum*, New Zealand broadleaf, oleander *Nerium oleander*, ribwort plantain, rose species, rosebay willowherb, shepherds' purse, St. John's wort *Hypericum* spp., traveller's-joy, wallflower species *Erysimum* spp., wild marjoram *Origanum vulgare,* winter heliotrope, wood avens *Geum urbanum* and Yorkshire-fog.

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

12.3.5.15 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 20 locations across the Proposed Scheme, associated with residential green areas, church grounds, parks and playing pitches (illustrated in Figure 12.5 in Volume 3 of this EIAR). The most significant areas of this habitat type were present at R119 Wilford Roundabout, Cois Cairn, Stonebridge Road, Rockwood, Radisson Blu St. Helen's Hotel, UCD Campus, RTÉ and Donnybrook Castle.

Tree species identified at these locations include alder, apple tree *Malus domestica,* ash, bay laurel *Laurus nobilis,* beech, birch species, cherry laurel, cherry species, copper beech *Fagus sylvatica purpurea*, crack willow, cypress species *Cupressus* spp., elder, elm species, eucalyptus, hawthorn, holly, holm oak *Quercus ilex,* hornbeam *Carpinus betulus*, horse chestnut, London plane *Platanus* × *acerifolia,* maple species, oak species, pine species, rowan, Scots pine, small-leaved lime, sycamore, Turkish oak *Quercus cerris,* willow species, whitebeam *Sorbus aria* and yew. The understorey commonly comprised barberry *Berberis* spp., butterfly-bush, cotoneaster species, gorse species *Ulex* spp., New Zealand broadleaf and rosebay willowherb. The field layer comprised bramble, ivy and nettle. Grass species present comprise perennial ryegrass. Ornamental species such as bamboo species *Bambusoideae* subfamily, and cabbage palm also featured occasionally.

This habitat type also occurred in mosaics with amenity grassland (improved) (GA2) and dry meadows and grassy verges (GS2).

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 Hedgerows (WL1)

Hedgerows were identified in approximately 19 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 which were recorded along the Proposed Scheme consisted of screening vegetation at residential properties, along roadsides and within the vegetated median of larger roads, rather than native and long-established hedgerow. Substantial linear areas of this habitat are present, along the N11 Bray Road between Kilbogget park at Shrewsbury Lawns and Cornelscourt, the R119 Dublin Road Shankill, the central road median of the N11 Bray Road and at St. Columcille's Hospital, include N11 Stillorgan Road from Newtownpark Avenue to St. John of God Hospital, and at UCD, RTÉ and Donnybrook Castle. Property boundaries consisting of this habitat type were identified at Corke Lodge, Cabinteely Way, Kill Lane, Rockbrook Hall, Mount Merrion Avenue, Thornwood, Radisson Blu St. Helen's Hotel, Church of the Sacred Heart, the Clayton Hotel and Starbucks Lower Leeson Street

The species composition varied greatly within this habitat type. Tree and shrub species consisted of alder, ash, aspen *Populus tremuloides*, barberry, bay laurel, beech, cherry laurel, cherry species, copper beech, cotoneaster species, cypress, dogwood, elder, eucalyptus, firethorn species *Pyracantha* spp., fuchsia species *Fuchsia* spp., garden privet *Ligustrum ovalifolium,* hawthorn, hazel, holly, hornbeam, horse chestnut, Leyland cypress, London plane, maple species, oleander, poplar species *Populus* spp., purple maple *Acer palmatum 'Atropurpureum'*, red robin *Photinia x fraseri 'Red Robin',* Scots pine, snowberry *Symphoricarpos albus*, sycamore, whitebeam, willow species, wych elm *Ulmus glabra* and yew.

The field layer comprised species including bramble, bush daisy *Euryops pectinatus*, cleavers, common bird's-foot-trefoil, common groundsel *Senecio vulgaris*, common thistle, common valerian, dandelion, hebe species *Hebe* spp., hedge bindweed, Himalayan honeysuckle *Leycesteria Formosa,* hogweed, ivy, lavender species

Lavandula spp., Montbretia *Crocosmia* X *crocosmiiflora*, nettle, rose species, St. John's-wort species, traveller's-joy, winter heliotrope, wood avens and Yorkshire-fog.

This habitat type also occurred in mosaics with amenity grassland (improved) (GA2) and scrub (WS1).

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

12.3.5.17 Treelines (WL2)

This habitat comprises 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 composed of urban street planting along footpaths / strips of amenity grassland and road edges. Substantial areas of this habitat are present along the R119 Dublin Road, the N11 Bray Road, N11 Stillorgan Road, R138 Donnybrook Road, R138 Morehampton Road, R138 Leeson Street Upper, R138 Sussex Road, Grand Canal, R138 Leeson Street Lower and Hatch Street Lower.

Species frequently recorded include alder, apple tree, ash, beech, birch species *Betula* sp., common lime *Tilia* × *europaea*, cypress species, elder, field maple *Acer campestre*, hawthorn, hazel, holly, holm oak, hornbeam, horse chestnut, Leyland cypress, London plane, oak species, oleander, purple maple, rowan, Scots pine, small-leaved lime, sycamore, weeping willow *Salix babylonica* and whitebeam.

The understorey consists of a variety of species including bramble, gorse species, hydrangea *Hydrangea* spp., rose species and St. John's-wort species. The field layer comprised borage *Borago officinalis*, dandelion, ivy, nettle, pendulous sedge *Carex pendula*, traveller's-joy and Yorkshire-fog.

This habitat type also occurred in mosaics with amenity grassland (improved) (GA2) and scrub (WS1).

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

12.3.5.18 Wet willow-alder-ash woodland (WN6)

This habitat type was identified at one location across the proposed scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR) at Loughlinstown Woods pNHA which is located on the eastern side of the N11 Bray Road. The Shanganagh River flows through the site, with frequent flooding, supporting a good example of wet alder woodland along the valley floor.

This habitat type corresponds to the EU Annex I Priority habitat type 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae) (91E0)'. The species recorded during surveys are characteristic of this priority habitat type, with a total of ten positive indicator species recorded at the site. Seven positive indicator species as per 'The Status of EU Protected Habitats and Species in Ireland' and 'The Interpretation Manual of European Union Habitats 2013' comprising alder, ash, downy birch *B. pubescens,* grey willow *Salix cinerea*, nettle, pendulous sedge, and reed canary-grass *Phalaris arundinacea.* (NPWS 2019b; European Commission 2013b). An additional three positive indicator species as per 'The National Survey of Native Woodlands 2003-2008 (NSNW)' were recorded including creeping bent-grass *Agrostis stolonifera,* marsh-bedstraw *Galium palustre* and flag iris (Perrin *et al., 2008).*

Throughout the survey area dominant tree species included alder, downy birch, goat willow *Salix caprea,* grey willow, Italian alder *Alnus cordata* and pendulous birch *B. pendula*. Other tree species frequently observed, comprised ash, beech, creeping buttercup*,* hazel, pedunculate oak *Quercus robur,* sycamore and wych elm. The understorey consists of broad buckler-fern *Dryopteris dilatata,* common thistle, creeping bent-grass, harts-tongue fern *Asplenium scolopendrium,* Irish ivy *Hedera hibernica*, lords-and-ladies *Arum maculatum*, marsh-bedstraw *Galium palustre*, marsh-marigold *Caltha palustris*, nettle, pendulous sedge, pirri-pirri bur *Acaena novae-zelandiae*, smooth sow-thistle and yellow iris.

Loughlinstown Woods pNHA was surveyed as part of the National Survey of Native Woodland in Ireland (NSNW) and was classified in the 2006 Second Phase Report as *Alnus glutinosa – Filipendula ulmaria* woodland of

Calystegia sepium type (Perrin *et al*., 2006). Loughlinstown Woods pNHA, identified as NSNW site 918 (Perrin *et al*., 2008) and mapped post-hoc from field maps, was classified as Annex I call based on a single relevé; may be in mosaic with non-91E0 woodland. Following NPWS (2013) guidance, 100% of area was assigned to 91E0 (O'Neill *et al*., 2010).

Since the NSNW survey undertaken in 2006 there have been changes both in terms of historical management of the woodland, and the species mix and cover abundance has matured i.e., percentage ash cover recorded. As such the area comprises a mosaic of habitats and transitions to other woodland types as currently mapped. Based on species composition, alluvial deposits and NPWS data, the area of habitat wet willow-alder-ash woodland (WN6) which was surveyed in December 2020 has been linked to Annex I alluvial woodlands (91E0) in line with Perrin *et al*., (2008).

This habitat type also occurred in mosaics with recolonising bare ground (ED3).

This habitat type is of International Importance due to its Annex I priority habitat status.

12.3.5.19 Scrub (WS1)

Scrub was identified in approximately 10 locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat were located south of Wilton Roundabout at Cois Cairn and in lands to the north of Cherrywood Luas stop. This habitat occurs intermittently along the Dublin Road, Bray Road and Stillorgan Road. Other discrete areas of scrub occur at Castle Street Bray and along the banks of the River Dodder at Donnybrook.

Grass species recorded consisted of annual black medick *Medicago lupulina*, canary-grass *Phalaris canariensis,* cock's-foot, fescue species *Festuca* spp., perennial ryegrass and Yorkshire-fog. Field layer species comprised bramble, butterfly-bush, carline thistle *Carlina vulgaris*, common birds-foot trefoil, broad-leaved dock, cabbage palm, common centaury *Centaurium erythraea*, common flax *Linum usitatissimum,* common ragwort, common thistle *Cirsium vulgaris,* common toadflax *Linaria vulgaris,* cotoneaster species, cow parsley *Anthriscus sylvestris*, crack willow, fuchsia species *Fuchsia* spp., geranium species, gorse species, hawksbeard species *Crepis* spp., herb-Robert, honeysuckle species *Lonicera* spp., livelong *Hylotelephium telephium*, mayweed species *Matricaria* spp., Montbretia, moss species, nettle, pale toadflax *Linaria repens*, pot marjoram *Origanum majorana,* rape *Brassica napus*, red clover, redshank, ribwort plantain, rosebay willowherb, silverweed, speedwell species *Veronica* spp., spurge species *Euphorbia* spp., St. John's-wort species, sticky mouse-ear *Cerastium glomeratum,* sweet William *Dianthus barbatus*, traveller's-joy, vetch species *Vicia* spp., wavy bittercress *Cardamine flexuosa,* winter heliotrope and yarrow.

Trees, where this habitat type occurs in a mosaic with immature woodland (WS2) comprise species including ash, apple tree, cypress species, hazel, hawthorn, holly, Italian alder and sycamore.

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

12.3.5.20 Immature woodland (WS2)

This habitat type was identified at two locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR) on the N11 Stillorgan Road at Springfield Park and at Kelston Avenue. Immature woodland includes areas dominated by young or sapling trees below threshold height (5m, or 4m in wetlands). Tree species comprise birch, lime *Tilia* spp., sycamore and unclassified conifer species at Springfield Park, while at Kelston Avenue ash, cypress, horse chestnut, Scots pine, sycamore and unclassified conifer species all occurred.

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

12.3.5.21 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 residential and commercial property and areas of amenity grassland habitat along road medians. The largest areas of this habitat type were observed at

St. John of God Hospital, Leisureplex Stillorgan (since demolished and is currently a construction site), Thornwood Apartments, Montrose Apartments and Thornfield.

Native species identified include common valerian, lavender species, oxeye daisy *Leucanthemum vulgare*, rowan, St. John's wort species, tree-mallow *Lavatera arborea* and wallflower species. Non-native species comprise African lily *Agapanthus africanus*, angel's fishing rods *Dierama* sp., bamboo species, butterfly-bush, cotoneaster species, cypress, dogwood species, fuchsia species, hebe species, Himalayan honeysuckle, hydrangea species, iris species *Iris* spp., jasmine species *Jasminum* spp., millet species *Sorghum* spp., myrtle species *Myrtus* spp., New Zealand broadleaf, ornamental grasses, redclaws *Escallonia rubra*, red-hot-pokers *Kniphofia* sp., rose of Sharon *Hibiscus syriacus*, Spanish dagger yucca *Yucca gloriosa*, spotted laurel *Aucuba japonica*, succulent species and traveller's-joy.

Trees utilised as ornamental landscape architecture include apple tree, bay laurel, beech, birch species, cherry species, dogwood species, eucalyptus, hornbeam, magnolia species *Magnolia* spp., pine species, poplar species and rowan.

This habitat type was recorded in mosaics with buildings and artificial surfaces (BL3).

This habitat type is of Local Importance (Lower Value) due to the habitat mainly comprising non-native species.

12.3.6 Rare and Protected Plant Species

There were no protected plant species listed on the Flora Protection Order, identified within the footprint of the Proposed Scheme during field surveys.

The desk study returned records of a total of eighteen (18) species listed on the Flora Protection Order across the wider study area (i.e., grid squares O12, O13, O21 and O22) and are listed in Appendix A12.1 in Volume 4 of this EIAR. Records of Flora Protection Order species included multiple records of opposite-leaved pondweed *Groenlandia densa* in the Grand Canal (recorded in grid square O13G), as well as one record of hairy violet *Viola hirta* recorded in grid square O1034), one record of betony *Betonica officinalis* (recorded in grid square O1034), two records of hairy St. John's wort *Hypericum hirsutum* and one record of meadow barley *Hordeum secalinum* (recorded in grid square O104362), all recorded at Phoenix Park, within 2.8km of the Proposed Scheme (NBDC Online Database 2023). The records also included one record for great burnet *Sanguisorba officinalis* (recorded in grid square O13) from the University College Dublin campus; one record for small cudweed *Filago minima* (recorded in grid square O13) from Irishtown; one record for wild asparagus *Asparagus prostratus* (recorded in grid square O22) from Blackrock; two records of lesser copperwort *Cephaloziella massalongi* from Ballycorus (grid square O22); one record of bog orchid *Hammarbya paludosa* from Glenasmole (grid square O12); one record of meadow saxifrage *Saxifraga granulata* from Sidmonton Square in Bray (grid square O21; and one record for wood bitter-vetch *Vicia orobus* (recorded in grid square O12) from Firhouse.

Betony, opposite-leaved pondweed and small cudweed are both listed as 'Near threatened' on Ireland's Red List No. 10: Vascular Plants (Wyse Jackson *et al.,* 2016), while great burnet, hairy violet, meadow barley and wood bitter-vetch are listed as 'Vulnerable' and wild asparagus as 'Endangered' in the same document. These species were not recorded within the ZoI.

The Flora Protection Order species also included five bryophyte species: beck pocket moss *Fissidens rufulus* (recorded within grid square O21), bent-moss *Campylostelium Saxicola* (recorded in grid square O12); bristle-leaf *Brachydontium trichodes* (recorded in grid square O12), glass-wort feather-moss *Scleropodium tourettii* (recorded in grid square O22), lead moss *Ditrichum plumbicola* (recorded in grid square O22), and the many-seasoned thread-moss *Bryum intermedium* (recorded in grid square O12), All of these species are listed as 'Endangered' within Ireland Red List No. 8: Bryophytes (Lockhart *et al.,* 2012).

The desk study also returned one 'Critically Endangered' bryophyte species, lance-leaved pottia *Tortula lanceola*, from grid Squares O12, O13 and O22 (Lockhart *et al.,* 2012). This species is not listed on the Flora Protection Order.

Populations of flora species listed on the Flora Protection Order are valued as being of National Importance. All other Red and non-Red listed flora are considered to be of Local Importance (Higher Value).

12.3.7 Non-native Invasive Plant Species

There were three non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 which were identified at 18 areas along the Proposed Scheme namely; giant hogweed *Heracleum mantegazzianum*, Himalayan balsam *Impatiens glandulifera* and Japanese knotweed *Reynoutria japonica*. The locations of these non-native invasive plant species are summarised below in Table 12.7 and shown on Figure 12.6 in Volume 3 of the EIAR.

The desk study returned records of a total of 22 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations across the wider study area (i.e., grid squares O12, O13, O21 and O22) and are listed in Appendix A12.1 in Volume 4 of this EIAR. The desk study returned nine listed species within 1km of the Proposed Scheme (NBDC 2023); one of which was floating pennywort *Hydrocotyle ranunculoides.* The record for floating pennywort stated the plant had been removed in 2018 with no evidence of re-occurrence*.* Other records included Himalayan balsam *Impatiens glandulifera,* giant hogweed *Heracleum mantegazzianum* and Japanese knotweed *Reynoutria japonica* along the M11 and the N11 roadsides in Bray, Loughlinstown, Mount Merrion, Donnybrook, and Ranelagh; Nuttall's waterweed *Elodea nuttallii* in the Grand Canal along Grand Parade; three-cornered garlic *Allium triquetrum* at Cabinteely Park, Cornelscourt, Donnybrook village and Grand Parade; parrot's-feather *Myriophyllum aquaticum* off the R138 at Donnybrook Castle; two records of Spanish bluebell *Hyacinthoides hispanica* off the R138 within the grounds of UCD; and American skunk-cabbage *Lysichiton americanus* just off the N11 in Cabinteely Park and Loughlinstown commons.

Canadian waterweed *Elodea canadensis*, which was also documented within 1km of the Proposed Scheme, from Loughlinstown, Belfield, and Ranelagh was delisted as a Third Schedule species, with the introduction of the European Communities (Birds and Natural Habitats) (Amendment) Regulations 2015, S.I. No. 355 / 2015.

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

Reference	Species	Description
CBC0013IAPS01	Japanese knotweed *Reynoutria japonica*	Small stand on the northern bank of the River Dodder, adjacent to the eastern side of the Donnybrook Road bridge
CBC0013IAPS02	Himalayan balsam *Impatiens glandulifera*	Small stand on the northern bank of the River Dodder, adjacent to the eastern side of the Donnybrook Road bridge
CBC0013IAPS03	Japanese knotweed *Reynoutria japonica*	Treated stand on the southern bank of the River Dodder, adjacent to the western side of the Donnybrook Road bridge
CBC0013IAPS04	Japanese knotweed *Reynoutria japonica*	Small stand adjacent to the New RTÉ Entrance on the Donnybrook Road.
CBC0013IAPS05	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, adjacent to the N11 / Wyattville Link Road Junction
CBC0013APS06	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, adjacent to the N11 / Wyattville Link Road Junction
CBC0013APS07	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the western bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS08	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS09	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS10	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS11	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS12	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS13	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS14	Giant hogweed *Heracleum mantegazzianum*	Patchily distributed stand on the eastern bank of the Carrickmines Stream, south of the N11 / Wyattville Link Road Junction
CBC0013APS15	Giant hogweed *Heracleum mantegazzianum*	Stand on the northern bank of the Shanganagh River, in the north-western section of Loughlinstown Woods pNHA.
CBC0013APS16	Japanese knotweed *Reynoutria japonica*	Stand on the northern bank of the Shanganagh River, west of the Loughlinstown Road
CBC0013APS17	Japanese knotweed *Reynoutria japonica*	Stand on the southern bank of the Shanganagh River, west of the Loughlinstown Road
CBC0013APS18	Giant hogweed *Heracleum mantegazzianum*	Stand in the western section of Loughlinstown Woods pNHA, north of Loughlinstown Pitch and Putt.

12.3.8 Mammals

12.3.8.1 Bats

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

Bat surveys were carried out across four bat survey seasons between 2018 and 2021 (as described in Section 12.2.3.5). Ten transects were surveyed within the footprint of the Proposed Scheme. Transect routes were located adjacent to RTÉ, R138 Stillorgan Road (referred to as CBC0013BT001); UCD, R138 Stillorgan Road (referred to as CBC0013BT002); R112 Fosters Avenue (referred to as CBC0013BT003); St. John of God, N11 Stillorgan Road (referred to as CBC0013BT004); Seaview Park, R837 Dublin Road (referred to as CBC0013BT005); R119 Dublin Road / Shanganagh Road roundabout (referred to as CBC0013BT006); Olcovar Residential Development, R119 Dublin Road (referred to as CBC0013BT007); Wilford Roundabout, R119 Dublin Road (referred to as

CBC0013BT008); R761 Dublin Road / Upper Dargle Road (referred to as CBC0013BT009); and Fran O'Toole Bridge, R761 Main Street (referred to as CBC0013BT010) between 2018 and 2020. Three additional transects were also surveyed in 2021 at UCD (CBC0013BT011), Stonebridge Lane Cycle Way (CBC0013BT013), and Wilford Roundabout (CBC0013BT008) where the transect was shortened and referred to as CBC0013BT012 during the 2021 surveys.

The results of these are described below in Sections 12.3.8.1.1 to Section 12.3.8.1.6 and are also presented in Figure 12.7.1 in Volume 3 of this EIAR. The structure of this section is such that each bat species is described in turn. The results of the various surveys are presented to allow an understanding of each species in terms of its distribution across the Proposed Scheme.

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

12.3.8.1.1 Leisler's Bat *Nyctalus leisleri*

Leisler's bat was recorded along all of the ten transects surveyed between 2018 and 2020; CBC0013BT001 (RTÉ Stillorgan Road), CBC0013BT002 (UCD Stillorgan Road), CBC0013BT003 (Fosters Avenue), CBC0013BT004 (St. John of God), CBC0013BT005 (Seaview Park), CBC0013BT006 (Shanganagh Road / Dublin Road roundabout), CBC0013BT007 (Olcovar Residential Development), CBC0013BT008 (Wilford Roundabout), CBC0013BT009 (Upper Dargle Road) and CBC0013BT010 (Fran O'Toole Bridge), and along the three transects surveyed in 2021; CBC0013BT011 (UCD) and CBC0013BT013 (Stonebridge Lane Cycle Way) and CBC0013BT012 (Wilford Roundabout).

A total of 255 recordings of Leisler's bat were identified in these locations between 2018 and 2021. Leisler's bat activity was highest at CBC0013BT008 / CBC0013BT012 (Wilford Roundabout), with 149 recordings occurring here.

During 2018 there was a total of 132 recordings of Leisler's bats; one along CBC0013BT001 (RTÉ Stillorgan Road), eight along CBC0013BT002 (UCD), thirteen along CBC0013BT003 (Fosters Avenue), 108 along CBC0013BT008 (Wilford Roundabout), three along CBC0013BT009 (Upper Dargle Road) and five along CBC0013BT010 (Fran O'Toole Bridge). There were no Leisler's bats recordings captured along CBC0013BT005 (Seaview Park), or CBC0013BT006 (Shanganagh Road / Dublin Road roundabout) during 2018.

During autumn 2019 there were a total of 11 recordings of Leisler's bats; three along CBC0013BT003 (Fosters Avenue), four along CBC0013BT005 (Seaview Park), two along CBC0013BT008 (Wilford Roundabout), and two along CBC0013BT010 (Fran O'Toole Bridge). In Spring 2020 there were a total of 37 recordings of Leisler's bats captured; 32 along CBC0013BT002 (UCD), one along CBC0013BT003 (Fosters Avenue), two each along CBC0013BT004 (St. John of God Hospital), and CBC0013BT008 (Wilford Roundabout).

There were 36 recordings of Leisler's bats during summer 2020; one along CBC0013BT004 (St. John of God Hospital), 25 along CBC0013BT005 (Seaview Park), one along CBC0013BT006 (Shanganagh Road / Dublin Road roundabout), four along CBC0013BT007 (Olcovar Residential Development) and five along CBC0013BT008 (Wilford Roundabout).

During summer 2022 there were a total of 38 recordings of Leisler's bats; 10 along CBC0013BT011 (UCD Stillorgan Road); 23 along CBC0013BT012 (Wilford Roundabout) and five along CBC0013BT013 (Stonebridge Lane Cycle Way). The results of the bat surveys as they relate to the Leisler's bat are shown on Figure 12.7.1 in Volume 3 of this EIAR.

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

The desk study found that Leisler's bat are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). The records include 32 records of live sightings within 1km of the Proposed Scheme: 15 records from and around Grand Parade to Stephens Green; nine records from Donnybrook; six from Cabinteely; and one each at Cork Great and Ravenswell (NBDC Online Database 2023).

12.3.8.1.2 Common Pipistrelle Bat *Pipistrellus pipistrellus*

Common pipistrelle bat was recorded along nine of the ten transects surveyed between 2018 and 2020; CBC0013BT001 (RTÉ Stillorgan Road), CBC0013BT002 (UCD Stillorgan Road), CBC0013BT004 (St. John of God Hospital), CBC0013BT005 (Seaview Park), CBC0013BT006 (Shanganagh Road / Dublin Road roundabout), CBC0013BT007 (Olcovar Residential Development), CBC0013BT008 (Wilford Roundabout) CBC0013BT009 (Upper Dargle Road) and CBC0013BT010 (Fran O'Toole Bridge), and along the three transects surveyed in 2021; CBC0013BT011 (UCD) and CBC0013BT013 (Stonebridge Lane Cycle Way) and CBC0013BT012 (Wilford Roundabout).

A total of 315 recordings of common pipistrelle bat were identified in these locations between 2018 and 2021. Common pipistrelle bat activity was highest at CBC0013BT008 / CBC0013BT012 (Wilford Roundabout), with 213 recordings of this species occurring here.

During 2018 there was a total of 58 recordings: three along CBC0013BT002 (UCD), three along CBC0013BT005 (Seaview Park), 30 along CBC0013BT008 (Wilford Roundabout), 19 along CBC0013BT009 (Upper Dargle Road) and three along CBC0013BT010 (Fran O'Toole Bridge).

During autumn 2019 there were a total of 15 recordings: one along CBC0013BT002 (UCD), one along CBC0013BT004 (St. John of God Hospital), six along CBC0013BT006 (Shanganagh Road / Dublin Road roundabout), one along CBC0013BT007 (Olcovar Residential Development), five along CBC0013BT008 (Wilford Roundabout) and one along CBC0013BT009 (Upper Dargle Road).

In spring 2020 there were a total of 15 recordings: six along CBC0013BT001 (RTÉ) and nine along CBC0013BT008 (Wilford Roundabout). There were 38 recordings of common pipistrelle bats during Summer 2020: two along CBC0013BT004 (St. John of God Hospital), three along CBC0013BT005 (Seaview Park), one along CBC0013BT006 (Shanganagh Road / Dublin Road roundabout), four along CBC0013BT007 (Olcovar Residential Development), 26 along CBC0013BT008 (Wilford Roundabout) and two along CBC0013BT010 (Fran O'Toole Bridge).

During summer 2022 there were a total of 189 recordings of common pipistrelle bat; two along CBC0013BT011 (UCD Stillorgan Road); 143 along CBC0013BT012 (Wilford Roundabout) and 44 along CBC0013BT013 (Stonebridge Lane Cycle Way). The results of the bat surveys as they relate to common pipistrelle bats are shown on Figure 12.7.1 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 common pipistrelle bat are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). The records include 39 records of live sightings within 1km of the Proposed Scheme. In the southern area of the Proposed Scheme these include 21 records in total: two records within the grid square O21U and O22Q each; one record each at Cherrywood Park, Rathmichael, Killiney Hill Park; Woodpark and Sallynoggin; three records within O22M and five in O22H. In the northern area of the Proposed Scheme there were 18 records in total, including one record at Galloping Green South and Ballsbridge each, and ten records from Milltown (NBDC Online Database 2023).

12.3.8.1.3 Nathusius' Pipistrelle Bat *Pipistrellus nathusii*

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

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

The desk study found that Nathusius' pipistrelle bat are known to occur within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes two live records along the Proposed Scheme by the Grand Canal within the 2km grid square O13R (NBDC Online Database 2023).

12.3.8.1.4 Soprano Pipistrelle Bat *Pipistrellus pygmaeus*

Soprano pipistrelle bat was recorded along two of the ten transects surveyed between 2018 and 2020; CBC0013BT001 (RTÉ Stillorgan Road) and CBC0013BT008 (Wilford Roundabout), and along the three transects surveyed in 2021; CBC0013BT011 (UCD) and CBC0013BT013 (Stonebridge Lane Cycle Way) and CBC0013BT012 (Wilford Roundabout).

A total of 60 recordings of soprano pipistrelle bat were identified in these locations between 2018 and 2021. Soprano pipistrelle bat activity was highest at CBC0013BT008 / CBC0013BT012 (Wilford Roundabout), with 47 recordings of this species occurring here.

A total of nine recordings of soprano pipistrelle bat were identified in these locations between 2018 and 2020. Soprano pipistrelle bat activity was highest at CBC0013BT008 (Wilford Roundabout) with eight recordings of this species occurring here. During 2018 there was a total of eight recordings, all of which occurred along CBC0013BT008 (Wilford Roundabout). There was one recording during spring 2020 which was captured along CBC0013BT001 (RTÉ).

Soprano pipistrelle bat was recorded along all the three transects; CBC0013BT011 (UCD), CBC0013BT012 (Wilford Roundabout) and CBC0013BT013 (Stonebridge Lane Cycle Way) surveyed in summer 2021. A total of two, 39 and one recording(s) occurred along CBC0013BT011 (UCD), CBC0013BT012 (Wilford Roundabout) and CBC0013BT013 (Stonebridge Lane Cycle Way), respectively. The results of the bat surveys as they relate to the soprano pipistrelle bats are shown on Figure 12.7.1 in Volume 3 of this EIAR.

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

The desk study found that soprano pipistrelle bat are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). The records include 43 records of live sightings within 1km of the Proposed Scheme, including nine records around Grand Parade to Stephens Green, 15 records in Donnybrook, nine in Cabinteely, five in Shankill, one in Killarney Park (Bray), two in Cork Little and two in Cork Great north of Bray (NBDC Online Database 2023).

12.3.8.1.5 Brown Long-eared Bat *Plecotus auritus*

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

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

The desk study found that brown long-eared bat are known to occur within 1.5km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). These records include 11 records of live sightings within 1km of the Proposed Scheme, including four records from Loughlinstown; three records from Ballyogan; two records from Cabinteely, and one record along the Grand Canal within the 2km grid square O13R and Kilbogget Park each (NBDC Online Database 2023).

12.3.8.1.6 *Myotis* Bat Species

Records of *Myotis* bat species were not identified during any of the surveys between 2018 and 2020. A further single bat pass, attributed to a *Myotis* species, was recorded along transect CBC0013BT011 (UCD) on 31 August 2021.

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

The desk study found that Myotis bat species, including Daubenton's bat *Myotis daubentonii* and Natterer's bat *M. nattereri*, 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 36 records of Daubenton's bat within 1km of the Proposed Scheme and three records of Natterer's bat. These records include 16 records of Daubenton's bats within the 2km grid square O21U at Bray; one record from Kilbogget Park and from Brennanstown each; 13 records between Milltown and

Clonskeagh; two records from Ballsbridge; and three records for Natterer's bat between Grand Parade and St. Stephen's Green (NBDC Online Database 2023).

12.3.8.1.7 Potential Roost Features

During the earlier stage of the surveys, a number of of trees or groups of trees having potential to support roosting bats (potential roosting features, PRFs) were identified. Some were located inside the footprint of the Proposed Scheme, whilst those outside of the then Proposed Scheme boundary footprint 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 again in March 2023. Those that are to be removed are listed in Table 12.8 and shown on Figure 12.7.2 in Volume 3 of this EIAR.

Table 12.8: Summary of Trees With Potential Roost Features (PRFs) Recorded Within the Footprint of the Proposed Scheme

Reference	Species	Description	To be removed or retained
CBC0013PRF012	Horse chestnut *Aesculus hippocastanum*	Crevices, knotholes	**Removed**, Inside Proposed Scheme Footprint
CBC0013PRF001	Lime *Tilia* sp.	Knotholes, Rot holes, tear outs	**Removed**, Inside Proposed Scheme Footprint
CBC0013PRF017	Sycamore *Acer pseudoplatanus*	Knot holes and peeling bark.	**Removed**, Inside Proposed Scheme Footprint
CBC0013PRF002	Ash *Fraxinus excelsior*	Peeling bark.	**Removed**, Inside Proposed Scheme Footprint
CBC0013PRF009	Sycamore *Acer pseudoplatanus*	Knotholes	**Removed**, Inside Proposed Scheme Footprint
CBC0013PRF010	Horse chestnut *Aesculus hippocastanum*	Knot holes and peeling bark.	**Removed**, Inside Proposed Scheme Footprint
CBC0013PRF011	Horse chestnut *Aesculus hippocastanum*	Knot hole.	Retained, Outside Proposed Scheme Footprint
CBC0013PRF024	Horse chestnut *Aesculus hippocastanum*	Flush cuts, hazard beams, knot holes	Retained, Inside Proposed Scheme Footprint
CBC0013PRF025	Sycamore *Acer pseudoplatanus*	Knotholes	Retained, Inside Proposed Scheme Footprint
CBC0013PRF026	Sycamore *Acer pseudoplatanus*	Knotholes	Retained, Inside Proposed Scheme Footprint
CBC0013PRF027	Sycamore *Acer pseudoplatanus*	Knotholes	Retained, Inside Proposed Scheme Footprint
CBC0013PRF028	Sycamore *Acer pseudoplatanus*	Knotholes	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF029	Sycamore *Acer pseudoplatanus*	Hazard beams, tear outs	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF030	Ash *Fraxinus excelsior*	Hazard beams	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF008	Horse chestnut *Aesculus hippocastanum*	Branch tear out.	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF007	Horse chestnut *Aesculus hippocastanum*	Knotholes.	Retained,Edge of Proposed Scheme Footprint
CBC0013PRF006	Horse chestnut *Aesculus hippocastanum*	Knotholes.	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF005	Horse chestnut *Aesculus hippocastanum*	Knotholes.	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF004	Horse chestnut *Aesculus hippocastanum*	Knotholes, Peeling Bark	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF016	Horse chestnut *Aesculus hippocastanum*	Knotholes	**Removed,** Inside Proposed Scheme Footprint

Reference	Species	Description	To be removed or retained
CBC0013PRF015	Sycamore *Acer pseudoplatanus*	Knotholes	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF013	Sycamore *Acer pseudoplatanus*	Knotholes	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF003	Beech *Fagus sylvatica*	Knotholes	Retained, Edge of Proposed Scheme Footprint
CBC0013PRF014	Sycamore *Acer pseudoplatanus*	Knotholes	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF018	Horse chestnut *Aesculus hippocastanum*	Knotholes	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF019	Bird cherry *Prunus avium*	Ivy cover	**Removed,** Inside Proposed Scheme Footprint
CBC0013PRF020	Horse chestnut *Aesculus hippocastanum*	Knotholes	Retained, Inside Proposed Scheme Footprint
CBC0013PRF021	Horse chestnut *Aesculus hippocastanum*	Knotholes	Retained, Inside Proposed Scheme Footprint
CBC0013PRF022	Horse chestnut *Aesculus hippocastanum*	Dense Ivy	Retained, Inside Proposed Scheme Footprint
CBC0013PRF023	Bird cherry *Prunus avium*	Dense Ivy cover	Retained, Inside Proposed Scheme Footprint
Building			
CBC0013RI001 - Woodbrook Side Lodge	N/A	Minor gaps under external fascia	**Removed & Rebuilt ,** Inside Proposed Scheme Footprint

Note: A description of each different type of PRF, as referred to in the above table 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).

It is also proposed to demolish a single property and build a replacement property, Woodbrook Side Lodge, located south of Wilford Roundabout, to facilitate the Proposed Scheme. This single storey property was subject to an internal inspection in 2008 for a proposed Road Improvement Scheme (Dublin Road Improvement Scheme, Bray EIS prepared by PH McCarthy consultants, 2008) and it was stated that no bats had been present "in recent history (within five to ten years)" based on the accumulation of debris in the many spiderwebs that were noted in the attic space. No emergence of bats nor droppings or staining on walls or under the buildings' fascia were recorded.

An external inspection in January 2023, from publicly accessible areas, identified features which were suggestive of roosting potential. A follow-on resurvey in March 2023 that included both internal and external survey reported that although the attic space has some limited potential as a roosting space at the gable ends, it has been insulated and no evidence of roosting bats was identified.

Notwithstanding this low potential, owing to the heritage nature of the building and the external features, a precautionary approach has been taken and the building has been assessed in this EIAR chapter as potentially being a roost.

12.3.8.2 Badger

Badger, and their breeding and resting places, are legally protected under the Wildlife Acts. No evidence of badger (e.g., setts or evidence of badger activity) were recorded during the multidisciplinary surveys carried out along the Proposed Scheme.

Despite this, badger are widely distributed throughout the Greater Dublin Area (GDA), often utilising public parks and residential gardens. The desk study returned 16 records, including five live sightings, found within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). The nearest record is from Donnybrook in the grounds of the Church of the Sacred Heart. As such, it has been assumed that badger may occur in vegetated areas adjacent to the Proposed Scheme.

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

12.3.8.3 Otter

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

Surveys conducted by Scott Cawley Ltd. during 2018 found evidence of an otter sprainting post on the River Dodder. This sprainting post was located on a rock in the mid-stream of the river, approximately 30m west of Anglesey Bridge, just north of the Dublin Bus Depot in Donnybrook. Follow on surveys in August 2020 and April 2022, found otter footprints and a potential otter track approximately 1.1km and 300m downstream of the Ballsbridge crossing, respectively. There was no evidence of otter habitation features on the downstream side of the Dodder which has been modified through the construction of flood relief measures. The vegetation on the upstream side has been cleared along one side of the watercourse during the ongoing construction of flood defences and the potential for otter holts has been reduced. Two of the watercourses (Brewery Stream and the Shanganagh River) which will be intersected by the Proposed Scheme are partially culverted and are therefore not likely to be favourable to support otter.

The desk study found that otter 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). The NBDC records included one live sighting on the Grand Canal; several spraints and prints along the River Dodder in Ballsbridge, approximately 400m from the Proposed Scheme, as well as records of droppings in Donnybrook within less than 10m of the Proposed Scheme. In addition, the desk study returned one roadkill record along the N11 at Shankill, within the Proposed Scheme boundary.

The Grand Canal is known for otter activity with records returned between Inchicore (Grid O115329) and Inchicore at Suir Road Dolphin's Barn and closer to the Proposed Scheme at Portobello in (NBDC Online Database 2023). A single otter spraint was recorded on the ledge underneath the Emmett Bridge during otter surveys associated with other BusConnects Schemes by Triturus Environmental in 2022 (Triturus Environmental Ltd. 2022). Although these records are upstream of the Proposed Scheme, otter are known to use the Grand Canal for foraging and commuting purposes.

The River Dodder is known to support a local otter population (Macklin *et al.,* 2019a). The Proposed Scheme crosses the River Dodder within 1.3km of two holts which were observed between Milltown and Donnybrook, during the Dublin City Otter Survey. Signs were also recorded along the River Dodder in Ballsbridge within 1km of the Proposed Scheme. Two holts were recorded along the Slang River, at Windy Arbour approximately 2km from the Proposed Scheme. Otter signs were also observed at Merrion Strand, where the Brewery Stream flows into Dublin Bay within 2km of the Proposed Scheme at UCD (Macklin *et al.,* 2019a,b).

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

Wicklow Mountains SAC, which is located approximately 6.7km upstream of the Proposed Scheme, is the closest European site designated for otter. Typically, otter territories are within the range of 7.5km for females and up to 21km for males (Ó'Neill *et al.,* 2009). The Proposed Scheme only crosses with the following watercourses (with no instream works proposed): Grand Canal, River Dodder, Brewery Stream, Shanganagh River, Rathmichael Stream and River Dargle, River Liffey, Liffey Estuary Upper and Liffey Estuary Lower. These watercourses lie within the typical territorial ranges of otters, with the River Dodder and River Dargle sharing hydrological connections to the Wicklow Mountains SAC. The Proposed Scheme falls within two WFD sub-catchments; Dargle_SC_10 and Dodder_SC_010. South of Kill Lane on the Stillorgan Road the Proposed Scheme falls within the WFD sub-catchment Dargle_SC_10, while north of Kill Lane the Proposed Scheme falls with the WFD sub-catchment Dodder_SC_010. The Wicklow mountains SAC lies within both of these sub-catchments. Given the Proposed Scheme lies within both of these sub-catchments together with the Wicklow Mountains SAC, the otter population in the vicinity of the Proposed Scheme is regarded to be potentially connected to this SAC.

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.,* 2019a), otters are known to occur across fourteen watercourses and the coastal habitat fringe across the wider DCC 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 across the GDA. 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.,* 2019a). 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.

A similar study prepared for Dun Laoghaire Rathdown County Council (Macklin *et al.,* 2019b) noted otter activity in some watercourses (the naming of which complicated, as local names were also used to identify particular sections) including the Elm Park Stream (at its seaward discharge point), Carysfort / Maretimo (south of its outfall), The Deansgrange Stream (between Clonkeen and Kilbogget parks), Cabinteely Stream (near Cabinteely Park at Brennanstown Road) and the Loughlinstown North (locally known as the Ballyogan in upper reaches, Carrickmines in middle reaches and Shanganagh in lower reaches (most records were downstream of the M50) and the Loughlinstown South, which had considerable evidence of otter activity including a number of holts), The Crinken stream (with most evidence downstream of the Proposed Scheme). The study (Macklin *et al*., 2019b) noted that many of the watercourses in the DLR area were heavily modified and in places had physical impediments obstructing both fish passage and otter. Water quality status was also poor at many of the watercourses and it was noted that evidence of otter activity – typically in the form of marking was less intense on Q2 and Q2-3 watercourses (Macklin *et al*., 2019b)

The Proposed Scheme will cross five watercourses, the Grand Canal, River Dodder, Brewery Stream, Shanganagh River and Rathmichael Stream, and will interact with the River Liffey via surface water discharges. Furthermore, the Proposed Scheme ends at the northern bank of the River Dargle at Fran O'Toole in Bray. 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. However, the otter population is considered separate from the Wicklow Mountains SAC population, is unlikely to be in the region of 1% of the national population. Therefore, the local otter population is valued as being of County Importance.

Despite the fact that otter is of 'Least Concern' from an Irish perspective, considering the above, the local otter population is valued as being of County Importance given that it is not considered separate from the Wicklow Mountains SAC population. However, the 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 proceeds as far as St. Stephen's Green and therefore does not reach the City Centre Quays. It is hydrologically connected to Dublin Bay through the Liffey Estuary Lower via the River Dodder and the Grand Canal. 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.

Harbour seal *Phoca vitulina*, grey seal *Halichoerus grypus*, and harbour porpoise *Phocoena phocoena* 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 pinnipeds are also listed on the Annex V and cetacean species on Annex IV of the Habitats Directive. Harbour porpoise is a QI species designated as part of Rockabill to Dalkey Island SAC which is located approximately 2.6km east of the Proposed Scheme at its closest point. Harbour seal and grey seal are listed on Annex II of the Habitats Directive and are listed QI species designated as part of Lambay Island SAC which is located approximately 22.3km 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:

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

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

12.3.8.5 Other Mammal Species

No other protected mammal species were recorded during the multidisciplinary 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):

- Hedgehog *Erinaceous europaeus;*
- Irish hare *Lepus timidus hibernicus;*
- Irish stoat *Mustela erminea hibernica;*
- Pine marten *Martes martes;*
- Pygmy shrew *Sorex minutus*; and
- Red squirrel *Sciurus vulgaris.*

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

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

12.3.9 Birds

12.3.9.1 Breeding Birds

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

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

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

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

The desk study returned records of a total of 133 breeding bird species across the study area (i.e., grid squares O12, O13, O21 and O22). Records included 20 species listed under Annex I of the Birds Directive, 46[1] SCI species, and an additional 31 Red Listed and 49 Amber Listed species. This includes 111 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme.

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

The majority of records along the Proposed Scheme comprise bird species common to suburban habitats (including residential and parkland areas), such as gull and garden bird species. Residential habitats and scattered trees and parkland, hedgerows, treelines, broadleaved woodland and amenity grassland habitats were observed in several locations across the Proposed Scheme including St. Stephen's Green, Iveagh Gardens, Leeson Park, Herbert Park, Elm Park, UCD, Kilbogget Park, Deerpark, Shanganagh Park, Cabinteely Park and Loughlinstown Woods pNHA. These species therefore are likely to use lands within the footprint of the Proposed Scheme for breeding and foraging.

Breeding species which are associated with buildings were returned from the desk study including swallow *Hirundo rustica*, starling *Sturnus vulgaris*, swift *Apus apus*, house martin *Delichon urbicum* and raptors (Birdwatch Ireland 2020), which occurred across the larger study area (i.e., grid squares O12, O13, O21 and O22). These species may therefore utilise suitable buildings adjacent to the Proposed Scheme. Records of kestrel *Falco tinnunculus* exist at Cabinteely and UCD grounds; sparrowhawk *Accipiter nisus* at Loughlinstown Woods, Cabinteely Park and Donnybrook; and peregrine falcon at Loughlinstown Woods and Kilbogget Park. These raptor species may therefore utilise open green spaces and trees adjacent to the Proposed Scheme. No suitable habitat was identified for merlin *Falco columbarius* within the footprint of the Proposed Scheme and desk study records were confined to coastal areas (i.e., grid square O23) and therefore this species is not deemed likely to breed within the footprint of the Proposed Scheme.

Several species of warblers and raptors which favour woodlands, agricultural lands and upland heathland areas were identified during the desk study (Appendix A12.1 in Volume 4 of this EIAR). Due to the largely urban setting of the Proposed Scheme, these habitat types are not present, or are highly fragmented within the boundary of the Proposed Scheme. As such, these species are not deemed to be present in significant numbers, however they may be present in larger parks and greenspaces in the lands surrounding the Proposed Scheme e.g., Loughlinstown Woods pNHA, St. Stephen's Green, Iveagh Gardens, Leeson Park, Herbert Park, Elm Park, UCD, Cabinteely Park, Kilbogget Park, Deerpark and Shanganagh Park.

Wetland and riverine bird species identified during the desk study (Appendix A12.1 in Volume 4 of this EIAR), include gulls, waders, waterfowl, swans, ducks, and grey heron *Ardea cinerea* which utilise intertidal zones,

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

freshwater lakes, ponds, canals, and rivers. Suitable habitats within close proximity to the Proposed Scheme include the Grand Canal, River Dodder, Brewery Stream, Kill of the Grange, Carrickmines Stream, Shanganagh River, Rathmichael Stream and River Dargle; the River Dodder and the Grand Canal containing populations of swans, ducks, herons, kingfisher and coot. Rivers are important nesting and foraging sites for species such as kingfisher, mute swan, and coot within the Proposed Scheme. The Proposed Scheme ends at the Dargle River at Fran O'Toole Bridge with known populations of kingfisher, grey heron, grey wagtail, mallard and mute swan; and crosses the River Dodder with known populations of kingfisher, grey wagtail, dipper, mute swan, tufted duck, little grebe and moorhen.

Kingfisher were not recorded during multidisciplinary surveys within the footprint of the Proposed Scheme.

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

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

Common Name / Scientific Name / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Barn owl *Tyto alba* (BO)	Laughanstown O2323	Red (B)	-	-
Barn swallow *Hirundo rustica* (SL)	Across the Proposed Scheme	Amber (B)	-	-
Black guillemot *Cepphus grylle*	Herbert Park O1732	Amber (B)	-	-
Common coot *Fulica atra* (CO)	Kilbogget Park Grid O238251	Amber (B/W)	-	Lough Derravaragh SPA approximately 75.2km
Common gull *Larus canus* (CM)	Across the Proposed Scheme	Amber (B/W	-	Inishkea Islands SPA approximately 275km
Common kestrel *Falco tinnunculus* (K.)	Shankill Grid O22K UCD Grid O182298	Red (B)	-	-
Common kingfisher *Alcedo atthis* (KF)	Dargle River Bray Grids O265191 & O257186 Loughlinstown Wood Grid O249230 River Dodder Herbert Park Grid O177319	Amber (B)	✓	River Boyne and River Blackwater SPA approximately 39.7km
Common linnet *Carduelis cannabina* (L.)	Bray Grid O268192 Loughlinstown Grid O22L Mount Merrion Grid O12Z Donnybrook Grid O13V	Amber (B)	-	-
Common pochard *Aythya ferina*	Across the proposed scheme	Red (B/W)	-	Lough Corrib SPA approximately 191km
Common snipe *Gallinago gallinago* (SN)	Loughlinstown Wood Grid O249230	Red (B/W)	-	-
Common starling *Sturnus vulgaris* (SG)	Across the Proposed Scheme	Amber (B)	-	-
Common swift *Apus apus* (SI)	Bray Grid O21P Loughlinstown Grid O22L UCD Grid O184299	Red (B)	-	-
Eurasian teal *Anas crecca* (T.)	Kilbogget Park Grid O239249	Amber (B/W)	-	North Bull Island SPA approximately 5.5km
Eurasian woodcock *Scolopax rusticola* (WK)	Loughlinstown Wood Grid O249230	Red (B/W)	-	-
European greenfinch *Carduelis chloris* (GR)	Across the Proposed Scheme	Amber (B)	-	-
Goldcrest *Regulus regulus* (GC)	Bray Grid O21U Loughlinstown Grid O22L Cabinteely Grid O22H UCD Grid O190297	Amber (B)	-	-
Great spotted woodpecker *Dendrocopos major* (GS)	Cabinteely Park Grid O231247	Green (B)	✓	-

Common Name / Scientific Name / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Grey heron *Ardea cinerea* (H.)	Dargle River Bray Grid O264188 Loughlinstown Wood Grid O248231 Kilbogget Park Grid O238251 UCD Grid O188297 Beaver Row Donnybrook Grid O179313	Green (B)	-	Wexford Harbour and Slobs SPA approximately 85.2km
Grey wagtail *Motacilla cinerea* (GL)	Dargle River Bray Grid O265190 Loughlinstown Wood Grid O249230 Dodder River Herbert Park Grid O179317 Grand Canal Grid O163327	Red (B)	-	-
House martin *Delichon urbicum* (HM)	Bray Grid O21U Loughlinstown Grid O22L UCD Grid O188297 Donnybrook Grid O177313	Amber (B)	-	-
House sparrow *Passer domesticus* (HS)	Across the Proposed Scheme	Amber (B)	-	-
Little egret *Egretta garzetta* (ET)	Bray Grid O259187 Cabinteely Grid O22H	Green (B/W)	✓	-
Little grebe *Tachybaptus ruficollis* (LG)	Kilbogget Park Grid O239250	Green (B/W)	-	Wexford Harbour and Slobs SPA approximately 85.2km
Mallard *Anas platyrhynchos* (MA)	Dargle River Bray Grid O263188 Loughlinstown Wood Grid O249230 Kilbogget Park Grid O238251 UCD Grid O187298 St. Stephens Green Grid O160334	Amber (B)	-	Dundalk Bay SPA approximately 58.3km
Meadow pipit *Anthus pratensis* (MP)	Shankill Grid O22L UCD Grid O183303	Red (B)	-	-
Mute swan *Cygnus olor* (MS)	Dargle River Bray Grid O263188 Loughlinstown Wood Grid O250230 UCD Grid O185301 St. Stephens Green Grid O161334	Amber (B/W)	-	-
Northern lapwing *Vanellus vanellus* (L.)	Cherrywood Grid O22G	Red (B/W)	-	Boyne Estuary SPA approximately 42.5km
Peregrine falcon *Falco peregrinus* (PE)	Kilbogget Park Grid O239251 Mount Merrion Grid O1929	Green (B)	✓	Wicklow Mountains SPA approximately 7.2km
Sand martin *Riparia riparia* (SM)	Bray Grid O267192 Loughlinstown Wood Grid O249230 Donnybrook Grid O177313	Amber (B)	-	-
Skylark *Alauda arvensis* (S.)	Loughlinstown Wood Grid O249230	Amber (B)	-	-
Spotted flycatcher *Musciapa striata* (SF)	Bray Grid O21P	Amber (B)	-	-
Tufted duck *Aythya fuligula* (TU)	Kilbogget Park Grid O239251 UCD Grid O188297 Grand Canal Grid O169330	Amber (B/W)	-	Lough Derravaragh SPA approximately 75.2km
Yellowhammer *Emberiza citrinella* (Y.)	Kiltiernan / Cherrywood Grid O22G	Red (B)	-	-

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

12.3.9.2 Wintering Birds

All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the Birds Directive, and/or as wintering SCIs within designated European sites. A total of 21 wintering bird surveys were carried out for the Proposed Scheme at site CBC0013WB002 within Shanganagh Park on the R119 Dublin Road from October 2020 to March 2021, and October 2021 to March 2022 on a fortnightly basis. CBC0013WB001 at Allies River Road, off R119 Dublin Road was surveyed nine times in total during the wintering bird survey season 2020 / 21 and was not surveyed again during the 2021 / 22 survey season due to a change to the Proposed Scheme and it no longer forming part of the land intake. Species recorded included black-headed gull *Chroicocephalus ridibundus* and herring gull *Larus argentatus*.

Table 12.10 provides a summary of the findings of the wintering bird surveys with respect to those species which are of highest conservation concern and were recorded within wintering bird survey sites. Table 12.11 displays the wintering bird survey results in comparison to the 1% of their International and National populations.

The survey area of amenity grassland at CBC0013WB002 is maintained through cutting. Grass cover was high across the survey period, considering it forms part of the Shanganagh Park. The fields at CBC0013WB001 were of agricultural use but no noticeable crop was seen during surveys. No disturbance was noted at CBC0013WB001; however disturbance was high at CBC0013WB002 due to animals (dogs off leash), a number of walkers using the public paths, and Gaelic pitches for recreational exercise.

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

Common Name / Scientific Name / BTO Code	Site: Peak Count and Activity in the Study Area (Date)	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Black-headed gull *Chroicocephalus ridibundus* (BH)	103 individuals foraging on grassland within Shanganagh Park at CBC0013WB002	43 individuals foraging on grassland within Shanganagh Park at CBC0013WB002	Amber (B/W)	-
Herring gull *Larus argentatus* (HG)	Two individuals foraging on grassland within Shanganagh Park at CBC0013WB002	n/a	Amber (B/W)	-

Table 12.11: Wintering Bird Species Recorded During Wintering Bird Surveys in Comparison to the 1% of their International and National Populations

Common Name / Scientific Name / BTO Code	Site Peak Count (2020/2021)	Site Peak Counts (2021/2022)	Associated European sites within the ZoI	1% of International Population	1% of National Population
Black-headed gull *Chroicocephalus ridibundus* (BH)	103	43	South Dublin Bay and River Tolka Estuary SPA North Bull Island SPA The Murrough SPA	31,000	n/a
Herring gull *Larus argentatus* (HG)	2	n/a	land's Eye SPA The Murrough SPA	14,000	n/a

A review of a study into light-bellied Brent goose inland feeding sites (Scott Cawley Ltd. 2017) has identified no known SPA wintering bird feeding sites in the footprint of the Proposed Scheme. There are also no known inland wintering bird feeding sites within approximately 300m of the Proposed Scheme i.e., the disturbance ZoI (Benson 2009). No droppings attributed to light-bellied Brent goose were recorded during either survey season.

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 139 regularly occurring wintering bird species across the study area (i.e., grid squares O12, O13, O21 and O22). Records included 21 species listed under Annex I of the Birds Directive, 55 SCI species, and 33 Red listed and 47 Amber listed species. This includes 111 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme.

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

The wider study area of Dublin Bay is considered of significant ornithological importance as it supports an Internationally Important population of light-bellied Brent goose. This SCI species may use open parkland and grassland adjacent to the study area for foraging purposes. A review of a study into light-bellied Brent goose inland feeding sites (Scott Cawley Ltd. 2017) has identified one known high importance inland wintering bird feeding site within 300m of the Proposed Scheme, Cabinteely / Kilbogget Park. A site is considered to be of high importance if a peak count of between 51 to 400 geese have been previously recorded at that site. In addition to Cabinteely / Kilbogget Park, there are large areas of suitable foraging and/or roosting habitat available for wintering bird species both adjacent to, and in the wider locality of the Proposed Scheme (i.e., beyond the 300m study area the footprint of the Proposed Scheme) including:

- Parks and greenspaces such as Loughlinstown Woods pNHA, St. Stephen's Green, Iveagh Gardens, Leeson Park, Herbert Park, Elm Park, UCD, Cabinteely Park, Kilbogget Park, Deerpark and Shanganagh Park; and
- Wetland habitat associated with SPAs such as South Dublin Bay and River Tolka Estuary SPA, and North Dublin Bay SPA.

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

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

Common Name / Scientific Name / BTO Code	Activity and Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA designated for SCI species
Black-headed gull *Chroicocephalus ridibundus* (BH)	Across the Proposed Scheme	Amber (B)	-	South Dublin Bay and River Tolka Estuary SPA approximately 900m
Light-bellied Brent goose *Branta bernicla hrota* (BG)	Cabinteely / Kilbogget Park	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 900m
Common coot *Fulica atra* (CO)	Kilbogget Park Grid O238251	Amber (B/W)	-	Lough Derravaragh SPA approximately 75.2km
Common redshank *Tringa totanus* (RK)	Deansgrange Green Corridor Grid O230262 Cabinteely Grid O22H	Red (W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 900m
Common snipe *Gallinago gallinago* (SN)	Loughlinstown Wood Grid O249230	Red (B/W)	-	-
Eurasian curlew *Numenius arquata* (CU)	Loughlinstown Wood Grid O248230	Red (W)	-	North Bull Island SPA approximately 5.5km

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
Eurasian teal *Anas crecca* (T)	Kilbogget Park Grid O239249	Amber (B/W)	-	North Bull Island SPA approximately 5.5km
Eurasian wigeon *Anas penelope* (WN)	Kilbogget Park Grid O239251	Amber (W)	-	The Murrough SPA approximately 11.9km
European golden plover *Pluvialis apricaria* (GP)	Cabinteely Grid O22H	Red (W)	✓	North Bull Island SPA approximately 5.5km
Eurasian woodcock *Scolopax rusticola* (WK)	Loughlinstown Wood Grid O249230	Red (B/W)	-	-
Greater scaup *Aythya marila* (SP)	Kilbogget Park Grid O239251 St. Stephens Green Grid O160334	Red (W)	-	Wexford Harbour and Slobs SPA approximately 85.2km
Greylag goose *Anser anser* (GJ)	Bray Grid O21U	Amber (W)	-	The Murrough SPA approximately 11.9km
Herring gull *Larus argentatus* (HG)	Across the Proposed Scheme	Amber (B/W)	-	The Murrough SPA approximately 11.9km
Lesser black-backed gull *Larus fuscus* (LB)	Bray Grid O263188 Loughlinstown Wood Grid O249230 St. Stephens Green Grid O160334	Amber (B/W)	-	Lambay Island SPA approximately 22.2km
Little egret *Egretta garzetta* (ET)	Bray Grid O259187 Cabinteely Grid O22H	Green (B/W)	✓	-
Little grebe *Tachybaptus ruficollis* (LG)	Kilbogget Park Grid O239250	Green (B/W)	-	Wexford Harbour and Slobs SPA approximately 85.2km
Mediterranean gull *Larus melanocephalus* (MU)	Loughlinstown Wood Grid O250230 Kilbogget Park Grid O241244	Amber (B/W)	✓	-
Mew gull *Larus canus* (CM)	Loughlinstown Wood Grid O249230 Kilbogget Park Grid O242245	Amber (B)	-	Dundalk Bay SPA approximately 58.3km
Mute swan *Cygnus olor* (MS)	Dargle River Bray Grid O263188 Loughlinstown Wood Grid O250230 UCD Grid O185301	Amber (B/W)	-	-
Northern lapwing *Vanellus vanellus* (L.)	Cherrywood Grid O22G	Red (B/W)	-	Boyne Estuary SPA approximately 42.5km
Oystercatcher *Haematopus ostralegus* (OC)	Loughlinstown Wood Grid O249231 Kilbogget Park Grid O242245	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 900m
Tufted duck *Aythya fuligula* (TU)	Kilbogget Park Grid O239251 UCD Grid O188297 Grand Canal Grid O169330	Amber (W)	-	Lough Derravaragh SPA approximately 75.2km.

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

12.3.10 Reptiles

Common lizard are legally protected under the Wildlife Acts. common lizard were not recorded during the multidisciplinary surveys and no suitable habitat was confirmed within the footprint of the Proposed Scheme.

The desktop study did not return records of common lizard within the immediate footprint of the Proposed Scheme and the wider study area. The species is found in a wide variety of habitats including grasslands, scrub, woodland,

heathland and coastal dune habitats (Marnell 2002; Farren *et al.,* 2010). Based on this, it cannot be ruled out that these species are not in the wider study area.

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

12.3.11 Amphibians

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

Suitable amphibian habitat (i.e., vegetated riverbanks, surface water / drainage features with stagnant, relatively unpolluted water) was identified within the footprint of, or adjacent to, the Proposed Scheme. This includes scattered areas of vegetated riverbank along the Grand Canal, River Dodder, Brewery Stream, Shanganagh River, Rathmichael Stream and River Dargle.

The desktop study returned 88 records for common frog and nine records for smooth newt within 1km of the Proposed Scheme. This includes records for common frog across the length of the Proposed Scheme. There are three records for smooth newt from Donnybrook; four records from Cabinteely; and two records from Shankill (NBDC Online Database 2023).

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, as there will be no instream works.

The Proposed Scheme lies within the Dargle_SC_10 and Dodder_SC_010 WFD sub-catchments.

The Dargle River sub-catchment is located within the Eastern River Basin District and covers an area of approximately 128km^2. The Dargle River rises in the Wicklow mountains and flows in a north-easterly direction through a series of rapids and waterfalls before entering the sea at Bray, Co. Wicklow (Matson *et al.,* 2019a). Six out of the eleven watercourses contained within the Dargle sub-catchment (Dargle_SC_10) are deemed to be 'At Risk' of failing to meet their WFD objectives. The Dargle River Catchment was assigned an ecological status of 'Good' in 2018. The waters of the River Dargle were assigned 'good' status for the period of 2016-2021, with a 'high' quality value at Fran O'Toole Bridge; and was deemed to be 'Not at Risk' of failing to meet its WFD High Ecological Status objective (EPA 2019).

The Carrickmines / Shanganagh system and Loughlinstown system support a resident population of brown trout (and several other fish species) while further downstream they support a migratory population of sea trout (both *Salmo trutta*) (DLRCC 2021). The coastal waters east of the Proposed Scheme currently retain a "high" water quality status (EPA 2022b).

The River Dodder sub-catchment is located in the Eastern River Basin District and covers an area of approximately 113km^2. The River Dodder flows in a north-easterly direction through south Co. Dublin, discharging to the River Liffey at Grand Canal Dock in Dublin city (Matson *et al.,* 2019b). The WFD sub-catchment Dodder_SC_010 was assigned an ecological fish status of 'Good' in 2018 in the upper reaches and deemed 'Not at Risk' of failing to meet the WFD objectives. At Anglesey Bridge in Donnybrook the River Dodder (Dodder_050) was assigned an ecological status of 'Moderate' and deemed to be 'At Risk' of failing to meet its WFD objectives (EPA 2021. Four sites were electro-fished in the Dodder River catchment as part of the 2011 WFD surveillance monitoring programme in rivers including the River Dodder at Beaver Row, which lies within 1km of the Proposed Scheme at Anglesey Bridge in Donnybrook. A total of six fish species were recorded at this location; salmon was the most abundant species, followed by brown trout, eels, stone loach, three-spined stickleback and minnow (Kelly *et al*., 2012).

The WFD water quality of the Brewery Stream system is currently 'Under Review' (EPA 2022b).

The Grand Canal runs from Dublin port on a westerly course via Tullamore to join the River Shannon near Banagher. Due to its nature, it is classed as an artificial water body under the Water Framework Directive. The Grand Canal achieved Good Ecological Potential (GEP) in the 2016-2021 period (Bradley *et al.,* 2012).

No aquatic surveys were undertaken in respect of the Proposed Scheme, as no watercourses are being directly interfered with. The desktop data is presented however, to contextualise the receiving environment.

12.3.12.1 Salmonid Species

The River Liffey is a highly significant regional salmonid catchment for species of Atlantic salmon and trout (Inland Fisheries Ireland (IFI) Consultation 2020). The desk study also returned records for Atlantic salmon on the River Dargle and Liffey Estuary Lower (Kelly *et al.,* 2012).

The River Dargle is an EU Designated Salmonid System (S.I. No. 293/1988: European Communities (Quality of Salmonid Waters) Regulations, 1988) (IFI Consultation 2020). The River Dargle is reported as one of Ireland's best sea trout rivers and also gets a small run of salmon (grilse) (Matson *et al*., 2019a).

The River Dodder is exceptional among most urban rivers in the area, having resident salmon and sea trout populations, as such the river is regarded as a very important fishery (IFI Consultation 2020). The Carrickmines / Shanganagh system and Loughlinstown system both support a resident population of brown trout and a migratory population of sea trout (both *Salmo trutta*) downstream (IFI Consultation 2020).

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

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

12.3.12.2 Lamprey Species

The desk study returned records for lamprey species within the Shanganagh and Brewery River systems and River Liffey (*Lampetra fluviatilis* only) (Kelly *et al*., 2012; IFI 2010).

Wicklow County Council Biodiversity Action Plan 2009-2015 details records of brook lamprey *Lampetra planeri* in the River Dargle (WCC 2009).

Surveys carried out by IFI during 2015 and 2016 found lamprey species in low numbers along the River Dodder, approximately 3.6km upstream of the Proposed Scheme at Templeogue (Matson *et al.,* 2019b).

Lamprey species are valued as being of National Importance.

12.3.12.3 European Eel

The desk study did not return records for European eel within the Shanganagh or Brewery River systems. The desk study returned records for European eel on the River Dargle and the River Dodder. Water sampling undertaken at several locations along the River Dargle during 2018 found European eel at a sampling site north of Enniskerry; approximately 5km upstream of the Proposed Scheme at Fran O'Toole Bridge (Matson *et al*., 2019a).

Surveys carried out by IFI along the River Dodder during 2015 and 2016 found European eel in low numbers approximately 3.6km upstream of the Proposed Scheme at Templeogue, and during 2018 approximately 3.3km upstream of the Proposed Scheme at Rathfarnham (Matson *et al*., 2019b). The Liffey Estuary serves as the natural linkage for European eel migrating between freshwater and marine environments (Central and Regional Fisheries Board 2008).

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

European eel populations are valued as being of National Importance.

12.3.12.4 All Other Fish Species

The desk study did not return records for specific fish species within the Shanganagh or Brewery River systems. Results of fish surveys undertaken at several locations along the River Dargle during 2018 included salmonid species and stone loach (Matson *et al.,* 2019a).

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

The Grand Canal is known as a major angling destination and species present include common bream, tench, common rudd, common perch *Perca fluviatilis* and pike (Waterways Ireland 2021). It also has a population of non-native invasive roach, a species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (Waterways Ireland 2021). The section of the Grand Canal from Dolphin's Barn to Portobello holds good stocks of tench, particularly from the Parnell Road stretch to the 7th Lock at Portobello. Pike and roach are also present (Waterways Ireland 2021).

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

12.3.13 Invertebrates

12.3.13.1 White-clawed Crayfish

White-clawed crayfish *Austropotamobius pallipes* are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive. Surveys for white clawed crayfish were not 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 grid squares O12, O13, O21 and O22. As such, white-clawed crayfish are not considered further in the assessment.

The closest reported location of white-clawed crayfish populations is in Poulaphouca Reservoir in 2007 as well as the River Camac near Clondalkin (WCC 2009; NBDC 2023). The Proposed Scheme is located in different sub-catchments (Dargle_SC_10 and Dodder_SC_010) to that of the Poulaphouca Reservoir (Liffey_SC_020). White-clawed crayfish are also known from the River Liffey; however they have not been recorded downstream of Leixlip Bridge and therefore all records are upstream of any surface water discharges. Elsewhere in the Dublin region, they are only known from some stretches of the River Camac.

As such, White-clawed crayfish are not considered further in the assessment.

12.3.13.2 Freshwater Molluscs

Surveys for freshwater molluscs were not carried out as part of this assessment by virtue of the Proposed Scheme and lack of instream works. The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned three records for glutinous snail *Myxas glutinosa*, iridescent pea mussel *Pisidium pulchellum* and false orb pea mussel *Pisidium pseudosphaerium* along the Grand Canal at Herbert Place in 2003. These species are listed as 'Endangered' on the Ireland Red List No. 2 Non-Marine Molluscs (Byrne *et al.,* 2009).

Iridescent pea mussel and false orb pea mussel populations are valued as being of National Importance, due to being listed on Ireland's Red List as 'Endangered'.

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

12.3.13.3 Marsh Fritillary Butterfly

Marsh fritillary *Euphydryas aurinia* are legally protected under Annex II of the Habitats Directive.

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 11.5km west of the Proposed Scheme at Kilakee, Rathfarnham in 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. Neither devil's-bit scabious nor these habitats were recorded within the footprint of the Proposed Scheme. Surveys for marsh fritillary were not carried out as part of this assessment. as suitable habitats were not recorded within the urbanised transport corridor of the Proposed Scheme. In an Irish context, the conservation status of this species in Ireland is designated as 'Vulnerable' (Regan *et al.,* 2010).

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

12.3.13.4 Other Invertebrates

The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned records for several invertebrates red listed on the Ireland Red List No. 4: Butterflies (Regan *et al*., 2010), Ireland Red List No. 6: Damselflies and Dragonflies (Odonata) (Nelson *et al.,* 2011) and Regional Red List of Irish Bees 2006 (Fitzpatrick *et al*., 2006; NBDC Online Database 2023).

Butterfly are known to favour nectar-rich flowers which provide larval foodplants. Preferred species include cock's-foot grass, common bird's-foot trefoil, cuckoo flower *Cardamine pratensis*, garden nasturtium *Tropaeleum majus,* holly *Ilex aquifolium,* ivy *Hedera helix* and nettle (Butterfly Conservation Ireland 2020). Corresponding Habitats along the Proposed Scheme are located in parkland habitat with scattered trees (WD5) and amenity grasslands (GA2); present within Christchurch Leeson park, in front of Hampton Hotel, Donnybrook on side of RTÉ, Belfield Park and Seafield Road, along Stillorgan Road, towards Bray Road, Woodbank and Wildford Court; where suitable grasses, common birds-foot trefoil, and common nettle *Urtica dioica* were recorded. 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.,* 2009).

Damselflies and dragonflies are typically found at slow-moving or stagnant water bodies such as wetlands, river mires and flood lands, however they have adapted to artificial habitats such as ponds and canals (Fox and Cham 1994). These species are carnivorous predators throughout their lifecycles and are used as bio-indicator species for water quality as they have low tolerances for pollution, with juveniles spending the entirety of their life in aquatic systems (Nelson *et al.,* 2011). Suitable habitats along the Proposed Scheme, which are isolated and fragmented, include: depositing / lowland rivers (FW2), such as the River Dodder and River Dargle, and canals (FW3) such as the Grand Canal.

The preferred foodplants for bees are native species with white, blue or yellow flowers (Fitzpatrick *et al.,* 2006). Additional fragmented sites where suitable floral species were recorded along the Proposed Scheme include ornamental flower beds and borders (BC4) within residential gardens, scattered trees and parkland (WD5), and amenity grasslands (GA2); in parks and along the banks of the watercourses.

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

Loss of natural and semi-natural habitats has been a key driver in decline of 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 (Trinity College Campus 2017). Isolated and fragmented sites which are adjacent to the route of the Proposed Scheme include: Loughlinstown Woods pNHA, St. Stephen's Green, Iveagh Gardens, Leeson Park, Herbert Park, Elm Park, UCD, Kilbogget Park, Deerpark, Shanganagh Park and Cabinteely Park. These other invertebrate species favour species-rich semi-natural grasslands and meadows, upland heathland and sand

dunes. Habitats within close proximity to the Proposed Scheme which correspond to species requirements include areas of ornamental planting along roadsides, parkland, canals, and gardens. Such habitats are fragmented and highly disturbed and are therefore deemed unsuitable for significant populations of Red listed invertebrates (Biesmeijer *et al.,* 2006; Öckinger *et al.,* 2009). As such, other invertebrates are not considered further in the assessment.

12.3.14 Summary Ecological Valuation and Identification of KERs

Table 12.13 summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance. KERs are highlighted in blue in Table 12.13. Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of assessing the impacts on what are determined to be important ecological or biodiversity features, as per the CIEEM Guidelines (CIEEM 2018) and the Guidelines for Assessment of Ecological Impacts of National Roads 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., buildings and artificial surfaces (BL3), amenity grassland (improved) (GA2) and ornamental / non-native shrub (WS3)). These habitat types tend to be associated with residential, commercial or industrial development, roads and highly managed amenity areas. It also includes grassland habitats that are relatively species poor and improved.

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

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

Table 12.13: Summary of Ecological Valuation and Identification of KERs

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
South Dublin Bay SAC [000210]	International Importance	Yes
Bray Head SAC [000714]	International Importance	Yes
Rockabill to Dalkey Island SAC [003000]	International Importance	Yes
North Dublin Bay SAC [000206]	International Importance	Yes
Wicklow Mountains SAC [002122]	International Importance	Yes
Howth Head SAC [000202]	International Importance	Yes
Ireland's Eye SAC [002193]	International Importance	Yes
Lambay Island SAC [000204]	International Importance	Yes

Ecological Receptor	Ecological Valuation	KER?
South Dublin Bay and River Tolka Estuary SPA [004024]	International Importance	Yes
Dalkey Islands SPA [004172]	International Importance	Yes
North Bull Island SPA [004006]	International Importance	Yes
Baldoyle Bay SPA [004016]	International Importance	Yes
The Murrough SPA [004186]	International Importance	Yes
Howth Head Coast SPA [004113]	International Importance	Yes
Ireland's Eye SPA [004117]	International Importance	Yes
Malahide Estuary SPA [004025]	International Importance	Yes
Rogerstown Estuary SPA [004015]	International Importance	Yes
Lambay Island SPA [004069]	International Importance	Yes
Skerries Islands SPA [004122]	International Importance	Yes
Rockabill SPA [004014]	International Importance	Yes
All other SAC or SPA sites	International Importance	No – beyond ZoI
Skerries Island NHA [001218]	National Importance	Yes
Loughlinstown Woods pNHA [001211]	National Importance	Yes
Grand Canal pNHA [002104]	National Importance	Yes
Booterstown Marsh pNHA [001205]	National Importance	Yes
South Dublin Bay pNHA [000210]	National Importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	National Importance	Yes
North Dublin Bay pNHA [000206]	National Importance	Yes
Dolphins, Dublin Docks pNHA [000201]	National Importance	Yes
The Murrough pNHA [000730]	National Importance	Yes
Howth Head pNHA [000202]	National Importance	Yes
Baldoyle Bay pNHA [000199]	National Importance	Yes
Malahide Estuary pNHA [000205]	National Importance	Yes
Ireland's Eye pNHA [000203]	National Importance	Yes
Portraine Shore pNHA [001215]	National Importance	Yes
Rogerstown Estuary pNHA [000208]	National Importance	Yes
Lambay Island pNHA [000204]	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
Tidal rivers (CW2)	National Importance	Yes
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
Canals (FW3)	National Importance	Yes
Reed and large sedge swamps (FS1)	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
Residential	Local Importance (Lower Value)	No
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Yes
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Yes
Hedgerows (WL1)	Local Importance (Higher Value)	Yes
Treelines (WL2)	Local Importance (Higher Value)	Yes
Wet willow-alder-ash woodland (WN6)	International Importance	Yes
Scrub (WS1)	Local Importance (Lower Value)	No

Ecological Receptor	Ecological Valuation	KER?
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 Ireland's Red lists (Vulnerable or of higher 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		
Bats	Local Importance (Higher Value)	Yes
Badger	Local Importance (Higher Value)	Yes
Otter	County Importance	Yes
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Yes
Marine mammals (all other marine mammals)	County Importance	Yes
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Yes
SCI / Annex I bird species	International Importance	Yes
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Yes
Reptiles	Local Importance (Higher Value)	Yes
Amphibians	Local Importance (Higher Value)	Yes
Atlantic salmon	International Importance	Yes
Brown trout	Local Importance (Higher Value)	Yes
European eel / Lamprey	National Importance	Yes
All other fish species	Local Importance (Higher Value)	Yes
Invertebrates (Freshwater molluscs)	Local Importance (Higher Value)	Yes
All other non-Red listed invertebrates	Local Importance (Lower Value)	No
Non-native invasive animal species	N/A	N/A
Local Biodiversity Areas (Local Biodiversity Areas not discussed under designated sites, flora and/or fauna – of which overlap in part with national designation as listed previously and/or are intersected by the Proposed Scheme)		
DCC		
Grand Canal	National Importance	Yes, but covered by pNHA
River Dodder Corridor	County Importance	Yes, but covered by FW2 habitat
Network of parks e.g., St. Stephen's Green and Herbert Park	County Importance	No – by virtue of avoidance
DLRCC		
Network of streams and rivers e.g., River Dodder	County Importance	Yes, but covered by FW2 habitat
Network of parks e.g., Cabinteely Park and Shanganagh Park	County Importance	No – by virtue of avoidance
WCC		
Network of streams and rivers e.g., River Dargle	County Importance	Yes, but covered by CW2 and FW2 habitat
Network of parks e.g., People's Park, Bray	County Importance	No – by virtue of avoidance

12.4 Potential Impacts

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

12.4.1 Characteristics of the Proposed Scheme

A detailed description of the Proposed 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 Construction and Operational Phases in Section 12.4.1.1 and Section 12.4.1.2.

12.4.1.1 Construction Phase

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

- Site preparation and clearance;
- Removal of existing boundaries, pavements, lighting columns, bus stops, and signage;
- Protection and/or diversion of buried services;
- Road widening, pavement reconstruction, and kerb improvements;
- Reconfiguration of traffic lanes throughout;
- Permanent land take at residential properties and non-residential properties, including commercial;
- Temporary land take at a number of areas across the scheme;
- Installation of new bus stops and junction / roundabout modification;
- Property boundary reinstatement, signage replacement, relocation of and/or installation of lighting columns; and
- Landscaping and tree planting, and reinstatement of temporary land acquisitions

12.4.1.1.1 Structural Works

The Proposed Scheme requires the construction / remodelling of existing structures. Retaining walls that have a retained height less than 1.5m are classified as minor retaining walls and are not considered further. The same applies for earth embankments. However, retaining walls with a retained height greater than 1.5m are classed as principal structures. There are ten principal retaining walls along the Proposed Scheme, as detailed in Table 12.14.

Table 12.14: Principal Retaining Walls

Wall Reference	Structure Type	Retained Height (m)			Chainage Start	Chainage End	Length (m)
R13-RW043	Existing Wall at Loughlinstown Roundabout	Varies	3.6	Max	A14050	A14140	110
R13-RW023	Cast In-Situ Reinforced Concrete Wall	Varies	2.5	Max	E10	A14770	40
R13-RW024	Precast Reinforced Concrete Wall	N/A	1.5	Max	A14770	A14800	30
R13-RW036	Precast Reinforced Concrete Wall	N/A	0.5	Max	A14800	A14980	Maximum 180
R13-RW045	Existing Masonry Wall at St Anne's Roundabout	Varies	1.5	Max	A15175	A15025	135
R13-RW046	Existing Masonry Wall at St Anne's Roundabout	Varies	3.2	Max	A15175	A15025	120
R13-RW038	Precast Reinforced Concrete Wall	Varies	1.8	Max	A17040	A17080	40
R13-RW013	Precast Reinforced Concrete Wall	Varies	1.5	Max	A17190	A17290	100
R13-RW016	Cast In-Situ Reinforced Concrete Wall	Varies	2.5	Max	A18085	A18130	45
R13-RW017	Cast In-Situ Reinforced Concrete Wall	N/A	2	Max	A18150	A18190	40

Retaining walls are typically installed to cater for level differences between the road and adjoining lands or where the narrowing of the existing corridor by way of space requirements does not allow for less constructed solution Retaining walls will generally be constructed of reinforced concrete, with railing and cladding as required, with suitable materials depending on the local environs. Retaining walls 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. Formwork and reinforcing steel for the wall will be fixed in place for *in-situ* concrete casting. 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. Elsewhere precast concrete walls are specified and these will be lifted in to place on previously prepared ground, and then secured before backfilling as appropriate.

Asides from key retaining walls listed above, a number of principal structures are included in the Proposed Scheme. These include:

- The provision of 'Island and Plaza' type bus shelter structures at the UCD Bus Interchange facility Bus stop reference #768 at chainage A4000, which has been developed in collaboration with UCD and are coordinated with the UCD Future Campus masterplan;
- The widening of the existing pedestrian subway (on its eastern side) at Patrician Villas / St. Laurence's in Stillorgan to accommodate new footpaths and cycle tracks will run parallel to the N11 mainline in both directions; and
- The demolition and reconstruction (set back further from the Proposed Scheme of the Woodbrook Side Lodge including its boundary wall and pedestrian / vehicle gated entry along the Dublin Road near Wilford Roundabout towards Bray.

12.4.1.1.2 Surface Water Drainage Infrastructure

The surface water drainage system for the Proposed Scheme will discharge into the existing surface water drainage system. There are eight existing surface water catchments and one WwTP to which the drainage system for the Proposed Scheme will discharge. Surface waters will drain to the River Dodder (Dodder_050); Elm Park Stream, Booterstown Stream, Priory Stream and Brewery Stream (all within the Brewery Stream_010 catchment); Kill of the Grange Stream (Kill of The Grange Stream_010); Cabinteely Stream and Carrickmines Stream (both within the Carrickmines Stream_010 catchment); Shanganagh River (Shanganagh_010); Rathmichael Stream and the River Dargle (both within the Dargle_040 catchment); and Ringsend WwTP, and ultimately via these receptors to the Irish Sea. The Proposed Scheme crosses the River Dodder at Donnybrook, the Elm Park Stream (Brewery Stream_010) at UCD (likely culverted), the Brewery Stream (Brewery Stream_010) at St. John of God Hospital, the Shanganagh River at Loughlinstown and the Rathmichael Stream on R119 / Dublin Road.

The drainage system for the Proposed Scheme, and therefore the runoff, will continue to discharge to the above receptors through existing surface water outfalls. All drainage outfall discharges to surface waters represent point discharges.

The Proposed Scheme will result in a decrease in impermeable area of 8m^2 in the catchment area draining to the Dodder_050. This will equate to a 0.07% reduction in impermeable area, and will result in a decrease in the volume and rate of runoff of the Dodder_050 as a result. There will be a net increase in impermeable area draining to Brewery Stream_010 of 11,471m^2, which equates to a 3.28% increase. There will also be a net increase in impermeable area draining to the Kill of The Grange Stream_010 of 2,552m^2, which equates to a 2.14% increase and the Carrickmines Stream_010 of 883m^2 which equates to a 1.63% increase. There will be a net increase in impermeable area draining to the Shanganagh River (Shanganagh_010) of 2,729m^2 which equates to a 5.42% increase and the Dargle_040 of 11,650m^2 which equates to a 14% increase. Overall, the small increases in impermeable areas for the catchments draining to the Irish Sea will have no measurable impact on this waterbody during the Operational Phase of the Proposed Scheme.

Notwithstanding this, the drainage design principles ensure that there will be no net increase in the surface water flow discharged to these receptors.

The Proposed Scheme will increase the amount of impermeable surface area through widening of carriageways. Drainage of these newly paved areas will include Sustainable Drainage System (SuDS) measures to treat and

attenuate any additional runoff. These measures will ensure that there is no increase in existing runoff rates from newly paved areas and appropriate treatment to ensure runoff quality. SuDS measures recommended for this Proposed Scheme include relocation and addition of drainage gullies, pavement capping layer attenuation (under the UCD Bus Interchange), filter drains, attenuation tanks, oversized pipes, swales, attenuation ponds and tree pits, which will be installed in suitable locations along the Proposed Scheme (e.g., in the central median and along road verges).

Table 12.15: Proposed SuDS and Impermeable Area Changes by Water Body

Waterbody	Approx. Impermeable Surface Area m^2			SuDS Measures Proposed
	Existing	Additional	Percentage change	
Ringsend WwTP	94,582	-535	-0.57%	None
Dodder_050	12,144	-8	-0.07%	None
Brewery Stream_010	349,311	11,471	3.28%	Tree pits, Filter drains, Attenuation tanks, Oversized pipes
Kill of The Grange Stream_010	118,997	2,552	2.14%	Tree pits, Filter drains, Oversized pipes
Carrickmines Stream_010	54,185	883	1.63%	Oversized pipes
Shanganagh_010	51,544	2,792	5.42%	Filter drains, Attenuation tanks, Oversized pipes
Dargle_040	83,204	11,650	14%	Tree pits, Filter drains, Attenuation tanks, Oversized pipes
South-Western Irish Sea	2,737	116	4.24%	None

12.4.1.1.3 Lighting

The majority of the Proposed Scheme is already artificially lit. However, several existing columns are proposed to be relocated or replaced to accommodate the Proposed Scheme 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 guidance. All relocated and new lighting columns are identified as proposed lighting columns as shown on the Street Lighting drawings (BCIDB-JAC-LHT_RL-0013_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.

12.4.1.1.4 Landscape and Urban 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-0013_XX_00-DR-LL-9001) in Volume 3 of this EIAR. The planting strategy has been developed to meet the needs of the Dublin City Tree Strategy (DCC 2015).

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 and also the tree planting strategy has been developed to be integrated with the Suds system, where possible.

12.4.1.1.5 Construction Compounds

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

- **Construction Compound BR1:** located in an area of derelict land characterised by Scrub and revegetating ground at Wilford Roundabout at the turnoff from the Dublin Road onto the Shankill Bypass flyover (M11 Junction 5 Bray North); and
- **Construction Compound BR2:** located in an area of managed grassland at Fosterbrook, off the Stillorgan Road, fronting the grounds of the Radisson St. Helens Hotel.

These two Construction Compounds will be used to store materials, plant and equipment, to manage the activities from, and to provide welfare facilities for construction personnel.

The Construction Compounds will be in place for the duration of the Construction Phase of the Proposed Scheme. Construction Compound BR1 will be located south-west of the Wilford Junction, with access / egress from Dublin Road as shown in Image 12.1. The area of Construction Compound BR1 is approximately 10,930m^2.

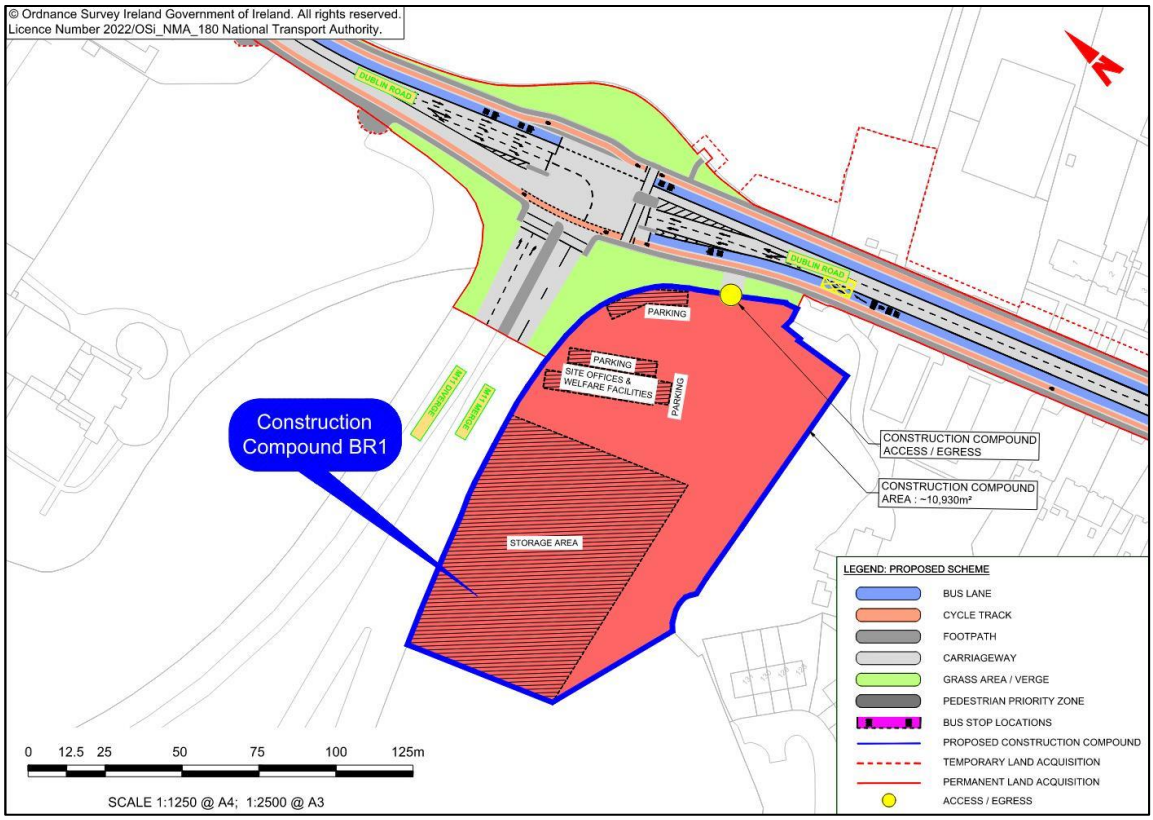

Image 12.1: Location and Extent of Construction Compound BR1

Construction Compound BR2 will be located east of Stillorgan Road, with access / egress from Fosterbrook as shown in Image 12.2. The area of Construction Compound BR2 is approximately 1,290m^2.

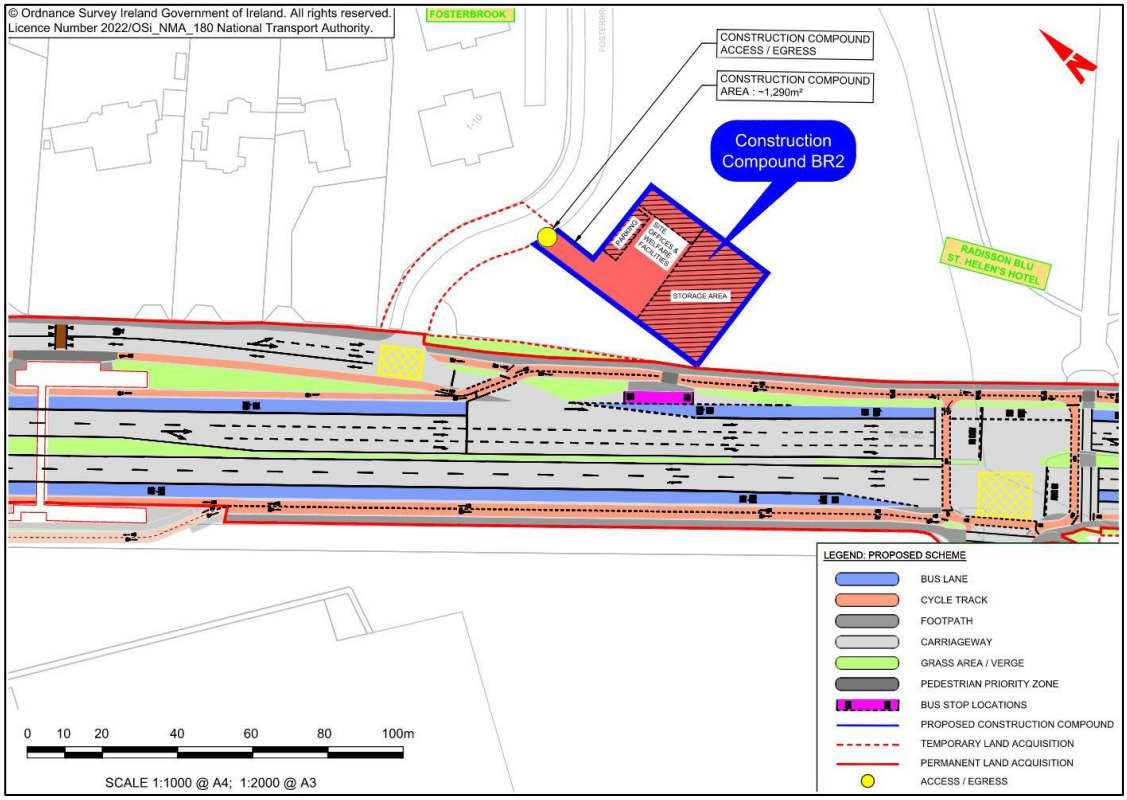

Image 12.2: Location and Extent of Construction Compound BR2

12.4.1.1.6 Estimated Project Duration

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

12.4.1.2 Operational Phase

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

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

12.4.2 'Do Nothing' Scenario

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

The baseline environment (see Section 12.3) describes the existing land use surrounding the Proposed Scheme. The Greater Dublin Area is highly urbanised with existing trends resulting in added pressure to water resources and habitat losses to ongoing development. As the full extent of the Proposed Scheme passes through lands zoned under the Dublin City Development Plan 2022-2028 (DCC 2022), Dún Laoghaire-Rathdown County Development Plan 2022-2028 (DLRCC 2022) and Wicklow County Development Plan 2022-2028 (WCC 2022), the current land use zonings provide the best indication of what the future short to medium-term biodiversity trends might be, as they will influence and direct development in the surrounding area. Lands surrounding the Proposed Scheme are largely zoned for residential, commercial or industrial purposes. Current biodiversity trends are likely to continue in areas zoned for development, adding to pressures on water bodies and habitat fragmentation. It is

also likely that traffic numbers will continue to remain high on a road network with variable drainage control or pollution control measures, which may have effects on biodiversity receptors in the receiving environment. However, any effects on biodiversity are likely to be moderated by the environmental protective policies in the Dublin City Development Plan 2022-2028 (DCC 2022), Dún Laoghaire-Rathdown County Development Plan 2022-2028 (DLRCC 2022), and Wicklow County Development Plan 2022-2028 (WCC 2022) and overarching pollution control objective in the River Basin Management Plan (RBMP) 2018-2021 (Department of Housing, Local Government and Heritage 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 of whether the integrity of any European sites would be affected (i.e., if the Proposed Scheme would adversely affect the integrity of a European site), as 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 nineteen (19) European sites (refer to the NIS which is included as a standalone document in this planning application):

- South Dublin Bay SAC [000210];

- Bray Head SAC [000714];
- North Dublin Bay SAC [000206];
- Wicklow Mountains SAC [002122];
- Rockabill to Dalkey Island SAC [003000];
- Lambay Island SAC [000204];
- Ireland's Eye SAC [002193];
- South Dublin Bay and River Tolka Estuary SPA [004024];
- North Bull Island SPA [004006];
- Howth Head Coast SPA [004113];
- Baldoyle Bay SPA [004016];
- Malahide Estuary SPA [004025];
- Rogerstown Estuary SPA [004015];
- Ireland's Eye SPA [004117];
- Skerries Islands SPA [004122];
- Lambay Island SPA [004069];
- Dalkey Islands SPA [004172];
- 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 degradation / effects on QI / SCI species as a result of hydrological impacts;
- Habitat degradation as a result of introducing / spreading non-native invasive species; and
- Disturbance and displacement impacts.

Habitat loss and fragmentation, Habitat degradation as a result of hydrogeological impacts and air quality impacts were scoped out from further assessment at the Stage 1 AA Screening stage as confirmed in the stage Two NIS. The nearest European site with groundwater dependent QI habitats / species is the Ballyman Glen SAC, which is located approximately 1.7km west, and upstream, from the Proposed Scheme. It is therefore outside the ZoI of hydrogeological impacts. Likewise, all European sites within the vicinity of the Proposed Scheme lie beyond the ZoI for air quality impacts (more than 900m from the Proposed Scheme boundary, and more than 900m from the proposed Construction Compounds during the Construction Phase, and the Proposed Scheme boundary during the Operational Phase). Therefore, there is no potential for impacts on European sites as a result of effects on hydrogeology or air quality.

12.4.3.1.1.1 Habitat Loss and Fragmentation

The Proposed Scheme does not physically overlap with any European site. Therefore, there is no potential for direct habitat loss or fragmentation to occur as a result of the Proposed Scheme. The nearest European site to the Proposed Scheme is the South Dublin Bay and River Tolka Estuary SPA, which is located 900m north-east. The nearest European site with a hydrological connection to the Proposed Scheme is also South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC which are located in Dublin Bay, which are located in Dublin Bay approximately 1.38km downstream of the point at which the (Elm Park Stream) is connected to the Proposed Scheme. Habitat loss may occur indirectly as a consequence of severe habitat degradation arising from a reduction in water quality and/or a change to the hydrological regime, as described in the section below.

Special Conservation Interest (SCI) species for which SPAs in the vicinity of the Proposed Scheme have been designated are known to utilise *ex-situ* feeding sites in the Dublin area (i.e., South Dublin Bay and River Tolka

Estuary SPA, North Bull Island SPA, Malahide Estuary SPA, Baldoyle Bay SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA and The Murrough SPA).

Two potential inland feeding sites immediately adjacent to the footprint of the Proposed Scheme were surveyed to inform this assessment, CBC0013WB001 located along the Allies River Road, off R119 / Dublin Road and CBC0013WB002 located within the Shanganagh Park on R119 / Dublin Road. Neither of these sites will be lost, but lands directly adjacent to them will be permanently modified. According to the data collected during wintering bird surveys undertaken here during both the 2020-2021 and 2021-2022 winter bird season, neither of the sites are deemed to be a significant inland foraging resource for light-bellied Brent goose or any other wetland bird species (e.g., geese, wader and/or swan species). Likewise, numbers of black-headed gull and herring gull recorded here during surveys undertaken are not significant with respect to their national or international populations. Considering this, the Proposed Scheme will not result in the loss of a suitable inland feeding site for these SCI bird species.

The Proposed Scheme will not result in temporary and/or permanent loss of inland sites within the Proposed Scheme footprint suitable to support breeding gull and wintering bird species. As only small numbers of birds were recorded during the two seasons of survey (2020 / 2021 and 2021 / 2022) at potential inland feeding sites immediately adjacent to the Proposed Scheme, and the lack of records of light-bellied Brent goose at these sites, they are not deemed to be a significant inland foraging resource. Therefore, there is no potential for impacts on SCI species associated with SPAs to occur as a result of habitat loss / fragmentation. Therefore, there is no potential for in combination effects to occur.

Regarding the two raptor species for which Wicklow Mountains SPA is designated, according to the guidance (Scottish Natural Heritage 2016) during the breeding season the core foraging range for peregrine is estimated at 2km from the nest site, with the maximum recorded distance of 18km in Britain. Likewise, during the breeding season merlin are known to forage within 5km of the next site. Wicklow Mountains SPA lies approximately 7.2km south-west of the Proposed Scheme, which is well outside the typical foraging ranges for both peregrine and merlin. Therefore, likely significant effects on these two SCI bird species, as a result of *ex-situ* habitat loss / fragmentation, can be excluded.

With the exception of otter, the location of the Proposed Scheme and its construction will not result in any direct loss or fragmentation of Annex I habitats or supporting habitats to Annex II species, for which European sites are designated within the ZoI of the Proposed Scheme. In terms of otter, while the Proposed Scheme does cross the Grand Canal, River Dodder, Brewery Stream, Shanganagh River and the Rathmichael Stream, and terminates at the River Dargle, it does so at existing crossing locations within which the rivers are either culverted or where there is a pre-existing bridge. As such the watercourses will not be subject to any instream works, nor will there be alteration to the territory currently occupied by otter.

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 the Dodder_50, Brewery Stream_010, Kill of the Grange Stream_010, Carrickmines Stream_010, Shanganagh_010, Dargle_040, South-western Irish Sea – Killiney Bay, a number of watercourses, as well as a network of interconnecting and established surface or combined sewer/surface water pipes which discharge via the Ringsend WwTP. 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.

The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during construction, or operation, has the potential to affect water quality in the receiving aquatic environment, which in turn can affect any species which utilise this aquatic environment. Otter use riparian

habitats for foraging and commuting purposes and therefore would be potentially at risk of hydrological impacts. Wicklow Mountains SAC, which is located approximately 12.9km south-west of the Proposed Scheme, via the River Dodder, (from Beaver Row in Donnybrook), is the closest European site for which otter is the QI species. Typically, otter territories are within the range of 7.5km for females and up to 21km for males (Ó'Neill *et al*., 2009). The Proposed Scheme interacts with the following watercourses: Grand Canal, River Dodder, Brewery Stream, Shanganagh River, Rathmichael Stream and River Dargle. Of these, River Dodder and River Dargle lie within the typical territorial ranges of otters, and share hydrological connections to the Wicklow Mountains SAC. The River Dodder which provides the key hydrological pathway between the Wicklow Mountains SAC and Dublin City. The Wicklow Mountains SAC lies within the Dodder_SC_010 sub-catchment, in which the Proposed Scheme is also partially located. Given there is no separation between the Wicklow Mountains SAC and the Proposed Scheme, the otter population in the vicinity of the Proposed Scheme is regarded to potentially belong to the Wicklow Mountains SAC populations. Therefore, habitat degradation / effects on the QI otter population for Wicklow Mountains SAC, as a result of hydrological impacts by the Proposed Scheme, cannot be excluded.

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

The QI habitats for which Bray Head and Howth Head SAC are designated (i.e., 'vegetated sea cliffs [1230]' and 'European dry heaths [4030]') lie above the high-water mark. Pollution is not regarded to be a threat or pressure which could potentially impact these SAC sites (NPWS 2013k; NPWS 2013l) and is not regarded to be a significant threat / pressure to this habitat at a national level (Barron *et al*., 2011). Therefore, the QI habitats of Howth Head SAC and Bray Head SAC will be unaffected by a degradation in the surface water quality of the coastal waters of Dublin Bay and significant effects in that regard can be excluded.

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 construction or operation, also has the potential to affect SCI bird species and QI marine mammal species that commute, forage and loaf in Dublin Bay i.e., birds associated with Skerries Islands SPA, Rockabill SPA, 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 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 South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, North Bull Island SPA, Baldoyle Bay SPA, The Murrough SPA, Howth Head Coast SPA, Ireland's Eye SPA, Malahide Estuary SPA, Rogerstown Estuary SPA, Lambay Island SPA, Skerries Islands SPA and Rockabill 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 Introducing / Spreading Non-Native Invasive Species

A total of eighteen (18) areas of giant hogweed, Himalayan balsam and Japanese knotweed, species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations, are present within, or in close 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 and habitat areas in European sites downstream in Dublin Bay (i.e., South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA). These in turn may result in the degradation of the existing habitats, in particular those habitats not permanently or regularly inundated by seawater, potentially outcompeting other native species and affecting species composition and physical structure of the habitat. Therefore, it is possible that the spread or introduction of invasive species could undermine the conservation objectives of these European sites.

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

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 non-native invasive species, there is the potential for in combination effects to occur in association with other activities / plans / projects.

12.4.3.1.1.4 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 (NH_3) 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.

12.4.3.1.1.5 Disturbance and Displacement Impacts

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

There are a number of SPAs located in relatively close proximity to the Proposed Scheme which are designated for SCI species that are known to forage and/or roost at inland sites, such as amenity grassland playing pitches (i.e., Malahide Estuary SPA, Baldoyle Bay SPA, North Bull Island SPA, South Dublin Bay and River Tolka Estuary 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.

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

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 (16) pNHAs:

- Skerries Island NHA [001218];
- Loughlinstown Woods pNHA [001211];
- Grand Canal pNHA [002104];
- Booterstown Marsh pNHA [001205];
- South Dublin Bay pNHA [000210];

- Dalkey Coastal Zone and Killiney Hill pNHA [001206];
- Bray Head pNHA [000714];
- North Dublin Bay pNHA [000206];
- Dolphins, Dublin Docks pNHA [000201];
- The Murrough pNHA [000730];
- Howth Head pNHA [000202];
- Baldoyle Bay pNHA [000199];
- Malahide Estuary pNHA [000205];
- Ireland's Eye pNHA [000203];
- Portraine Shore pNHA [001215];
- Rogerstown Estuary pNHA [000208]; 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 the 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 sites located within the boundaries of these European sites. These pNHAs are primarily designated for similar reasons. The Proposed Scheme also has the potential to affect biodiversity in a broader sense than just the QIs / SCIs of those European sites. Where biodiversity receptors in these pNHAs do not form part of the QIs / SCIs in the NIS assessment, they are considered under the other individual impact assessment headings for each KER below. Potential impacts arising from the Proposed Scheme on these pNHA sites would result in a likely significant negative effect at a national geographic scale.

The assessment of potential impacts arising from the Proposed Scheme on the Loughlinstown Woods pNHA and Grand Canal pNHA, as they are located within or adjacent to the Proposed Scheme Boundary, but are not being directly impacted by construction) include habitat degradation as a result of surface water quality effects, habitat degradation as a result of air quality effects and the spread of non-native invasive species (see Section 12.4.3.2), effects on rare and protected plant species (see Section 12.4.3.3 and negative effects on the protected fauna species associated with these sites such as mammals, birds, and fish species (see Section 12.4.3.4, Section 12.4.3.5 and Section 12.4.3.8.

12.4.3.1.2.1 Habitat Loss and Fragmentation

The Proposed Scheme will not result in any direct impacts to the Grand Canal pNHA although the Proposed Scheme traverses the pNHA over a pre-existing bridge. The Proposed Scheme will traverse Loughlinstown Woods pNHA at its north -western extent, although the proposed works in this area is very limited, with the arrangements remaining largely as they currently are. The proposed works within the pNHA boundary do so over an area that is long developed as part of the existing N11 Bray Road. Thus the Proposed Scheme will not result in any habitat loss or fragmentation effects on the Loughlinstown Woods pNHA or Grand Canal pNHA and therefore no significant effects, in that regard, are predicted.

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 Grand Canal, River Dodder, Brewery Stream, Shanganagh River, Rathmichael Stream and River Dargle or any other 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 Loughlinstown Woods pNHA or Grand Canal 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 Grand Canal, River Dodder, Brewery Stream, Shanganagh River, Rathmichael Stream and River Dargle downstream could also be affected. 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 Loughlinstown Woods pNHA is located downgradient of the Proposed Scheme. There are some ground improvement works required for the Proposed Scheme approximately 400m from the pNHA. Any drawdown from the excavation is expected to be limited, localised, not extending into the boundary of the pNHA site, and temporary. In the absence of mitigation, there is a risk of pollutants entering the groundwater as a result of spillages or accidents, and in such circumstances, this would constitute a significant effect on the Loughlinstown Woods pNHA. Therefore, mitigation measures, as described in Section 12.5.1.2.3 are required to address this potential impact.

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

A total of 18 areas of giant hogweed, Himalayan balsam and Japanese knotweed, species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations 2011 (as amended), are present within, or in close proximity to, the footprint of the Proposed Scheme. In the absence of mitigation, there is potential for this invasive species to spread or be introduced, during construction and/or routine maintenance/management works, to downstream pNHA sites including Loughlinstown Woods pNHA, Grand Canal pNHA and pNHA sites downstream in Dublin Bay (i.e., South Dublin Bay pNHA and North 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 composition and physical structure of the habitat. Therefore, it is possible that the spread or introduction of non-native invasive species could affect the integrity of the Loughlinstown Woods pNHA, Grand Canal pNHA and pNHA sites in Dublin Bay.

It is not considered possible that the listed non-native invasive species could spread to pNHA sites that are located a considerable distance from the outfall locations of the Grand Canal, River Dodder, Brewery Stream, Shanganagh River, Rathmichael Stream and River Dargle and separated by a large marine waterbody (i.e., Dalkey Coastal Zone and Killiney Hill pNHA, The Murrough pNHA, Howth Head pNHA, Baldoyle Bay pNHA, Malahide Estuary pNHA, Ireland's Eye pNHA, Portraine Shore pNHA, Rogerstown Estuary pNHA, Lambay Island pNHA and Skerries Island pNHA).

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

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1.2.5).

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 Grand Canal pNHA and Loughlinstown Woods 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 or plant species, or temporarily impacting the turbidity of waterbodies which in turn could impact sensitive plant species such as opposite-leaved pondweed found in Grand 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 guidance document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (Institute of Air Quality Management 2020). Vehicle-derived air emissions were modelled during the Construction Phase along the Proposed Scheme at the Loughlinstown Woods pNHA and Grand Canal pNHA crossing, i.e., Grand Canal pNHA (Leeson Bridge, western side), Grand Canal pNHA (Leeson Bridge, eastern side), Loughlinstown Woods pNHA (Bray Road) and Loughlinstown Woods pNHA (Commons Road) (refer to Section 7.4.2 of Chapter 7 (Air Quality) for details). The worst-case predicted annual average NOx concentrations at various distances from the proposed road edge exceed the 30µg/m^3 limit value. In all cases where exceedances occur, the baseline environment is already in excess of this value. During the construction year of the Proposed Scheme, annual mean NOx concentrations are predicted to decrease slightly at Grand Canal pNHA (Leeson Bridge, western side) (115.6µg/m^3 to 114.2µg/m^3), Grand Canal pNHA (Leeson Bridge, eastern side) (154.1µg/m^3 to 151.8µg/m^3) Loughlinstown Woods pNHA (Bray Road) (65.5µg/m^3 to 64.0µg/m^3) and Loughlinstown Woods pNHA (Commons Road) (35.6µg/m^3 to 35.2µg/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 12.5.1.2.4).

The contribution of the Construction Phase of the Proposed Scheme to the NO_2 dry deposition rate was modelled at the Grand Canal pNHA (Leeson Bridge, western side), Grand Canal pNHA (Leeson Bridge, eastern side), Loughlinstown Woods pNHA (Bray Road) and Loughlinstown Woods pNHA (Commons Road). Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Loughlinstown Woods pNHA and Grand Canal pNHA. These include habitats such as canals (FW3), dry meadow and grassy verges (GS2), reed and large sedge swamps (FS1), and wet willow-alder-ash-woodland (WN6). The Grand Canal pNHA site is below the lower critical load of inland and surface water habitats of 5-10Kg(N)/ha/yr while the Loughlinstown Woods pNHA site is below the lower critical load of forest habitats (10-20Kg/(N)/h/yr) (National Roads Authority 2011). There is no significant change in the NO_2 dry deposition rate at the Loughlinstown Woods pNHA and the Grand Canal pNHA sites as a result of the construction of the Proposed Scheme. Therefore, harmful effects on vegetation within the Loughlinstown Woods 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 PM_{10} and $PM_{2.5}$ concentrations at all modelled receptors (refer to Section 7.4.3 Chapter 7 (Air Quality) for details), therefore, impacts on vegetation within the pNHAs from particulate metals or heavy metals are not likely nor will there be any reduction in habitat area of the pNHA habitats, and mitigation is therefore not required.

12.4.3.2 Habitats

This section assesses the potential effects of the Proposed Scheme on habitats. In terms of quantifying the magnitude of effects on habitats, the estimated percentage of the local habitat resource being affected is based

upon the total area of a given habitat type that was recorded within the study area of the Proposed Scheme. This provides some local context as to the magnitude of the habitat loss and whether the impact is significant or not, and at what geographic scale.

12.4.3.2.1 Habitat Loss and Fragmentation

The construction of the Proposed Scheme will result in habitat loss across its length. This occurs in the form of permanent land take of edge habitats adjacent to the existing road network, or as temporary land take to facilitate construction activities. The totality of habitat loss across the Proposed Scheme (not considering buildings and other hard standing areas) is approximately 13.44ha 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 tidal rivers (CW2), which is considered to be of National Importance given its Annex I status under the Habitats Directive (i.e., 'Estuaries [1130]'), refers to the River Dargle. The Proposed Scheme proceeds as far as Fran O'Toole bridge ending on the northern side of River Dargle, and does not cross the River Dargle Therefore the River Dargle (which is a tidal in nature at this point) will not be directly affected by the Proposed Scheme and therefore there is no potential for significant negative effects at any geographic scale.

The habitat type depositing / lowland rivers (FW2) may be affected by the Proposed Scheme. This habitat type is considered to be of Local Importance (Higher Value). The River Dodder, Brewery Stream, Shanganagh River and the Rathmichael Stream, all lie in close proximity to the Proposed Scheme, which will interact with these watercourses by virtue of the fact that surface water discharges from the Proposed Scheme, including surface water runoff during construction, will drain to these watercourses. In addition, the River Dodder is crossed by the Proposed Scheme at Anglesey Bridge on Donnybrook Road while the Grand Canal is crossed by the Proposed Scheme at Eustace Bridge. There will be no in-stream works at these crossing points and there will be no permanent loss of this habitat type as a result of the Proposed Scheme. Therefore, there is no potential for significant effects at any geographic scale.

A number of habitat types considered to be of Local Importance (Higher Value) will be lost as a result of the Proposed Scheme. These include relatively small areas of (mixed) broadleaved woodland (WD1), scattered trees and parkland (WD5), hedgerow (WL1), and treeline (WL2) habitats (both linear and area features) The overall total areas of the habitat types which overlap with the Proposed Scheme boundary, and will be directly lost as a result of the construction of the Proposed Scheme, is provided in Table 12.1613.44. It should be noted that the extent of tree loss is calculated across the length of the Proposed Scheme and is captured under treelines (WL2) as the majority of habitat loss affects this habitat type. However small numbers of these trees may be lost from the habitat classification scattered trees and parkland (WD5). This distinction is considered in the habitat loss impact assessment. The permanent loss of such habitat types which are considered to be of Local Importance (Higher Value) has the potential to affect the conservation status of each of these habitat types and, therefore, result in a significant negative effect at the local geographic scale.

The remaining areas within the footprint of the Proposed Scheme comprise habitats considered to be of a Local Importance (Lower Value). These include, arable crops (BC1), buildings and artificial surfaces (BL3), exposed sand, gravel or till (ED1), spoil and bare ground (ED2), recolonising bare ground (ED3), improved amenity grasslands (GA2), dry meadows and grassy verges (GS2), scrub (WS1), immature woodland (WS2) and ornamental / non-native shrub (WS3). These habitats are located next to existing urban development, and as such are highly disturbed. With the exception of the temporary loss of 1.09ha of scrub (WS1) habitat and 0.13ha of WD5 habitat for Construction Compound BR1 and BR2, habitat loss will consist of small, isolated sections of GA2 habitat adjacent to the existing road infrastructure. The overall total area of these habitat types which overlaps with the Proposed Scheme boundary and will potentially be lost as a direct impact during construction of the Proposed Scheme is not considered to be significant at any geographical scale.

The various KER habitat types affected and corresponding total areas which overlap with the Proposed Scheme boundary are summarised in Table 12.16. These calculations include all KER habitat areas within the Proposed Scheme boundary, as the possibility of areas within the Proposed Scheme boundary but outside of the footprint of the Proposed Scheme itself being affected by construction activities cannot be ruled out. KERs highlighted in blue will be subject to direct habitat loss as a result of the Proposed Scheme.

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

The mitigation measures that have been designed to avoid or reduce the effects of direct impacts to habitats are provided in Section 12.5.1.2.1.

Table 12.16: Extent of KER Habitat Types Within the Proposed Scheme

Habitat Type	Extent of Permanent Habitat Loss	Extent of Temporary Habitat Loss (Temporary Habitat Loss and Construction Compounds)
International		
Wet willow-alder-ash woodland (WN6)	No habitat loss	No habitat loss
National Importance		
Tidal rivers (CW2) (corresponding to Annex I Estuaries [1130])	No habitat loss	No habitat loss
Canal (FW3)	No habitat loss	No habitat loss
Local Importance (Higher Value)		
Depositing / lowland rivers (FW2)	No habitat loss	No habitat loss
Mixed broadleaved woodland (WD1)	Approximately 2.3.1ha	Approximately 1.07ha
Scattered trees and parkland (WD5)*	Approximately 0.23ha	Approximately 0.46ha
Hedgerows (WL1)	Approximately 0.4ha	Approximately 0.03ha
Treelines (WL2)	Approximately 0.87ha	Approximately 0.09ha
Immature woodland (WS2)	Approximately 0.07ha	Approximately 0ha
Local Importance (Lower Value)		
Amenity grassland (GA2)	Approximately 7.89ha	Approximately 0.88ha

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

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

12.4.3.2.2 Habitat Degradation – Surface Water Quality

During 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, the downstream habitats of the Liffey Estuary Lower and Dublin Bay coastal water bodies could also be affected.

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

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

Habitat degradation as a consequence of construction effects on surface water quality has the potential to affect the conservation status of tidal rivers (CW2) / Annex I habitat Estuaries [1130] habitat (e.g., River Dargle) and the Grand Canal pNHA. Similarly, Annex I habitats contained in European sites in and around Dublin Bay could also be affected and therefore, effects on surface water quality have the potential to result in a significant negative impact at a national scale, in the case of the aquatic / wetland Annex I habitats located within the ZoI of the Proposed Scheme.

The mitigation measures that have been designed to avoid or reduce the potential impacts of the Proposed Scheme on surface water quality are presented in Section 12.5.1.2.2.

12.4.3.2.3 Habitat Degradation – Hydrological Regime

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

12.4.3.2.4 Habitat Degradation – Groundwater

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

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

As discussed in Section 12.4.3.1.2.3 in the absence of mitigation, there is a risk of indirect impacts on the Loughlinstown Woods pNHA, via contamination of groundwater as a result of spillages or accidents.

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

As detailed in the CEMP for the Proposed Scheme (Appendix A5.1 – CEMP in Volume 4 of the EIAR), a Surface Water Management Plan (SWMP) containing specific controls / mitigation measures i.e. pollution control measures 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 Chapter 7 (Air Quality) and Section 12.4.3.1.2.5, 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 (and/or vector material such as soil that is contaminated with these non-native species) is controlled under regulation 49 of the (Birds and Natural Habitats) Regulations, 2011 (as amended) and refers to plant or animal species listed on the Third Schedule of those regulations (see also Section 12.3.7).

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

The effects of introducing such non-native invasive plant species to highly sensitive and ecologically important habitat areas (e.g., designated area for nature conservation or areas of Annex I habitat) have the potential to result in a likely significant negative effect, at geographic scales ranging from Local to International. A total of eighteen (18) areas of non-native invasive plant species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations, 2011 (as amended) were identified along the Proposed Scheme. The species recorded were giant hogweed, Himalayan balsam and Japanese knotweed. The desktop study revealed records for the following additional species in close proximity to the Proposed Scheme: American skunk cabbage, floating pennywort, giant hogweed, Japanese knotweed, Nuttall's waterweed, parrot's-feather, Spanish bluebell, three-cornered garlic and water fern, as well as Canadian waterweed, which has been removed from the list of third schedule species.

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

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1.2.5).

12.4.3.3 Rare and Protected Plant Species

12.4.3.3.1 Habitat Loss

No protected plant species listed on the Flora Protection Order were recorded within or in close proximity to the Proposed Scheme. The desk study revealed records for a number of different species listed on the Flora Protection Order within 1km of the Proposed Scheme.

Of these species, all species were documented as being outside the footprint of the Proposed Scheme. There is no potential for direct impacts on any of these species to occur as a consequence of the Proposed Scheme.

12.4.3.3.2 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora Protection Order were recorded within the Proposed Scheme during field surveys. However, the desk study returned records of opposite-leaved pondweed *Groenlandia densa* from the Grand Canal. Opposite-leaved pondweed may lie dormant in sediments for many years until conditions become suitable for regrowth.

During construction and in the absence of mitigation, habitat degradation of the Grand Canal or other waterbodies, 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 – CEMP 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

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1.2.2).

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. Several trees which have been identified as being suitable to support roosting bats will be lost as a result of the Proposed Scheme. Refer to Section 12.3.8.1.7 and Figure 12.7.2 for descriptions and their locations. The Proposed Scheme will not result in the loss of any known breeding / resting sites for any bat species, however, it will result in the removal of 19 potential roost sites in the form of the above mentioned PRF trees. Therefore, in the absence of mitigation, there is potential for the felling of these trees to result in direct harm and pose a mortality risk to bats, should bats be present in the trees at the time of felling. This could result in a significant negative effect on the conservation status of bats at the local geographic level.

In respect of the proposed demolition and rebuilding of Woodbrook Side Lodge, surveys undertaken in 2008 in support of a separate Dublin Road Improvement Scheme road EIS prepared by PH McCarthy Consultants for Dun Laoghaire Rathdown County Council (PH McCarthy, 2008), found no evidence of a roost at the time nor in the preceding 5-10 years. This is based on the accumulation of dust on spiders webs in the attic space and the absence of staining or dropping under the fascia, coupled with no evidence of bat emergence from the building. Limited evidence of bat activity was noted, specifically a single soprano pipistrelle moving along a tree lined land away from the existing road. The survey reported that other unmanaged surveys from Bray and Shankill had noted Leisler's bats, soprano and common pipistrelle, which corresponds with the recent survey data carried out by Scott Cawley Ltd. ecologists, which noted evidence mostly of Leisler's bat around the Dublin road fronting Woodbrook Side Lodge, with other species noted in the wider surrounds.

Woodbrook Side Lodge was subjected to a search for occupation by bats by Scott Cawley Ltd. From a recent visit (January 2023) where the external publicly observable parts of the house were viewed, there is potential for the building to support roosting bats (i.e., some gaps along upper eves under fascia were noted). A follow on resurvey in March 2023 resulted in both an external and internal assessment of the Woodbrook Side Lodge The presence of roosting bats at the proposed demolition and rebuilding of the Woodbrook Side Lodge was ruled out based on the results of the inspection, however a precautionary approach has been adopted with regards this potential roost structure. Appropriate mitigation measures to ensure no direct harm comes to individual bats during its demolition are included in Section 12.5.1.4.1.2. The loss of this structures, if they were used by roosting bats, would be significant at the local geographic scale only, given the low number of bats likely to be roosting therein with considerable artificial lighting about, notwithstanding the presence of adjacent interconnected wooded areas.

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

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

Suitable habitat for foraging and / or commuting bats within the footprint of the Proposed Scheme includes hedgerows and treelines, mixed broadleaved woodland, rivers, areas of parkland, and open grassland. The area of the habitats which will be lost as a result of the Proposed Scheme is provided in Table 12.16 and shown in the Landscape General Arrangement drawings (BCIDB-JAC-ENV_LA-0013_XX_00-DR-LL-0001) in Volume 3 of the EIAR. This is not deemed significant, considering the extent of habitat loss, their location (adjacent to existing

artificially lit roads in a generally highly disturbed urban environment) and the presence and relative abundance of other available similar habitat that will not be impacted in the local area. The Proposed Scheme will not result in any habitat loss along the watercourses.

In assessing the impacts of habitat loss as a result of fragmentation of foraging / commuting habitat on bat populations, consideration was given to a species Core Sustenance Zone (CSZ). A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the '*resilience and conservation status'* of the colony using the roost. Bat Conservation Trust Guidance (Bat Conservation Trust 2016) states that:

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

There is evidence of bats foraging and commuting within the study area of the Proposed Scheme, particularly along the R138 Stillorgan Road (CBC0013BT002), UCD (CBC0013BT011), R116 Stonebridge Road (CBC0013BT013) and R119 Dublin Road (CBC0013BT008 / CBC0013BT012). All parts of the Proposed Scheme which contain suitable habitat are likely to be within the CSZ of at least one bat roost. Considering the type of works proposed (e.g., upgrading of existing infrastructure for the most part), there is limited potential for the Proposed Scheme to act as a barrier to flight paths for bat species, as there will be no major changes to pre-existing habitats along most of the route.

The Proposed Scheme will result loss and/or fragmentation of existing habitat used by commuting / foraging bats which 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 the site clearance phase commences and the barrier itself is in the form of the cleared lands. The Proposed Scheme will result in the removal/fragmentation of small areas /strips of mixed broadleaved woodland (WD1), scattered trees and parkland (WD5), immature woodland (WS2), hedgerows (WL1) and treelines (WL2) 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.

The provision of the UCD Bus Interchange will result in the removal of existing trees contained within the woodland habitats (WD2) identified here, both within the proposed Bus Interchange location (in the vicinity of CBC0013BT011) and along the northbound slip-road to the UCD entrance (in the vicinity of CBC0013BT003), to accommodate footpath widening. However, the existing vegetated boundaries in this area are relatively wide, typically consisting of stretches of linear woodland backing onto areas of scattered trees and parkland (WD5). Tree removal at this location would result in the removal of 155 individual trees in four groups, only one of which is a PRF with the majority of trees here being retained. Therefore, the removal of trees at this location would not result in habitat fragmentation as the overall landscape features (i.e., existing mixed broadleaved / conifer woodland (WD2) adjacent to the Proposed Scheme) would remain, albeit at a reduced width in places. Tree removal will also be required in roadside mixed broadleaved woodland (WD1) located between Greygates and the Stillorgan Road, to facilitate the provision of cycling infrastructure. Tree removal here will be limited to those trees closest to the Stillorgan Road and therefore will not result in habitat fragmentation, but rather a reduction in the overall width of the woodland feature at this location. Removal of woodland vegetation along Stillorgan Road will also occur at Oatlands College (to facilitate construction of a bus stop) and Patrician Villas (approximately 50% of trees within this woodland belt are to be removed to facilitate required widening for pedestrian and cycling infrastructure). A portion of existing mixed broadleaved woodland (WD1) will also be lost at the Loughlinstown roundabout to ensure the required visibility on approach to the roundabout from the R837 Dublin Road can be achieved. Removal of mature trees within mixed broadleaved woodland (WD1) belts will continue along the R837 Dublin Road (CBC0013BT005) to facilitate the relocation of boundary walls from adjacent properties. Mature tress within scattered trees and parkland (WD5) habitat will also be removed along Stonebridge Road (CBC0013BT013) to accommodate proposed cycling and pedestrian infrastructure. Trees will also be removed from habitats along Beech Road (realignment of existing footpath), Dublin Road (CBC0013BT008) (to facilitate

the widening of the carriageway eastwards) and Shanganagh Park (CBC0013BT008) (to provide cycling infrastructure).

There is also the need to remove of some trees and scrub associated with the currently enclosed frontage of Woodbrook Side Lodge, along with the proposed demolition and rebuilding of the lodge house further back to within the current curtilage. The tree removal will require three trees to be removed, one of which is a mature sycamore with low-moderate potential to support bats. Hover the tree, which overhangs the existing Bray Road and is artificially lit, has had its ivy cut at the base and is considered that bat roosting potential is better further inland in the retained mature trees within the curtilage of Woodbrook Side Lodge and the screening vegetation separating it from the open agricultural land behind.

Considering the extent of tree/vegetation across the Proposed Scheme, within the context of its current extent (i.e., in most cases tree removal is limited to the outermost trees in strips of linear roadside woodland), thereby avoiding complete fragmentation, this impact will be significant at the local level only.

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 approximately 4.17ha on a permanent basis and 4.06ha 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 for the most part considered to provide significant contributions to CSZs of roosts located outside of the footprint of the Proposed Scheme. The effect of habitat fragmentation and the barrier effect associated with the construction of the Proposed Scheme is therefore considered to be significant at the Local Geographic level only.

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

Construction Compounds are proposed in the following two locations:

- Construction Compound BR1 (Wilford Junction) will be located at an area of scrub south-west of Wilford Roundabout and along the R761 Dublin Road; and
- Construction Compound BR2 (Fosterbrook) will be located at an area of scattered trees and parkland, and treelines to the west of Radisson St. Helen's and along the R138 Stillorgan Road.

Security lighting will be installed in these compounds for the duration of construction (i.e., 36 months), thereby temporarily increasing the level of artificial lighting in this area. Artificial lighting within suitable habitat may result in avoidance behaviour by bats, and could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and result in abandonment of nearby roosts. Given the urban setting of these proposed Construction Compounds, bats in the area would be habituated to some level of artificial lighting, although the nature and volume of mature trees along the Dublin Road to the north of Construction Compound BR1 corresponds to an area of considerable bat activity, notwithstanding current artificial street lighting. Provided security lighting does not involve high intensity lighting (e.g., floodlighting) the impact of increased artificial lighting at Construction Compounds is considered to be significant at the local level only.

The bulk of the construction works along the Proposed Scheme will typically be undertaken during normal daylight working hours, although it is recognised that some elements of night-time work will be required given the transport importance of this existing corridor e.g., lane closures and resurfacing. This could include important watercourse crossing points such as the River Dodder and Grand Canal crossing. The bulk of the existing corridor is largely illuminated by regularly spaced lighting columns for much of its length and therefore the requirement for lighting to accommodate construction works during night-time will be limited, in areas where existing light levels are low and of short duration. The effect of the additional lighting is therefore considered to be significant at a local level only and temporary.

12.4.3.4.2 Badger

During the multidisciplinary surveys did not confirm any badger setts or evidence of badger within the footprint of the Proposed Scheme. Based on the results of the desk study, badger are known to occur in the vicinity of the Proposed Scheme, and the nearest was from Donnybrook in the grounds of the Church of the Sacred Heart,

Although it cannot be predicted if badger will establish new setts within the ZoI of the Proposed Scheme before construction works commence, it is a possibility, and therefore this scenario has been taken into account in the mitigation strategy (refer to Section 12.5.1.4.2).

12.4.3.4.2.1 Loss of Foraging Habitat and Breeding / Rest Sites

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

Construction may result in the permanent loss of 11.86ha of suitable foraging / commuting habitat for badgers (e.g., amenity grassland (GA2), scattered trees and parkland (WD5), dry meadows and grassy verges (GS2), scrub (WS1), mixed broadleaved woodland (WD1), and hedgerows (WL1) / treelines (WL2)). In addition, the provision of Construction Compounds for the duration of the Construction Phase will result in the temporary loss of 1.22ha of scrub (WS1) and scattered trees and parkland (WD5) habitat, which could be used by commuting / foraging badgers. Given the relative abundance of suitable habitat in the wider vicinity (e.g., amenity grassland (GA2) and scattered trees and parkland (WD5) to the east), the permanent and temporary losses of these habitats is not considered significant at any geographic scale. As the majority of the proposed location of Construction Compound BR1 site is composed of scrub largely surrounded by built wall with road frontage on three sides, it is not considered to be an important area for commuting / foraging badgers, and therefore its use as a Construction Compound will not have any significant effect on the local badger population. Construction Compound BR2 will result in the short term loss of Scrub WS1 and some GA2 habitat alongside a triangular wooded copse, but the loss habitats is not considered significant owing to the abundance of open territory around Fosterbrook / Radisson Blu St. Helens grounds.

Permanent habitat removal for the Proposed Scheme will be largely adjacent to pre-existing roads / paths and will typically be limited to 2m linear sections of amenity grassland (GA2), existing hard surfaces (BL3), scattered trees and parkland (WD5) and roadside treelines (WL1) / hedgerows (WL2), within a highly disturbed urban environment. These areas of habitat removal are not likely to provide significant foraging habitat for the local badger population. Therefore, the Proposed Scheme is unlikely to affect the conservation status of the local badger population and will not result in a significant negative effect, at any geographic scale.

12.4.3.4.2.2 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. One of the two locations proposed for Construction Compounds are composed of suitable foraging or commuting habitat for badger (scattered trees and parkland). 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

Multidisciplinary surveys did not confirm any otter holts or evidence of otter activity within the footprint of the Proposed Scheme and the some of the watercourses in the vicinity of the Proposed Scheme are culverted, or of such condition that they would provide unfavourable otter territory.

Although it cannot be predicted if otter will establish new holt or couch sites 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 12.5.1.4.3).

12.4.3.4.3.1 Loss of Breeding / Resting Sites

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

12.4.3.4.3.2 Loss / Fragmentation of Foraging / Commuting Habitat

Evidence of otter was not recorded within or in close proximity to the Proposed Scheme during the field surveys undertaken for the Proposed Scheme. However, based on the results of the desk study, otter are known to utilise the River Liffey and Grand Canal. In addition, otter frequently use the Lower Liffey Estuary, to which the Scheme is hydrologically connected, for commuting and foraging purposes, with holts identified on the River Dodder, Grand Canal and in the Liffey Estuary Lower as well as some individual watercourses – typically the lower stretches, of watercourses in the Dún Laoghaire-Rathdown administrative boundary intersected by the Proposed Scheme (Macklin *et al.,* 2019a, b).

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

The Proposed Scheme is not expected to result in any loss / fragmentation to habitats used by otter. This is because the Proposed Scheme does not include any works to watercourses or associated riparian vegetation in the vicinity of the Proposed Scheme. There are no works proposed on the Grand Canal, River Dodder or the River Dargle, and the Brewery Stream, Shanganagh River and the Rathmichael Stream are culverted, where they occur in close proximity to the Proposed Scheme. Therefore, there is no potential for the Proposed Scheme to result in the loss or fragmentation of foraging / commuting habitat for otter.

Otter are known to routinely use highly modified habitat within culverts and beneath bridges. Any 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 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 Severance / Barrier Effect

There are no construction works proposed within the Grand Canal, River Dodder and the River Dargle, as the Proposed Scheme is merely remodelling existing road layout across the existing road bridges and therefore will not impede passage beneath. The Brewery Stream, Shanganagh River and the Rathmichael Stream are culverted

where they occur in close proximity to the Proposed Scheme. Therefore, there is no potential for severance / barrier effects, as a result of construction works, to significantly affect the local otter population.

12.4.3.4.3.4 Habitat and Food Source Degradation – Water Quality

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

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

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

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

Proposed mitigation measures have been designed to protect water quality during construction (see Section 12.5.1.4.3.3.

12.4.3.4.3.5 Disturbance / Displacement

No otter holts were identified during the surveys undertaken. The results of the desk study show that active otter holts are known to occur within the vicinity of the Proposed Scheme, including along the River Dodder and Shanganagh River, and further downstream in the Liffey Estuary Lower. Increased human presence and/or noise and vibration associated with construction works within the footprint of the Proposed Scheme is unlikely to affect these holts. However, construction works associated with the Proposed Scheme have the potential to (at least temporarily) displace commuting or foraging otter, particularly in unpopulated areas that are downslope of the Shanganagh River i.e., wooded sections of the Loughlinstown Woods pNHA that extend eastwards of the Proposed Scheme.

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

Construction works associated with the Proposed Scheme have the potential to temporarily displace commuting or foraging otter at the proposed River Dodder and Grand Canal crossing points. Noise and disturbance levels associated with these works lie within the range 64-81dB, depending on the activity, at 10m from the Proposed Scheme boundary and return to background levels within 50m (average daytime noise levels within the Leeson

Street to Donnybrook (Anglesea Road Junction) section of the Proposed Scheme was in the order of 68dB – refer to Chapter 9 (Noise & Vibration). As such disturbance for mammals is estimated to reach approximately 50m from the Proposed Scheme in this highly urbanised area. Documented otter holts are outside of this Zol, disturbance effects from the Proposed Scheme are not deemed to cause displacement affects leading to abandonment of these holts or territory.

Otter are known to tolerate human disturbance under certain circumstances (Bailey and Rochford 2006; The Environment Agency 2010; Irish Wildlife Trust 2012). There are numerous records of otter within the urban Dublin area, which suggests a relatively high level of habituation to human disturbance and noise by otter (Macklin *et al*., 2019a, b). As construction works will typically be undertaken during normal daylight working hours and otter are generally nocturnal in habit, and that otter can (in many circumstances) tolerate high levels of human presence and disturbance, displacement of otter from their habitat is extremely unlikely to affect the local otter population. Therefore, disturbance during construction is not likely to have a significant effect on the species' conservation status and will not result in a 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 that the locations of the proposed Construction Compounds are remote from any watercourses, lighting during construction is not considered likely to result in any significant effect to otters in the vicinity. However, in view of potential night-time works in near busy road bridges crossing some watercourses e.g. River Dodder at Donnybrook, mitigation measures have been designed to minimise habitat severance during construction (see Sections 12.5.1.4.3.2 and 12.5.1.4.3.4).

12.4.3.4.4 Marine Mammals

12.4.3.4.4.1 Habitat and Food Resource Degradation – Water Quality

As discussed in Section 12.4.3.2.2, the Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on marine mammals either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats). Habitat degradation due to effects on surface water quality during construction has the potential to affect the species' conservation status and result in a significant negative effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed effect, and the availability of suitable habitat in Dublin Bay.

Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1.4.4.1).

12.4.3.4.5 Other Mammals

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

12.4.3.4.5.1 Habitat Loss

The construction of the Proposed Scheme will result in the temporary loss of suitable habitat for small mammals located within the boundary of the Proposed Scheme, although there will be occasional loss of small discrete areas of open territory across the Proposed Scheme. However, a permanent loss of territory and reconfiguration of the front of the O'Reilly Car park at UCD to facilitate the proposed Bus Interchange will result in permanent habitat loss. Given the relatively low numbers of individuals of each species that are likely to be affected (i.e., pine marten, red squirrel, hedgehog and pygmy shrew), and the abundance of alternative suitable habitat available locally, the effects of habitat loss associated with construction works are unlikely to affect the long-term viability of their local populations. Therefore, habitat loss is unlikely to affect the species' conservation status or result in a significant negative effect, at any geographic scale.

Mitigation measures have been designed to reduce habitat loss during construction (see Section 12.5.1.4.5).

12.4.3.4.5.2 Mortality Risk

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

12.4.3.4.5.3 Disturbance / Displacement

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

As construction works in areas of suitable foraging habitat will typically be undertaken during normal daylight working hours and the relevant mammal species are nocturnal in habit, displacement of mammal species from foraging areas (outside of areas where foraging habitat will be lost as a result of the Proposed Scheme) is extremely unlikely to affect the local mammal population and will not result in a 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 concluded that the Proposed Scheme would not affect their breeding colonies or have any long-term effects on the local breeding populations. Therefore, for these species, the Proposed Scheme will not affect the conservation status of the breeding populations and will not have any adverse effects on the integrity of European sites.

12.4.3.5.1.1 Habitat Loss and Loss of Breeding / Resting Sites

The Proposed Scheme will result in the loss of breeding bird nesting and foraging habitat within the footprint of the Proposed Scheme. The areas of habitat loss within the Proposed Scheme boundary are provided in Section 12.4.3.2 and tabulated in Table 12.16: Extent of KER Habitat Types Within the Proposed Scheme for all KER habitat types. These areas comprise a total area of approximately 12.06ha (including mosaics dominated by linear woodland vegetation) of mixed broadleaved woodland (WD1), scattered trees and parkland (WD5) and immature woodland (WS2) habitats, and approximately 282m of hedgerows (WL1) and treelines (WL2) habitats (largely planted). In addition, there are areas of scrub (WS1), ornamental / non-native shrub (WS3), dry meadows and grassy verges (GS2) and amenity grassland (GA2) within the footprint of the Proposed Scheme, which are not KERs in their own right due to their limited botanical value. However, these habitats may provide nesting and/or foraging habitat for birds. 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:

- Hedgerow (WL1) habitat in the vicinity of the Loughlinstown roundabout, to facilitate bus stop exit taper, and along the boundary of agricultural lands on the Dublin Road (R119), to facilitate cycling and pedestrian infrastructure;

- Treeline (WL2) habitat at various locations along the Dublin Road (R119) and Stillorgan / Bray Road (N11) to accommodate pedestrian and cycling infrastructure;
- Mixed broadleaved woodland (WD1) habitat along the Dublin Road (R837 and R119), to accommodate carriageway widening and cycling infrastructure and Stillorgan Road (Oatlands College, Patrician Villas and at Loughlinstown roundabout), to facilitate construction of bus stop, widening of existing cycling and pedestrian infrastructure, and to ensure required sightlines can be achieved;
- Scattered trees and parkland (WD5) habitat along Stonebridge Road to accommodate cycling and pedestrian infrastructure and at Fosterbrook to facilitate to provision of Construction Compound BR2;
- Scrub (WS1) habitat at the Wilford Junction to accommodate Construction Compound BR1; and
- Amenity grassland (GA2) and mixed broadleaved woodland (WD1) at UCD to accommodate the proposed UCD Bus Interchange, at Greygates to facilitate the provision of cycling infrastructure, at Loughlinstown roundabout to accommodate proposed SuDS, at Shanganagh Park to facilitate the provision of cycling and pedestrian infrastructure as well as small stretches of this habitat along the verges of the existing carriageway.

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 its carrying capacity or not in terms of breeding bird species. For species with larger home ranges during the breeding season, habitat loss at the scale of the Proposed Scheme is not likely to have any perceptible effects on breeding success or population dynamics. As the Proposed Scheme will be constructed within an already busy transport corridor, habitats suitable to support breeding birds are limited. Treelines and hedgerows are highly disturbed, and largely within the road median, therefore do not offer significant shelter for breeding bird species.

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

- Parks and greenspaces with hedgerow, treeline and/or scrub boundaries such as Loughlinstown Woods pNHA, St. Stephens Green, Iveagh Gardens, Leeson Park, Herbert Park, Elm Park golf course, UCD, Cabinteely Park, Kilbogget Park, Deerpark and Shanganagh Park;
- Woodland such as that present in Loughlinstown Woods pNHA; and
- Sections of the watercourses both upstream and downstream of the Proposed Scheme.

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

Mitigation measures will be implemented to reduce the effects of habitat loss on breeding bird species locally (see Section 12.5.1.5.1.1).

12.4.3.5.1.2 Mortality Risk

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

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

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

In any event, mitigation measures will be implemented to reduce the potential mortality risk presented by any clearance works (see Section 12.5.1.5.1.2).

12.4.3.5.1.3 Disturbance / Displacement

The noise, vibration, increased human presence and the visual deterrent of construction traffic, associated with site clearance and construction will temporarily disturb breeding bird species and is likely to displace breeding birds from habitat areas adjacent to the footprint of the Proposed Scheme. Construction activities will largely involve carriageway and pavement resurfacing / reconstruction as required, readjustment of kerbs and new road. However, as an important transport corridor in a heavily urbanised landscape, there is an existing relatively high level of human disturbance within the immediate environment of the Proposed Scheme and as such it is likely that breeding species present are habituated to a certain degree of disturbance. The magnitude of the impact will be dependent on the type of construction works and their duration; general construction activities will have a less pronounced affect than blasting, in terms of its ZoI, but will be on-going for periods of up to 36 months and multiple breeding seasons across the entirety of the Construction Phase. However, phasing of the construction works in scheme sections will reduce the temporary nature of this impact to approximately one to eighteen-month disturbances in each section of the Proposed Scheme. With regards the proposed Construction Compounds disturbance impacts will be short-term in nature as they will be ongoing for the duration of the Construction Phase.

Table 12.17 provides a summary of the indicative construction noise calculations at varying distances, which have been modelled in Chapter 9 (Noise & Vibration) in Volume 3 of this EIAR. Areas within the Proposed Scheme, which will be subject to construction activities which generate noise levels greater than 50dB (e.g., piling), include all areas within 250m of the Proposed Scheme. These activities will result in a greater magnitude of effect on the baseline environment. As a result, noise and vibration from these activities will have the potential to result in the reduced breeding success of breeding bird species in the vicinity of the works. Breeding pairs will be temporarily displaced during the construction works. The area over which disturbance / displacement effects will occur, forms a relatively small part of larger expanses of similar habitat types in the wider locality (e.g., mixed broadleaved woodland (WD1)). As such, given the availability of suitable habitat in the wider locality of the Proposed Scheme, the construction works are therefore not likely to affect the conservation status of breeding birds and will not result in a significant negative effect, above the local geographic scale. Although it is not possible to quantify the magnitude of this potential impact (or the potential effect zone) with precision, it could potentially extend several hundred metres from the Proposed Scheme. The results of noise modelling carried out for the Proposed Scheme confirmed that at 150m, noise levels for all construction activities will be below 60dB (See Chapter 9 (Noise & Vibration)). Given the temporary to short-term nature of the construction works, coupled with the existing levels of disturbance within these urban areas, disturbance or displacement effects associated with the Construction Phase of the Proposed Scheme will also be over the short-term. Therefore, these impacts will not affect the conservation status of breeding bird species and will not result in a negative effect, above the local geographic scale.

12.4.3.5.1.4 Habitat Degradation – Surface Water Quality

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.

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

12.4.3.5.2 Wintering Birds

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

12.4.3.5.2.1 Habitat Loss and/or Disturbance / Displacement

There will be no direct loss of feeding habitat such as large, open grassed areas within, or adjacent to, the Proposed Scheme boundary. A narrow band of amenity grassland (GA2) will be temporally lost at the entrance to Shanganagh Park (on the parkside of the existing playground, along the Dublin Road (R119) during construction. This area would not be used by wintering bird species.

The Proposed Scheme will require the removal of a number of treelines, alongside amenity grasslands which are potentially suitable for wintering bird species along its length. Much of this wooded and peripheral grassland territory are not considered suitable for wintering birds, who have preference for inland feeding sites (typically larger open green fields) as suggested in field surveys around Dublin (Scott Cawley Ltd. 2017).

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

Current understanding of construction related noise disturbance to wintering waterbirds is based on the published research (Cutts *et al*., 2009; Wright *et al*., 2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds, i.e., birds becoming alert and some behavioural changes (e.g., reduced feeding activity), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity (BS 5228) are generally below 60dB or, in most cases, are approaching the 50dB threshold. As such, disturbance effects for general construction activities across the majority of the Proposed Scheme would not be expected to extend beyond a distance of approximately 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond. Table 12.17 provides the indicative construction noise calculation associated with different construction activities of the Proposed Scheme at varying distances.

Table 12.17: Indicative Construction Noise Calculations at Varying Distances

Activity	Predicted CNL at Stated Distance from Edge of Works (dB $L_{Aeq,12hr}$ or $L_{Aeq,4hr}$)								
(dB)	10m	15m	20m	30m	50m	75m	100m	150m	250m
General Road works	79	76	73	69	65	61	59	55	51
Road Widening and Utility Diversion	83	80	77	73	69	65	63	59	55
Urban Realm landscaping	79	76	73	69	65	61	59	55	51
Construction compounds	78	75	72	68	64	60	58	54	50
Boundary wall construction	80	77	74	70	66	62	60	56	49
Retaining walls	81	78	75	71	67	63	61	57	53
Bored/Auger Piling	80	77	74	70	66	62	60	56	52
Additional Structural Works (e.g., bridge construction)	83	80	77	73	69	65	63	59	55

None of the construction activities proposed would be expected to result in any more than a moderate level of disturbance effect on wintering birds at distances beyond 300m. At 150m, noise levels are below 60dB. Low, or no, effects would be expected for those noise levels. Any landscape features, vegetation cover or buildings between the construction site and wintering bird sites would contribute to further reducing the ambient noise at any given distance. Therefore, 300m is considered to be a precautionary buffer in defining the ZoI of disturbance effects.

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

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

The majority of wintering birds identified in the desk study are typically found in coastal, estuarine and intertidal habitats including the Liffey Estuary and Dublin Bay, and therefore will not be impacted directly during construction. Certain species, such as light-bellied Brent goose, often forage on inland sites in the Greater Dublin Area. Suitable sites are usually composed of open parkland / playing pitches. There is one confirmed inland wintering bird feeding site, Cabinteely / Kilbogget Park located approximately 219m east of the Proposed Scheme, within the distance (300m) within which birds would potentially be expected to be displaced. Cabinteely / Kilbogget Park is considered to be an inland feeding site of high importance for light-bellied Brent goose. The survey results at Shanganagh Park (referred to as CBC0013WB002) indicate a relatively low frequency of occurrence of wintering bird species on these lands and suggests these species do not regularly use or rely upon these lands as foraging and/or roosting habitat. The peak flocks of each respective wintering bird species recorded at these sites are also relatively low, in particular when compared to 1% of their international flyway and national populations. A wetland is considered to be of international importance if it regularly supports 1% of the relevant international, or flyway, population or if it supports a population of more than 20,000 waterbirds (Nagy and Langendoen 2018).

Table 12.18: Wintering Bird Species Recorded During Wintering Bird Surveys in Comparison to the 1% of Their International and National Populations

Common Name / Scientific Name / BTO Code	Peak Count Recorded at Site – Date Recorded	Threshold of International Population (1% of International Population)	Threshold of National Population (1% of National Population)
Black-headed gull *Chroicocephalus ridibundus* (BH)	103	31,000	n/a
Herring Gull *Larus argentatus* (HG)	2	14,400	n/a

The following two known inland wintering bird feeding sites are known to occur within approximately 300m-1km of the Proposed Scheme (i.e., beyond the ZoI), and it is likely that birds displaced from the Cabinteely / Kilbogget Park site, would be displaced to the following known sites:

- St. Andrew's Playing Pitch (unknown importance); and
- Blackrock College (high importance)

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

- Parks and greenspaces such as Loughlinstown Woods pNHA, St. Stephen's Green, Iveagh Gardens, Leeson Park, Herbert Park, Elm Park, UCD, Cabinteely Park, Kilbogget Park, Deerpark and Shanganagh Park; and
- Wetland habitat associated with South Dublin Bay and River Tolka Estuary SPA, and North Dublin Bay SPA.

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

The small numbers of wintering birds which are disturbed during construction will likely be displaced to suitable sites in the surrounding environment, such as those listed above, and therefore impacts are not considered to be significant beyond the local level. There will be no land take at any site with suitability for wintering birds. Therefore, in consideration of these factors, an increase in short-term disturbance or displacement effects will not affect the conservation status of any wintering bird species and will not result in a significant negative effect, above the local level.

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 Appendix A5.1 – CEMP in Volume 4 of this EIAR).

12.4.3.6 Reptiles

There were no reptile species recorded during the multidisciplinary 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, however there are nineteen (19) records of common lizard within the wider surrounding area. Therefore it cannot be ruled out that these species are not present in the wider area surrounding the Proposed Scheme, due to the presence of suitable habitat.

12.4.3.6.1 Disturbance and Mortality Risk

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

12.4.3.6.2 Habitat Severance / Barrier Effect

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

12.4.3.7 Amphibians

No amphibian species were recorded during the multidisciplinary surveys carried out along the Proposed Scheme, despite the presence of suitable habitat within the footprint of the Proposed Scheme (e.g., downstream riparian banks along the River Dodder). The desk study returned records for common frog and smooth newt within 1km

of the Proposed Scheme, and therefore it cannot be ruled out that these species occur in the vicinity of the Proposed Scheme.

12.4.3.7.1 Disturbance / Mortality Risk

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

12.4.3.7.2 Habitat Severance / Barrier Effect

The temporary to short-term physical disruption of the existing landscape during site clearance and construction will fragment habitat 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 water quality during construction (see Section 12.5.1, Chapter 13 (Water) and Appendix A5.1 – CEMP in Volume 4 of the EIAR).

12.4.3.8 Fish

12.4.3.8.1 Habitat Loss / Severance and Barrier Effect

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

12.4.3.8.2 Habitat Degradation – Surface Water Quality

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 affect the conservation status of affected fish species and result in a significant negative effect, at a local to County geographic scale, as described below.

Desk study records, as presented in Section 12.2.3 revealed that the River Dodder is known to support populations of Atlantic salmon and brown trout, and the Shanganagh River brown trout. Furthermore, the River Liffey is recognised as a highly significant regional salmonid catchment for species of Atlantic salmon and brown trout. Given that salmonid species are protected under both national and international legislation, habitat degradation, as a result of effects on surface water quality on the River Dodder and its downstream River Liffey, and/or the Shanganagh River, during construction, has the potential to result in a likely significant effect at the County level on salmonid species.

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

The results of the desk study revealed that European eel is known to occur in the River Dodder and River Dargle. In addition, the Liffey Estuary, into which the River Dodder ultimately drains, serves as the gateway for eels migrating between freshwater and ocean environments, providing the necessary habitat for their transition. Habitat degradation, as a result of effects on surface water quality during construction, has the potential to result in a likely significant effect at the County level on eel, given the presence of suitable habitat and declining trend of eel in Irish waters.

With regards all other fish species, the effects of habitat degradation as a result of effects on surface water quality during construction has the potential to result in a 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. Mitigation measures have been designed to protect water quality during construction (see Section 12.5.2.8.1, Chapter 13 (Water) and Appendix A5.1 – CEMP in Volume 4 of the EIAR).

12.4.3.9 Invertebrates – Freshwater

12.4.3.9.1 Habitat Loss / Mortality Risk

The desk study returned records of three Red listed freshwater molluscs, glutinous snail, iridescent pea mussel and false orb pea mussel along the Grand Canal, located approximately 550m north-east of Proposed Scheme. Although the Proposed Scheme is not hydrologically connected to the Grand Canal via surface water drainage, there is potential for Red listed invertebrates to be present in other watercourses into which a hydrological connection exists, and it cannot be ruled out that these species do not occur in the vicinity of the Proposed Scheme.

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

12.4.3.9.2 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 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 affect the conservation status of affected invertebrate species and result in a likely significant negative effect, at a local geographic scale. Mitigation measures have been designed to protect water quality during construction (see Section 12.5.2.9.1, Chapter 13 (Water) and Appendix A5.1 – CEMP in Volume 4 of the EIAR).

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

Table 12.19: Summary of Potential Construction Phase Impacts (Pre-mitigation)

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Designated Areas for Nature Conservation			
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
Bray Head SAC Bray Head pNHA	International Importance National Importance	None	N/A
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
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
Wicklow Mountains SAC	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head SAC Howth Head pNHA	International Importance National Importance	None	N/A
Ireland's Eye SAC Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA	International Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown Estuary pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rockabill SPA Rockabill Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Loughlinstown Woods pNHA	National Importance	Habitat degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Grand Canal pNHA	National Importance	Habitat degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Habitats (outside of designated areas for nature conservation)			
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local to national geographic scale
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
Canals (FW3)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Wet willow-alder-ash woodland (WN6)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Immature Woodland (WS2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Rare / Protected Plant Species			
Flora Species listed on the Flora Protection Order	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Flora Species on Irelands Red Lists (Vulnerable or of higher concern)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Non-native Invasive Plant Species	N/A	Spread at expense of habitats and native species	Likely significant effect at the local to international scale geographic scale
Fauna Species			
Bats	Local Importance (Higher Value)	Mortality risk; habitat loss / fragmentation; disturbance / displacement (lighting)	Likely significant effect at the local geographic scale
Badger	Local Importance (Higher Value)	Disturbance / displacement (lighting)	Likely significant effect at the local geographic scale
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Marine mammals (all other 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)	Habitat loss	Likely significant effect at the local geographic scale
SCI / Annex I bird species	International Importance	See SPAs above	See SPAs above
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Reptiles	Local Importance (Higher Value)	None	N/A
Amphibians	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Atlantic salmon	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
Brown trout	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
European eel / Lamprey	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
All other fish species	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Invertebrates - Freshwater molluscs	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Local Biodiversity Areas			
DCC			
Grand Canal	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
River Dodder Corridor	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Network of parks e.g., St. Stephen's Green and Herbert Park	County Importance	None	N/A
DLRCC			
Network of streams and rivers e.g., River Dodder	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
Network of parks e.g., Cabinteely Park and Shanganagh Park	County Importance	Habitat loss (Shanganagh Park)	Likely significant effect at the local to county geographic scale
WCC			
Network of streams and rivers e.g., River Dargle	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
Network of parks e.g., People's Park, Bray	County Importance	None	N/A

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 NIS, which is included as a standalone document in the planning application.

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

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

The Proposed Scheme is hydrologically connected to Dublin Bay via a number of watercourses and existing pipes which drain directly to Dublin Bay. The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and the accidental spillage and/ or leaks of contaminants. The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge point and therefore impact the downstream, i.e., Dublin and Killiney Bay within which European sites are located: South Dublin Bay SAC, Bray Head SAC, Rockabill to Dalkey Island SAC, North Dublin Bay SAC, Howth Head SAC, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA and North Bull Island SPA. The QI habitats for which Bray Head and Howth Head SAC are designated (i.e., 'vegetated sea cliffs [1230]' and 'European dry heaths [4030]') lie above the high-water mark. Pollution is not regarded to be a threat or pressure which could potentially impact these SAC sites (NPWS 2021b) and is not regarded to be a significant threat / pressure to this habitat at a national level (Barron *et al*., 2011). Therefore, the QI habitats of Howth Head SAC and Bray Head SAC will be unaffected by a degradation in the surface water quality of the coastal waters of Dublin Bay and significant effects in that regard can be excluded.

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

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

12.4.4.1.1.3 Habitat Degradation as a Result of Introducing / Spreading Non-native Invasive Species

A total of eighteen (18) areas of giant hogweed, Himalayan balsam and Japanese knotweed, species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 are present within, or in close proximity to, the Proposed Scheme. In the absence of mitigation, there is potential for this to spread or be introduced during routine maintenance/management works, to terrestrial habitat areas in European

sites downstream in Dublin Bay (i.e., South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA). These in turn may result in the degradation of the existing habitats and therefore undermine the conservation objectives of these European sites.

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

12.4.4.1.1.4 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 (NH_3) 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.

12.4.4.1.1.5 Disturbance and Displacement Impacts

There are no European sites within the immediate footprint of the Proposed Scheme or within the disturbance ZoI, however, a number of QI species are known to occur within the vicinity of the Proposed Scheme. Refer to Section 12.4.4.4 and Section 12.4.4.8 for more details with regards to potential Operational 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 12.4.4.5.2 with regards to potential Operational 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 above in Section 12.4.4.1.1 may also negatively affect the following pNHA and NHA sites, which are located within the boundaries of European sites and designated for similar reasons: Booterstown pNHA, South Dublin Bay pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, North Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, The Murrough pNHA, Howth Head pNHA, Baldoyle Bay pNHA, Malahide Estuary pNHA, Ireland's Eye pNHA, Portraine Shore pNHA, Rogerstown Estuary pNHA, Lambay Island pNHA and Skerries Island NHA. The respective European sites are provided in Table 12.5. The Proposed Scheme also has the potential to affect biodiversity in a broader sense than only the QIs / SCIs of those European sites. Where biodiversity receptors in these NHAs and pNHAs do not form part of the QIs / SCIs in the NIS assessment, they are considered under the other individual impact assessment headings for each KER below. Potential impacts arising from the Proposed Scheme on these pNHA sites would result in a likely significant negative effect at a national geographic scale.

The assessment of potential impacts arising from the Proposed Scheme on the Grand Canal pNHA include habitat degradation as a result of surface water quality and the spread of non-native invasive plant species (see Section 12.4.4.2.2), effects on rare and protected plant species (see Section 12.4.4.3) and negative effects on the protected fauna species associated with the canal such as bats, otter and birds (see Section 12.4.4.4 and Section 12.4.4.5). The Proposed Scheme during Operational Phase will not result in any direct impacts to the qualifying

features of Loughlinstown Woods pNHA (notwithstanding the legacy mapping overlap of the pNHA boundary with the existing N11 Dublin Road) or the Grand Canal pNHA.

12.4.4.1.2.1 Habitat Degradation – Air Quality

Air quality modelling of NOx concentrations, and deposition rates were modelled for the Operational Phase of the Proposed Scheme at distances up to 200m from the Proposed Scheme or where significant changes to Annual Average Daily Traffic flows occur. The assessment methodology for air quality impacts from roads and their interaction / effects on ecology are discussed in this section and also within Chapter 7 (Air Quality).

Vehicle-derived air emissions were modelled during the Construction Phase along the proposed road development at the Loughlinstown Woods pNHA and Grand Canal pNHA crossing, i.e., Grand Canal pNHA (Leeson Bridge, western side), Grand Canal pNHA (Leeson Bridge, eastern side), Loughlinstown Woods pNHA (Bray Road) and Loughlinstown Woods pNHA (Commons Road) (refer to Chapter 7 (Air Quality) for details). The worst-case predicted annual average NOx concentrations at various distances from the proposed road edge exceed the 30µg/m^3 limit value. In all cases where exceedances occur, the baseline environment is already in excess of this value. During the operational year (2028) of the Proposed Scheme, annual mean NOx concentrations are predicted to decrease at Grand Canal pNHA (Leeson Bridge, western side) (111.4µg/m^3 to 83.3µg/m^3), Grand Canal pNHA (Leeson Bridge, eastern side) (145.8µg/m^3 to 104.7µg/m^3), Loughlinstown Woods pNHA (Bray Road) (64.6µg/m^3 to 58.3µg/m^3), and Loughlinstown Woods pNHA (Commons Road) (35.8µg/m^3 to 36.3µg/m^3). During the Operational Phase of the Proposed Scheme, the ecological impacts associated with the Operational Phase traffic emissions are overall positive, slight and long-term. As such, no mitigation measures are required.

The contribution of the Operational Phase of the Proposed Scheme to the NO_2 dry deposition rate was modelled at the Grand Canal pNHA (Leeson Bridge, western side), Grand Canal pNHA (Leeson Bridge, eastern side), Loughlinstown Woods pNHA (Bray Road) and Loughlinstown Woods pNHA (Commons Road). Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Loughlinstown Woods pNHA and the Grand Canal pNHA. These include habitats such as canals (FW3), dry meadow and grassy verges (GS2), reed and large sedge swamps (FS1), and wet willow-alder-ash-woodland (WN6). The Grand Canal pNHA site is below the lower critical load of inland and surface water habitats of 5-10Kg(N)/ha/yr while the Loughlinstown Woods pNHA site is below the lower critical load of forest habitats (10-20Kg(N)/h/yr) (National Roads Authority 2011). There is a decrease in the NO_2 dry deposition rate at three of the Loughlinstown Woods pNHA and Grand Canal pNHA sites as a result of the operation of the Proposed Scheme. The rate decreases from 5.78kg(N)/ha/yr to 4.63kg(N)/ha/yr at Grand Canal pNHA (Leeson Bridge, western side), from 7.07kg(N)/ha/yr to 5.52kg(N)/ha/yr at Grand Canal pNHA (Leeson Bridge, eastern side), from 3.80kg(N)/ ha/yr to 3.50kg(N)/ha/yr at Loughlinstown Woods pNHA (Bray Road), and from 2.38kg(N)/ha/yr to 3.50kg(N)/ha/yr at Loughlinstown Woods pNHA (Bray Road). There is a slight increase at the Loughlinstown Woods pNHA (Commons Road) from 2.38kg(N)/ha/yr to 2.41kg(N)/ha/yr. Therefore, significant effects on vegetation within the Loughlinstown Woods pNHA and the Grand Canal pNHA from NO_2 are not predicted likely, nor will there be any reduction in habitat area of the pNHA habitats, and mitigation is therefore not required.

12.4.4.2 Habitats

12.4.4.2.1 Habitat Degradation - Surface Water Quality

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. The drainage system for the Proposed Scheme will discharge to eight surface water receptors: Dodder_50, Brewery Stream_010, Kill of the Grange Stream_010, Carrickmines Stream_010, Shanganagh_010, Dargle_040, South-western Irish Sea – Killiney Bay, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. For the Proposed Scheme, there will be no change to the level of impermeable area ultimately discharging to Dublin Bay, and for South-western Irish Sea-Killiney Bay, the next increase is small at 114m^2. This increase in impermeable area will be managed for the Proposed Scheme through a combination of attenuated oversized pipes, bioretention areas and tree pits 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 such as Liffey Estuary Lower. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDS, where appropriate.

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

Mitigation measures to maintain SuDS are provided in Section 12.5.2.2.1.1.

12.4.4.2.2 Habitat Degradation – Non-Native Invasive Plant Species

Three non-native invasive plant species, giant hogweed, Himalayan balsam and Japanese knotweed, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), were identified within the Proposed Scheme during the field surveys (See Table 12.7). These species were recorded at 18 locations in total. In the absence of mitigation, there is potential for routine maintenance works to inadvertently spread contaminated vegetation cuttings both within the Proposed Scheme boundary, and within the immediate vicinity.

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

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1.2.5).

12.4.4.2.3 Habitat Degradation – Air Quality

As discussed in Section 7.4.2.1 of Chapter 7 (Air Quality), air quality modelling of NOx concentrations and deposition rates were modelled for the Operational Phase of the Proposed Scheme at distances up to 200m from the Proposed Scheme (refer to Chapter 7 (Air Quality) for details). The results from the air quality modelling deem the Proposed Scheme overall positive during the Operational Phase of the Proposed Scheme. 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 were recorded within the Proposed Scheme during field surveys. However, the desk study returned records a number of species listed on the Flora Protection Order from within the grid squares O12, O13, O21 and O22 in which the Proposed Scheme is located. None of these species lie within the footprint of the Proposed Scheme. Some are terrestrial in nature whilst others are aquatic or riparian species.

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

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

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

Mitigation measures to maintain SuDS are provided in Section 12.5.2.3.1.

12.4.4.3.2 Habitat Degradation – Non-native Invasive Plant Species

Three non-native invasive plant species, giant hogweed, Himalayan balsam and Japanese knotweed, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, were identified within the Proposed Scheme during the field surveys (See Table 12.7). These species were recorded at 18 locations in total. 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., habitats with Flora Protection Order species) has the potential to result in a significant negative effect, at geographic scales ranging from local to national.

Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1.2.5).

12.4.4.4 Mammals

12.4.4.4.1 Bats

12.4.4.4.1.1 Indirect Disturbance of Light Patterns Due to Operational Lighting

Additional permanent lighting features within suitable habitat may result in avoidance behaviour by bats. Such displacement (which would be a matter of metres) could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Given the urban environment of the Proposed Scheme, and the fact that artificial lighting is already present along the footprint of the Proposed Scheme, the effects of displacement as a result of increased artificial lighting are not considered to be significant at any geographic scale. This is because the lighting strategy involves the upgrade/relocation 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 is therefore not considered to be significant at any geographic scale. The exception to this is the area proposed for the UCD Campus Bus Interchange to the eastern part of the existing O'Reilly Hall carpark. At this car park which is currently lit by lighting columns including alongside wooded areas. Additional lighting, predominantly in the form of uplighters is proposed around the interchange plaza structure. Although there will be localised tree loss in the area to facilitate the construction, which could result in displacement effects on bats foraging around the wooded periphery 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.

Mitigation to avoid light spill is detailed in Section 12.5.2.4.1.5.

12.4.4.4.1.2 Disturbance / Displacement – Increased Human Activity

The Operational Phase of the Proposed Scheme will not contribute to significant changes in increased human activity by virtue of it being along an existing transport corridor. Populations of bats associated with the Proposed Scheme are likely to be habituated to a certain degree of human disturbance. This would include the proposed UCD campus bus interchange which is subject to considerable and persistent traffic and pedestrian activity

throughout much of the day. No significant effects as a consequence of increased human activity to bats are predicted.

12.4.4.4.1.3 Habitat Severance / Barrier Effect / Collision Risk

The provision of the proposed structures and principal retaining walls including: UCD campus bus interchange; St. Laurence's extended pedestrian subway and the relocation of Woodbrook Side Lodge will not result in any significant barrier effect to local bats. That is because it is unlikely that most bats (other than high flying Leisler's bat would typically commute over open, highly disturbed and well -lit area areas.

Given the proposed locations and nature of these structures, within or adjacent to well-lit infrastructure route or car parking facility, it is considered that collision risk of these structures is not likely to result in a significant effect on the local bat populations or their conservation status, and is therefore not likely to be significant at any geographic scale and the construction of these physical element will not significantly alter the existing environment.

12.4.4.4.2 Badger

No evidence of badger was recorded along the Proposed Scheme during surveys undertaken. However, based on the results of the desktop study, badger are known to occur within the wider vicinity and therefore potential 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 operation. This is because the Proposed Scheme is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The Proposed Scheme will neither exacerbate nor improve the level of mortality risk associated with this infrastructure. Therefore, the impact of mortality risk to badger, as a result of the Proposed Scheme is not regarded to be significant at any geographic scale.

12.4.4.4.2.3 Light Spill

Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005).

The lighting design of the Proposed Scheme controls light emissions such that along the majority of the alignment light spill does not extend beyond the Proposed Scheme boundary and where it does, this is at tie-ins with the existing road / footpath networks or at residential properties. There are no known badger setts, or areas of high badger activity, within the Proposed Scheme boundary that are located within the modelled light spill zone for the Proposed Scheme.

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

12.4.4.4.2.4 Disturbance / Displacement – Increased Human Activity

The Operational Phase of the Proposed Scheme, including the proposed UCD campus bus interchange, which is already heavily used by humans and vehicles, will not contribute to significant changes in increased human activity by virtue of it being along an existing transport corridor. Populations of badger associated with the Proposed Scheme are likely to be habituated to a certain degree of human disturbance. No significant effect as a consequence of increased human activity to badger are predicted.

12.4.4.4.3 Otter

No evidence of otter was recorded along the Proposed Scheme during early multidisciplinary surveys undertaken. However, based on the results of the desk study, otter are known to occur within the wider vicinity, particularly along the Grand Canal, River Dodder and the Shanganagh River. Therefore, potential 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 (outside of the aquatic areas) across the landscape and the Proposed Scheme will neither exacerbate nor improve the barrier effect already in existence. 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 Light Spill

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

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

12.4.4.4.3.3 Habitat Degradation – Surface Water Quality

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

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

12.4.4.4.3.4 Mortality Risk

The Proposed Scheme will not result in any increase in terms of mortality risk to otter during 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 otter, as a result of the Proposed Scheme is not considered to be significant at any geographic scale.

12.4.4.4.3.5 Disturbance / Displacement – Increased Human Activity

The Operational Phase of the Proposed Scheme will not contribute to significant changes in human activity by virtue of it being along an existing transport corridor. Populations of otter associated with the Proposed Scheme are likely to be habituated to a certain degree of human disturbance. No significant effect as a consequence of increased human activity to otter are predicted.

12.4.4.4.4 Marine Mammals

12.4.4.4.4.1 Surface Water Quality and Prey Abundance

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

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of marine mammals and result in a significant negative effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed impact, the availability of suitable habitat for 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 desktop study, other protected terrestrial mammals (see Section 12.3.8.5) are known to occur within the wider vicinity and therefore impacts on this species cannot be excluded.

12.4.4.4.5.1 Habitat Severance / Barrier Effect

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

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on mammals is not considered to be significant at any geographic scale. The existing infrastructure itself already acts as a barrier to terrestrial 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 terrestrial mammals, as a result of the Proposed Scheme is not regarded to be significant at any geographic scale.

12.4.4.4.5.3 Light Spill

Nocturnal mammals are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005). Permanent lighting is proposed along the Proposed Scheme however, it should be noted that the Proposed Scheme corridor is already lit artificially, and terrestrial mammals in the area would be habituated to some degree of artificial lighting. This includes areas such as the proposed UCD campus bus interchange plaza, an area which is heavily used by humans and vehicles and as such has much safety lighting across the car park area.

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

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

12.4.4.5 Birds

12.4.4.5.1 Breeding Birds

12.4.4.5.1.1 Disturbance / Displacement

Increases in noise levels associated with the increased frequency of bus traffic, as well as increased human presence owing to the provision of the proposed cycle tracks, 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, therefore affecting the establishment of breeding bird territories.

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

Localised disturbance effects on breeding birds will most likely be of greater impact at areas where greater quantities of vegetation may be lost than the remainder of the scheme (e.g., UCD campus bus interchange plaza, and sections of the treeline (WL2) along both sides Dublin Road towards the Wilford Junction roundabout). The removal of screening vegetation is likely to result in reduced height vegetation or complete lack of screening from the Proposed Scheme. This could result in localised displacement, owing to the decreased screening effect of habitats outside the Proposed Scheme. It is therefore considered that there may be a temporary significant effect on breeding birds at a local scale, until such a time that newly planted vegetation, such as treelines, establish and the screening effect is restored.

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

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of breeding birds and result in a significant negative effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed impact and the availability of suitable habitat for breeding birds in the wider vicinity, 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 habitats near the Proposed Scheme boundary due to an increase in noise, human activity and visual disturbance associated with increased human presence and increased traffic flow. Although the extent of the are affected by Operational disturbance / displacement effect cannot be quantified with precision, it is expected to be much less than the 300m ZoI associated with construction works because operational disturbance will be limited to vehicular traffic and periodic maintenance works, which is also present within the existing environment. Most species of wintering birds are likely to habituate to the increased traffic flows and human presence along cycle tracks, etc. Any operational noise increases are not likely to alter the existing baseline effect on wintering birds using the habitats locally.

Although there is still likely to be some level of displacement effect, a perceptible effect would be expected to be limited to inland feeding site habitats immediately adjacent to the Proposed Scheme. No known major wintering bird feeding sites occur within the footprint of the Proposed Scheme or immediately adjacent to it, the closest being Cabinteely / Kilboggett Park approximately 219m east of the Proposed Scheme. The only area directly adjacent to the Proposed Scheme which was considered to have potential to support wintering birds was the Shanganagh Park amenity grassland. Survey evidence revealed low usage of the site, by a small number of SCI or wintering bird species. The removal of vegetation to allow the widening of the footpath to accommodate a cycle path, does not contribute to significant loss of foraging territory for wintering birds, nor does it extend significantly further into the area used by wintering birds from its current extent. As any operational noise increases are not likely to alter the existing baseline noise effect on wintering birds in the locality, effects of noise disturbance can also be excluded.

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

The drainage design for the Proposed Scheme incorporates pollution control measures in areas where the impermeable surface area is being increased (e.g., oversized pipes, bioretention areas and tree pits). The inclusion of these SuDS will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 13 (Water). The Proposed Scheme will not exacerbate the existing surface water quality conditions in any of the receiving surface waters, or larger waterbodies such as Liffey Estuary Lower. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDS, where appropriate.

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e., Dodder_50, Brewery Stream_010, Kill of the Grange Stream_010, Carrickmines Stream_010, Shanganagh_010, Dargle_040, South-western Irish Sea – Killiney Bay, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

Habitat degradation as a result of effects on surface water quality during Operation has the potential to affect the conservation status of wintering birds and result in a significant negative effect, at a local geographic scale. This

is in consideration of the temporary nature and scale of the proposed impact and the availability of suitable habitat for wintering birds in the wider vicinity, 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 Scheme during surveys undertaken. No suitable habitat for common lizard was recorded during the surveys undertaken either. The desktop review returned 19 records for common lizard in the wider surrounding and in the vicinity of the Proposed Scheme. A precautionary approach has been adopted which has not excluded the possibility of common lizard being present in the vicinity of the Proposed Scheme.

12.4.4.6.1 Habitat Severance / Barrier Effect

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

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

12.4.4.6.2 Mortality Risk

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

12.4.4.7 Amphibians

No evidence of any protected amphibian species, such as common frog or smooth newt, were identified along the Proposed Schemed during surveys undertaken. However, suitable amphibian habitat such as vegetated riverbanks were recorded within the Proposed Scheme. The desk study returned a considerable number of records of amphibians in the vicinity of the Proposed Scheme (88 records for common frog and nine for smooth newt) and therefore impacts on these species cannot be excluded.

12.4.4.7.1 Habitat Severance / Barrier Effect

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

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

12.4.4.7.2 Mortality Risk

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

12.4.4.7.3 Habitat Degradation – Surface Water

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

The drainage design for the Proposed Scheme incorporates pollution control measures in areas where the impermeable surface area is being increased (e.g., oversized pipes, bioretention areas and tree pits). The inclusion of these 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 and Dublin Bay Catchment and Ovoca-Varty Catchment. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDS, where appropriate.

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e., Dodder_50, Brewery Stream_010, Kill of the Grange Stream_010, Carrickmines Stream_010, Shanganagh_010, Dargle_040, South-western Irish Sea – Killiney Bay, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

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

12.4.4.8 Fish

12.4.4.8.1 Habitat Degradation – Surface Water

As discussed in Section 12.4.4.2.1, without the design mitigation incorporated into the 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 Atlantic salmon, lampreys, European eel and other fish species either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

The drainage design for the Proposed Scheme incorporates pollution control measures in areas where the impermeable surface area is being increased (e.g., oversized pipes, bioretention areas and tree pits). The inclusion of these 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 within the Liffey and Dublin Bay Catchment and Ovoca-Vartry Catchment. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDS, where appropriate.

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e., Dodder_50, Brewery Stream_010, Kill of the Grange Stream_010, Carrickmines Stream_010, Shanganagh_010, Dargle_040, South-western Irish Sea – Killiney Bay, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

Habitat degradation as a result of effects on surface water during Operation has the potential to affect the conservation status of fish and result in a significant negative effect, at a local geographic scale.12.4.4.2.1.

12.4.4.9 Invertebrates - Freshwater

12.4.4.9.1 Habitat Degradation – Surface Water

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

The drainage design for the Proposed Scheme incorporates pollution control measures in areas where the impermeable surface area is being increased (e.g., oversized pipes, bioretention areas and tree pits). The inclusion of these 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 within the Liffey and Dublin Bay Catchment and Ovoca-Vartry Catchment. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDS, where appropriate.

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e., Dodder_50, Brewery Stream_010, Kill of the Grange Stream_010, Carrickmines Stream_010, Shanganagh_010, Dargle_040, South-western Irish Sea – Killiney Bay, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of freshwater molluscs and result in a significant negative effect, at a local geographic scale.

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

Table 12.20: Summary of Potential Operational Phase Impacts (Pre-mitigation)

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Designated Areas for Nature Conservation			
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
Bray Head SAC Bray Head pNHA	International Importance National Importance	None	N/A
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
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
Wicklow Mountains SAC	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head SAC Howth Head pNHA	International Importance National Importance	None	N/A
Ireland's Eye SAC Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA	International Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown Estuary pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rockabill SPA Rockabill Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale
Loughlinstown Woods pNHA	National Importance	Habitat degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Grand Canal pNHA	National Importance	Habitat degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Habitats (Outside of Designated Areas for Nature Conservation)			
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
Canals (FW3)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Immature Woodland (WS2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Wet willow-alder-ash woodland (WN6)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Rare / Protected Plant Species			
Flora Species listed on the Flora Protection Order	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Flora species on Ireland's Red lists (Vulnerable or of higher concern)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Non-native invasive plant species	N/A	Spread at expense of habitats and native species	Likely significant effect at the local to international scale geographic scale
Fauna Species			
Bats	Local Importance (Higher Value)	Mortality risk; habitat loss / fragmentation; disturbance / displacement (lighting)	Likely significant effect at the local geographic scale
Badger	Local Importance (Higher Value)	Disturbance / displacement (lighting)	Likely significant effect at the local geographic scale
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
Marine mammals (all other 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)	None	N/A
SCI / Annex I bird species	International Importance	See SPAs above	See SPAs above
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Reptiles	Local Importance (Higher Value)	None	N/A
Amphibians	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Atlantic salmon	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
Brown trout	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
European eel / Lamprey	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
All other fish species	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Invertebrates – Freshwater molluscs	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Local Biodiversity Areas			
DCC			
Grand Canal	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
River Dodder Corridor	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
Network of parks e.g., St. Stephen's Green and Herbert Park	County Importance	None	N/A
DLRCC			
Network of streams and rivers e.g., River Dodder	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
Network of parks e.g., Cabinteely Park and Shanganagh Park	County Importance	Habitat loss (Shanganagh Park)	Likely significant effect at the local to county geographic scale
WCC			
Network of streams and rivers e.g., River Dargle	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale
Network of parks e.g. People's Park, Bray	County Importance	None	N/A

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 licences or 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 pNHAs within the ZoI are as per those for European sites as the boundaries coincide with the SACs and SPAs. Therefore, the mitigation measures outlined above in Section 12.5.1.1.1, and as detailed in the NIS, will prevent the Proposed Scheme resulting in a significant negative effect on these pNHAs at the national geographic scale.

It should be noted that the full suite of mitigation measures proposed to protect surface water during the Construction Phase and to prevent the spread of non-native invasive species to downstream European and national sites are set out in full in Appendix A5.1 – CEMP in Volume 4 of this EIAR.

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

12.5.1.2 Habitats

12.5.1.2.1 Habitat Loss and Fragmentation

Where practicable, areas of vegetation including habitats of Local Importance (Higher Value), (i.e., mixed broadleaved woodland (WD1), scattered trees and parkland (WD5), hedgerow (WL1), treeline (WL2) and immature woodland (WS2) 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 (BCIDE-JAC-LA-0013_XX_00-DR-LL-9001) in Volume 3 of this EIAR. These areas will be protected for the duration of construction works and fenced off at an appropriate distance.

To mitigate loss of habitat, proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor listed below. This planting is listed below and displayed on the Landscaping General Arrangement drawings BCIDB-JAC-ENV-LA-0013_XX-DR-LL-0001 in Volume 3 of this EIAR:

- 551 trees planted;
- 1,662m of proposed hedgerow;
- 3,942m^2 of proposed species-rich grassland;
- 1,721m^2 of proposed ornamental planting;
- 4,153m^2 of proposed native tree planting; and
- 25,050m^2 of proposed amenity grassland planting.

12.5.1.2.2 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.

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:

- A Requirement for a Pollution Incident Response Plan;
- Construction compound management including the storage of fuels and materials;
- Control of sediment;
- Use of concrete;
- Management of vehicles and plant including refuelling and wheel wash facilities (if necessary); and
- Monitoring.

Following implementation of the mitigation measures outlined in the SWMP, the majority of impacts will not be significant. There are a few activities, however that require additional measures to ensure that impacts are not significant.

Scheme specific measures which the appointed contractor will implement in relation to surface water quality at the following locations, namely the Dargle_040, a segment of which is a designated salmonid river, as a result of the extensive road construction works proposed in Section 4c of the Proposed Scheme.

Approximately 600m of the Proposed Scheme in this section has some surface water connection to the River Dargle as it flows through Bray, the segment of the Dargle_040 which is designated a salmonid river. The existing drainage system in this location also includes some combined sewer connections, however as a precautionary measure it is assumed that all of the gullies in this location drain to the River Dargle. In order to prevent any silty water or hydrocarbons entering the water body during construction it is proposed to use 'silt sacs' or the equivalent in every gully along the entire length of the Proposed Scheme in this catchment (Chainage A17900 to A18500) as construction progresses. These will capture any silt in the surface water. During the connection of the new kerbside edge drains into the existing surface water system, there is a higher risk of contamination. This connection will only be carried out in dry weather. All refuelling here will be carried out at the Construction Compound BR1 only and adhere to the control measures outlined in the SWMP.

In Section 3c of the Proposed Scheme, which drains to the other segment of the Dargle_040 (Rathmichael River), silt sacs will also be deployed for up to 250m north and south of the point at which the water body is crossed (between Chainage A16850 to A17350). As hydrocarbons can be carried long distances in surface water drains, whereas silt in water tends to drop out of suspension in a shorter distance, no mobile plant will be refuelled within 500m of the crossing (between Chainage A16600 to A17600). Any refuelling needed in this section must be carried out within Construction Compound BR1.

12.5.1.2.3 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 will be considered in the design of the Construction Compounds. These are to be designed in accordance with relevant guidelines and codes of best practice at the time of construction and will be fully bunded;
- Good housekeeping on site (daily site clean-ups, use of disposal bins, etc.) will be applied during the entire Construction Phase;
- All concrete mixing and batching activities will be located in areas away from watercourses and drains;
- Potential pollutants will be adequately secured against vandalism in containers in a dedicated secured area;
- Provision of proper containment of potential pollutants according to codes of best practice;
- Thorough control will be implemented 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 will be kept close to the storage area and staff will be trained on how to use spill kits correctly.

The mitigation measures to protect groundwater quantity and quality during the Construction Phase are also outlined in Chapter 14 (Land, Soils, Geology & Hydrogeology) and Appendix A51.- CEMP in Volume 4 of this EIAR.

12.5.1.2.4 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.

12.5.1.2.5 Habitat Degradation – Non-Native Invasive Plant Species

The NTA will ensure that a confirmatory pre-construction non-native invasive species survey will be undertaken by a suitably qualified specialist to confirm the absence and/or extent of all Third Schedule non-native invasive species within the footprint of the Proposed Scheme. Where an infestation is confirmed / identified, this will require the implementation of a Non-Native Invasive Species Management Plan (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 non-native invasive species re-survey has confirmed the presence of previously identified Third Schedule non-native invasive species, or identified 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 updated following the pre-construction survey as advised by a suitably qualified specialist, with regard to the guidance, on The Management of Invasive Alien Plant Species on National Roads (Technical Guidance) (TII 2020a; 2020b) and other species-specific guidance documents including those listed in the ISMP, as necessary; and
- The NTA will ensure that all control measures specified in the ISMP will be implemented by a suitably qualified and licensed specialist prior to the construction of the Proposed Scheme to control the spread of non-native invasive species within the footprint of the Proposed Scheme. Furthermore, the appointed contractor will adhere to control measures specified within the ISMP throughout the Construction Phase of the Proposed Scheme.

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

12.5.1.3 Rare and Protected Plant Species

No protected plant species listed on the Flora Protection Order 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 Grand 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 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;
- The Habitats Directive; and
- Birds and Habitats Regulations.

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

- While no active roosts were identified during the multidisciplinary surveys within the footprint of the Proposed Scheme, a total of 30 trees with Potential Roost Features (PRFs) were identified within the footprint of the Proposed Scheme (permanent and temporary land-take) during the multidisciplinary surveys (see Figure 12.7.2 in Volume of this EIAR). Of these trees, 19 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 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; and
- 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.

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

- Where the qualified arborist engaged by the appointed contractor is required to assess the condition of, and advise on any repair works necessary to, any trees which are to be retained (including PRF-containing trees or category U trees[2]), these will be notified to the appointed ecologist to be surveyed to confirm if these trees are PRFs (as done for the pre-construction surveys outlined in Section 12.5.1.4.1.2). Where trees with previously identified or new PRF(s) require works including removal for example due to poor condition, they will be subject to mitigation as described in Section 12.5.1.4.1.2; and
- There will be no additional lighting within 5m of any tree with PRFs during the Construction Phase of the Proposed Scheme to avoid potential disturbance to roosting bats.

[2] Category U trees are defined under BS5837:2012 as those tree in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years. Typically they are trees that are dead or show serious, irremediable, structural defect,and from a health and safety perspective are often removed.

12.5.1.4.1.2 Roost Loss

As previously mentioned, 19 trees with 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 and trees to be retained within the boundary of the Proposed Scheme shall be rechecked for PRFs by an experienced bat specialist engaged by the NTA as part of the pre-construction surveys. The survey will:

- Confirm trees previously identified with PRFs 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 trees with PRFs in the intervening period between the original surveys and grant of planning.

Pre-construction Survey

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

- In advance of any clearance all trees deemed to contain PRFs which are subject to felling / clearance will be checked for the presence of bats by a suitably qualified / 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 tree that is confirmed to be removed (identified as part of the original surveys in support of the application) or additional PRFs identified during the pre-construction survey) that are to be removed:

- Standard Schwegler 1FFH (2 number) and 3FF boxes (1 number) for all PRF trees to be removed;
- The boxes will be installed three months in advance of felling of any PRF tree and in public spaces managed by the local authority as close as possible to areas of the PRF tree to be felled and which overlap with areas of bat activity confirmed during activity surveys undertaken as part of the EIAR;
- The boxes will be installed on the tree at a height of 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 more than 3.5m;
- There will be a minimum of 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, the local authority Biodiversity Officer and the NPWS.

12.5.1.4.1.3 Protection of Bats During Demolition of Woodbrook Side Lodge

In addition to the measures outlined above, the following are in respect of the removal (and relocation and rebuilding) of Woodbrook Side Lodge which has been identified as being potentially suitable to support roosting bats:

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:

- Woodbrook Side Lodge must be re-surveyed prior to its demolition to ensure there are no roosting bats present. A suitably qualified and experienced ecologist must carry out internal 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 to mid-September inclusive).
- Where a bat roost is encountered, all relevant works will cease and an application for a derogation licence shall be submitted by the suitably qualified / licensed bat specialist to the NPWS to seek permission for the removal of the roost.

12.5.1.4.1.4 Habitat Loss and 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, that are not directly impacted by the Proposed Scheme will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on the Landscaping General Arrangement drawings (BCIDE-JAC-LA0013_XX_00-DR-LL-0001) 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, as listed below and displayed on the Landscaping General Arrangement Drawings (BCIDE-JAC-LA0013_XX_00-DR-LL-0001) in Volume 3 of this EIAR:

- 551 trees planted; and
- 1,662m of proposed hedgerow.

Many bat 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 Compounds and or additional lighting required for night-time works could impact on commuting / foraging territory.

Where deemed necessary, a suitably qualified licensed ecologist(s), engaged by the appointed contractor will ensure that lighting at the Construction Compounds and in active work areas, which are in close proximity to watercourses with known bat activity, will be designed to minimise light spill and be cognisant of downward light-spill onto watercourses.

Mitigation measures to reduce light spill will include the following:

- The use of sensor / timer triggered lighting;

- LED luminaires to be used where 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 with known bat activity e.g. River Dodder and Grand Canal).

12.5.1.4.2 Badger

Badger, and their breeding and resting places, are protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure a badger or to wilfully interfere with or destroy their breeding or resting places (setts).

12.5.1.4.2.1 Disturbance / Displacement

Although there were no signs of badger recorded during field surveys of accessible areas, badger could potentially establish new territory within the ZoI of the Proposed Scheme. Therefore, the NTA will ensure that a confirmatory pre-construction check of all suitable badger habitat will be completed within 12 months prior to any construction works commencing.

The presence of any new setts or significant badger activity will be treated and/or protected in accordance with the Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (NRA 2005b).

12.5.1.4.2.2 Protection of Badgers from Accidental Harm During Construction (Excavations)

Uncovered deep excavations could be potentially hazardous for badgers commuting and foraging in the area. Badgers could fall into these excavations, becoming trapped and potentially hurt and distressed.

To protect badgers from indirect harm during construction, where practicable, open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor.

Excavations will also be covered at night, where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow badgers to safely exit should they fall in.

12.5.1.4.2.3 Lighting

For mitigation to reduce the impact of lighting on local badger populations refer to Section 12.5.1.4.1.5.

12.5.1.4.3 Otter

Otter are listed on Annex II and Annex IV of the Habitats Directive and are strictly protected under the Birds and Habitats Regulations. Otter, and their breeding and resting places, are also protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure an otter or to wilfully interfere with or destroy their breeding or resting places (holts / couches). Although there were no signs of otter recorded during field surveys, otter are known to occur in the vicinity of the Proposed Scheme, particularly along the Grand Canal, River Dodder, Shanganagh River and the River Dargle.

Given the ecological sensitivity of these watercourses in particular, the appointed contractor will engage a suitably qualified and/or licensed ecologist(s) to oversee and advise works at watercourse crossings during construction to communicate all findings in a timely manner to the NTA and statutory authorities, to acquire any licences or consents required to conduct the work, and to supervise and direct the ecological measures associated with the Proposed Scheme.

Where a new or reactivated otter holt to be encountered, within 150 metres (up and downstream) of 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 instruction to the appointed contractor(s), deliver toolbox talks and temporarily halt works, if, and as, necessary, having conferred with the NTA.

12.5.1.4.3.1 Loss of Breeding / Resting Sites

Although there were no signs of otter 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 by a suitably qualified ecologist within 12-month period prior to any construction works commencing.

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).

12.5.1.4.3.3 Habitat Degradation / Reduced Prey Availability – 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 Chapter 13 (Water).

12.5.1.4.3.4 Lighting

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 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 Mammals

No other protected mammal species were recorded during the multidisciplinary 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 protected mammal species and will not result in a significant negative effect, at any geographic scale. No additional mitigation is proposed other than the following:

- 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 Chapter 13 (Water).

- Where possible, habitats of importance providing refuge / shelter) to other protected mammals such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on the Landscaping General Arrangement drawings (BCIDB-JAC-LA-0013 _XX_00-DR-LL-0001) in Volume 3 of this EIAR. Similar to the mitigation for breeding birds, tree removal, particularly where understorey vegetation is abundant will be undertaken outside of the bird nesting season, but as late in the wintering season (e.g., February) so as to give small resting mammals such as hedgehog that might be hibernating a chance at moving.

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 habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on the Landscaping General Arrangement drawings (BCIDB-JAC-LA-0013 _XX_00-DR-LL-0001) 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-LA-0013 _XX_00-DR-LL-0001) in Volume 3 of this EIAR for locations.

Many species may not nest near a road development due to disturbance (e.g., drowning out of bird song by traffic noise). Whilst the planting is not likely to fully offset the loss of breeding and foraging habitat (due to the proximity of road traffic disturbance on the operational road) it is likely to provide additional foraging habitat for some species.

12.5.1.5.1.2 Mortality Risk

Where practical, vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will not be removed, between the 01 March and the 31 August, to avoid direct impacts on nesting birds.

Where the construction programme does not allow this seasonal restriction to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of breeding birds prior to clearance.

Areas found not to contain nests will be cleared within three days of the nest survey, otherwise repeat surveys will be required. Vegetation clearance will not commence where nests are present, works will resume when birds have fledged and nests are no longer in use, or an agreement is reached with the NPWS.

12.5.1.5.1.3 Disturbance / Displacement

Similar to the requirements provided above in terms of reducing mortality risk, vegetation clearance undertaken in the appropriate time should ensure that breeding birds have adequate time in which to identify alternative vegetation in which to establish nests.

To mitigate disturbance and/or displacement to breeding birds from noise and vibration activities the relevant mitigation measures as described in Chapter 9 (Noise & Vibration) will be implemented by the appointed contractor.

The use of noise generating equipment shall be tempered by the use of modern machinery that shall have appropriate noise restrictors for use in urban situations. Furthermore, the location of equipment that has the

potential to cause long-term noise impacts, shall be sited in such a manner so that noise baffling screening reduces noise spill to adjacent areas of open ground.

12.5.1.5.1.4 Habitat Degradation – Surface Water Quality

In terms of mitigation, an 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 Prevent Disturbance and 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 at 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 Habitat Degradation – Surface Water Quality

In terms of mitigation, an 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).

12.5.1.6 Reptiles

No reptile species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme. The Construction Phase of the Proposed Scheme is not deemed to affect the local reptile population and will not result in a significant negative effect, at any geographic scale. As such, no mitigation is proposed.

12.5.1.7 Amphibians

12.5.1.7.1 Habitat Loss, Disturbance and Mortality Risk

No amphibian species were recorded during the multidisciplinary surveys carried out along the Proposed Scheme, despite the presence of suitable habitat adjacent to the footprint of the Proposed Scheme (e.g., riverbanks of River Dodder and other waterbodies).

If vegetation clearance works by the appointed contractor are to begin during the season where frogspawn or tadpoles may be present (i.e., February to mid-summer), or where breeding adult newts, their eggs or larvae may be present (i.e., mid-March to September), a pre-construction survey of suitable habitat will be undertaken by a suitably qualified ecologist engaged by the appointed contractor to determine whether breeding amphibians are present. Where amphibians are present, mitigation measures outlined below will be completed before works recommence.

- In the case of common frog, any frog spawn, tadpoles, juvenile or adult frogs present will be captured, under a licence from 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 – Surface Water Quality

In terms of mitigation, an 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).

12.5.1.8 Fish

12.5.1.8.1 Habitat Degradation – Surface Water Quality

In terms of mitigation, an 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 – Freshwater Molluscs

12.5.1.9.1 Habitat Degradation – Surface Water Quality

In terms of mitigation, an 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).

12.5.2 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; 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 within the ZoI are as set out for European sites as the boundaries of the pNHAs follow those of the SACs and SPAs. Therefore, the mitigation measures outlined in Section 12.5.1.1, 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.

For mitigation measures in relation to potential Operational impacts arising from the Proposed Scheme on the Loughlinstown Woods pNHA and Grand Canal pNHA includes habitat degradation as a result of surface water quality effects, (see Section 12.5.2.2.1.1) and the spread of non-native invasive species, (see Section 12.5.2.2.1.2); effects on rare and protected plant species, (see Section 12.5.2.3); and negative effects on the protected fauna species associated with the sites such as mammals, birds, and fish species, (see Sections 12.5.2.4, 12.5.2.5 and 12.5.2.8).

12.5.2.2 Habitats

12.5.2.2.1.1 Habitat Degradation – Surface Water Quality

The proposed SuDs drainage system, as shown in Proposed Surface Water Drainage Works drawings (BCIDCARP-DNG_RD-1415_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 filter drains. Where no new paved areas are proposed, the existing drainage network will be retained and utilised. The effective implementation of these measures will ensure that there is no increase in existing runoff rates from newly paved areas and appropriate treatment to ensure runoff quality. The range of measures including SuDS installed during the Construction Phase will reduce both the volume and rate of surface waters discharging into the existing surface water drainage network, as well as improving the environmental quality of any such discharges during the Operational Phase of the Proposed Scheme.

These standard drainage design controls have been proven through widespread use in developments across the country. The proposed SuDs drainage system incorporated into the design of the site are common drainage systems that are used in most development types. They are proposed and designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS, 2005). Once the Proposed Scheme is in operation, the Local Authorities will be required to implement a maintenance and inspection regime for SuDs which will be subject to their management procedures. No additional mitigation is required.

12.5.2.2.1.2 Habitat Degradation – Non-Native Invasive Plant Species

Once the Proposed Scheme is in operation, the local authorities will implement a maintenance and management regime subject to their management procedures, where any introduction of non-native invasive plant species will be managed. No additional mitigation is required.

12.5.2.2.1.3 Habitat Degradation – 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, no additional mitigation is required.

12.5.2.2.1.4 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, refer to Section 12.5.2.2.1.1.

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 Operational Phase of the Proposed Scheme is not predicted to result in any significant effects to populations of bats in the vicinity of the majority 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 and 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, and owing to the loss of individual mature PRF trees, particularly towards the southern end of the Proposed Scheme, 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 and will be carried out by the during the Construction Phase. Refer to the Landscape General Arrangement drawings (BCIDB-JAC-DNG_RD-0013_XX_DR-CD-0001) in Volume 3 of this EIAR.

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 Bus Interchange is in an area where considerable bat activity was recorded, its design and location within the existing car park 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 additional mitigation is required.

12.5.2.4.1.3 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 - Bat Mitigation Guidelines for Ireland) 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 two years or as advised by a suitably qualified ecologist, to confirm occupancy.

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

12.5.2.4.1.4 Monitoring of Confirmed Roost for Demolition of Woodbrook Side Lodge (Where a Roost is Confirmed)

Where a compensatory roost is required to enable the demolition and later rebuilding of the lodge, this would require the application of a derogation licence, and approval of NPWS. The following precautionary approach is proposed to compensate for loss of as roost if confirmed. Given that the rebuilt house is privately owned, the use of bat bricks or similar is not proposed as access for post-installation monitoring (one, three and five years) cannot be guaranteed, and the light spill from adjacent road and commercial premises is considered unfavourable. Thus, similar to the installation of bat boxes for the loss of trees containing PRFs, it is proposed that species-specific bat boxes, of suitable capacity to reflect the nature of the roost to be removed will be installed in retained trees as close as is practical to the location of rebuilt Woodbrook Side Lodge, in trees to the immediate north-east.

The boxes will be checked for presence of bats or signs of bat occupancy once per year in years one, three and five post-construction by an appropriately licensed and qualified ecologist. The results of these surveys will be shared with BCI, the local authority Biodiversity Officer and the NPWS. While the success of the proposed bat mitigation strategy will not be measured by occupancy of roosts by bats, it is considered to be best practice and appropriate to implement a monitoring plan to gather information and assess whether the bat population has responded favourably to mitigation measures. Post-works licence returns would likely be required for the discharge of obligations attached to the derogation licence (which could be in addition to the strategy in respect of the roost removal, to which will need to be submitted to the Department of Housing, Local Government and Heritage, following the completion of licensable works.

12.5.2.4.1.5 Indirect Disturbance of Flight Patterns Due to Operational Lighting

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

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.

12.5.2.4.2 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.

12.5.2.4.3 Otter

12.5.2.4.3.1 Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on otter, refer to Section 12.5.2.2.1.1.

12.5.2.4.4 Marine Mammals

12.5.2.4.4.1 Habitat Degradation – Surface Water Quality

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 12.5.2.2.1.1.

12.5.2.4.5 Other Mammals Species

The Operational Phase of the Proposed Scheme is not predicted to result in any significant effects to populations of other terrestrial protected 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 Quality

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 12.5.2.2.1.1.

12.5.2.5.2 Wintering Birds

12.5.2.5.2.1 Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on wintering bird species, please refer to Section 12.5.2.2.1.1.

12.5.2.6 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.

12.5.2.7 Amphibians

12.5.2.7.1 Habitat Degradation- Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on amphibians, please refer to Section 12.5.2.2.1.1.

12.5.2.8 Fish

12.5.2.8.1 Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on fish, please refer to Section 12.5.2.2.1.1.

12.5.2.9 Invertebrates – Freshwater Molluscs

12.5.2.9.1 Habitat Degradation – Surface Water Quality

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 12.5.2.2.1.1.

12.6 Residual Impacts

12.6.1 Construction Phase

Following the implementation of the mitigation measures outlined in Section 12.5, the Proposed Scheme will not result in any significant residual effects above the local scale on the KERs identified (see Table 12.21) on its own, or cumulatively together with other proposed developments during the Construction Phase.

Table 12.21: 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				
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
Bray Head SAC Bray Head pNHA	International Importance National Importance	None	N/A	N/A
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
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
Wicklow Mountains SAC	International Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head SAC Howth Head pNHA	International Importance National Importance	None	N/A	N/A
Ireland's Eye SAC	International Importance	None	N/A	N/A
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 North Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
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
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect

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 Estuary pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
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
Loughlinstown Woods pNHA	National Importance	Habitat degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Grand Canal pNHA	National Importance	Habitat degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Habitats (outside of designated areas for nature conservation)				
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national to local geographic scale	No significant residual effect
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Canals (FW3)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Immature Woodland (WS2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Wet willow-alder-ash woodland (WN6)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Rare / Protected Plant Species				
Flora Species listed on the Flora Protection Order	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Flora Species on Irelands Red Lists (Vulnerable or of higher concern)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Non-native invasive plant species	N/A	Spread at expense of habitats and native species	Likely significant effect at the local to international scale 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)
Fauna Species				
Bats	Local Importance (Higher Value)	Mortality risk; habitat loss / fragmentation; disturbance / displacement	Likely significant effect at the local geographic scale	No significant residual effect (mortality risk) Likely significant residual effect at the local geographic scale (habitat loss / fragmentation; disturbance / displacement)
Badger	Local Importance (Higher Value)	Disturbance / displacement (lighting)	Likely significant effect at the local geographic scale	No significant residual effect
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Marine mammals (all other marine mammals)	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	None	N/A	No significant residual effect
SCI / Annex I bird species	International Importance	See SPAs above	See SPAs above	See SPAs above
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (habitat degradation (hydrology); mortality risk) Likely significant residual effect at the local geographic scale (habitat loss; disturbance / displacement)
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (habitat degradation (hydrology); mortality risk) Likely significant residual effect at the local geographic scale (habitat loss; disturbance / displacement)
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (habitat degradation (hydrology); mortality risk) Likely significant residual effect at the local geographic scale (habitat loss; disturbance / displacement)
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat loss; mortality risk; disturbance / displacement; habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (habitat degradation (hydrology); mortality risk) Likely significant residual effect at the local geographic scale (habitat loss; disturbance / displacement)
Reptiles	Local Importance (Higher Value)	None	N/A	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Amphibians	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Atlantic salmon	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale	No significant residual effect
Brown trout	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale	No significant residual effect
European eel / Lamprey	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to county geographic scale	No significant residual effect
All other fish species	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Invertebrates – Freshwater molluscs	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Local Biodiversity Areas				
DCC				
Grand Canal	National Importance	Habitat degradation (hydrology; non-native species)	Likely significant effect at the local to national geographic scale	No significant residual effect
River Dodder Corridor	County Importance	Habitat degradation (hydrology; non-native species)	Likely significant effect at the local to county geographic scale	No significant residual effect
Network of parks e.g., St. Stephen's Green and Herbert Park	County Importance	Habitat degradation (non-native species)	Likely significant effect at the local to county geographic scale	No significant residual effect
DLRCC				
Network of streams and rivers e.g., River Dodder	County Importance	Habitat degradation (hydrology; non-native species)	Likely significant effect at the local to county geographic scale	No significant residual effect
Network of parks e.g., Cabinteely Park and Shanganagh Park	County Importance	Habitat degradation (non-native species)	Likely significant effect at the local geographic scale	No significant residual effect
WCC				
Network of streams and rivers e.g., River Dargle	County Importance	Habitat degradation (hydrology; non-native species)	Likely significant effect at the local to county geographic scale	No significant residual effect
Network of parks e.g., People's Park, Bray	County Importance	Habitat degradation (non-native species)	Likely significant effect at the local to county 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 on the KERs identified (Table 12.22) on its own, or cumulatively together with other proposed developments during the Operational Phase.

Table 12.22: 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				
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

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Bray Head SAC Bray Head pNHA	International Importance National Importance	None	N/A	N/A
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
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
Wicklow Mountains SAC	International Importance	Habitat degradation (hydrology)	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 to national geographic scale	No significant residual effect
Ireland's Eye SAC	International 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 to national geographic scale	No significant residual effect
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Dalkey Islands SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international geographic scale	No significant residual effect
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
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect

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 Estuary pNHA	International Importance National Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Loughlinstown Woods pNHA	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Grand Canal pNHA	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Habitats (Outside of Designated Areas for Nature Conservation)				
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Canals (FW3)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Treelines (WL2)	Local Importance (Higher Value)	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Immature Woodlands (W2)	Local Importance (Higher Value)	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Wet willow-alder-ash woodland (WN6)	International Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale	No significant residual effect
Rare / Protected Plant Species				
Flora species listed on the Flora Protection Order	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Flora species on Ireland's Red lists (Vulnerable or of higher concern)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Non-native Invasive Plant Species	N/A	Spread at expense of habitats and native species	Likely significant effect at the local to international scale 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)
Fauna Species				
Bats	Local Importance (Higher Value)	None	N/A	N/A
Badger	Local Importance (Higher Value)	None	N/A	N/A
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine mammals (all other marine mammals)	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	None	N/A	N/A
SCI / Annex I bird species	International Importance	See SPAs above	See SPAs above	See SPAs above
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Any other Green listed bird species (non-SCI breeding populations)	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
Reptiles	Local Importance (Higher Value)	None	N/A	N/A
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Atlantic salmon	International Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Brown trout	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
European eel / Lamprey	National Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
All other fish species	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Invertebrates - Freshwater molluscs	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Local Biodiversity Areas				
DCC				
Grand Canal	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local to national geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
River Dodder Corridor	County Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local to county geographic scale	No significant residual effect
Network of parks e.g., St. Stephen's Green and Herbert Park	County Importance	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local to county geographic scale	No significant residual effect
DLRCC				
Network of streams and rivers e.g., River Dodder	County Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local to county geographic scale	No significant residual effect
Network of parks e.g., Cabinteely Park and Shanganagh Park	County Importance	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
WCC				
Network of streams and rivers e.g., River Dargle	County Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local to county geographic scale	No significant residual effect
Network of parks e.g., People's Park, Bray	County Importance	Habitat degradation (non-native invasive plant species)	Likely significant effect at the local to county geographic scale	No significant residual effect

12.7 References

All-Ireland Pollinator Plan 2021-2025. National Biodiversity Data Centre Series No. 25, Waterford. March 2021

Andrews, H. (2018). Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Bat Tree Habitat Key.

Aughney, T., Roche, N. and Langton, S. (2018). The Irish Bat Monitoring Programme 2015-2017. Irish Wildlife Manuals, No. 103. National Parks and Wildlife Service, Department of Culture Heritage and the Gaeltacht, Ireland.

Bailey, M. and Rochford, J. (2006). Otter Survey of Ireland 2004 / 2005 Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Barron, S.J., Delaney, A., Perrin, P.M., Martin, J.R. and O'Neill, F.H. (2011). National survey and assessment of the conservation status of Irish sea cliffs. Irish Wildlife Manuals No. 53. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Bat Conservation Trust (2016). Core Sustenance Zones: Determining zone size. Available at: https://www.bats.org.uk/our-work/landscapes-for-bats/core-sustenance-zones.

Benson, L. (2009). Use of Inland Feeding Sites by Light-bellied Brent Geese in Dublin 2008-2009: A New Conservation Concern? Irish Birds 8: 563-570.

Biesmeijer, JC, Roberts, S.P.M., Reemer, M., Ohlemuller, R., Edwards, M., Peeters, T., Schaffers, A.P., Potts, S.G., Kleukers, R., Thomas, C.D., Settele, J. and Kunin, W.E. (2006). Parallel declines in pollinators and insect - pollinated plants in Britain and the Netherlands. Science, 313, 351 – 354.

Bignal, K., Ashmore, M. and Power, S. (2004). The Ecological Effects of Diffuse Air Pollution from Road Transport. English Nature Research Report No. 580.

Birdwatch Ireland (2020) Bird nesting behaviour. Available at: www.birdwatchireland.ie.

Bat Conservation Ireland (2020/21/22) Database.

Bradley, C., Byrne, C., Craig, M., Free, G., Gallagher, T., Kennedy, B., Little, R., Lucey, J., Mannix, A., McCreesh, P., McDermott, G., McGarrigle, M., Ní Longphuirt, S., O'Boyle, S., Plant, C., Tierney, D., Trodd, W., Webster, P., Wilkes, R. and Wynne, C. (2012) Water Quality in Ireland 2010-2012. Prepared for the Environmental Protection Agency by Aquatic Environment, Office of Environmental Assessment.

Botanical Society of Britain and Ireland (2022) Maps [Online] Available at: https://bsbi.org/maps.

British Standards Institution (2008). Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1:2009+A1:2014). British Standards Institution.

British Standards Institution (2012). Trees in relation to design, demolition and construction – Recommendations (BS 5837:2012). British Standards Institution.

Butterfly Conservation Ireland (2020). Butterfly Conservation Ireland Annual Report 2020.

Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009). Ireland Red List No. 2 – Non-marine Molluscs. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

CBD (2006). Global Biodiversity Outlook 2 Secretariat of the Convention on Biological Diversity, Montreal, 81 + vii pages.

Central and Regional Fisheries Board (2008) Sampling Fish for the Water Framework Directive – Transitional Waters 2008.

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

CIEEM (2021). Advice on Ecological Assessment of Air Quality Impacts.

Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition. The Bat Conservation Trust, London.

Cutts, N., Phelps A. and Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impact and Guidance. Report prepared by the Institute of Estuarine and Coastal Studies University of Hull and Humber INCA.

DCC (2105). Dublin City Biodiversity Action Plan 2015-2020.

DCC (2021). Dublin City Biodiversity Action Plan 2021-2026.

DCC (2022). Dublin City Development Plan 2022-2028. [Online] Available at: https://www.dublincity.ie/residential/planning/strategic-planning/dublin-city-development-plan/development-plan-2022-2028

DLRCC (2017). Strategic Environmental Assessment (SEA): Environmental report and Non-technical Summary. Woodbrook – Shanganagh Draft Local Area Plan 2017 – 2023. Available at: https://dlrcoco.citizenspace.com/planning/draftws-lap-2017/supporting_documents/Appendix%206%20%20SEA_WebVersion.pdf.

DLRCC (2021). Dún Laoghaire-Rathdown County Biodiversity Action Plan 2021-2025. [Online] Available at: https://www.dlrcoco.ie/sites/default/files/atoms/files/5488-dlr_biodiversity_plan_2021-2025_lr_0.pdf.

DLRCC (2022). Dún Laoghaire-Rathdown County Development Plan 2022-2028. [Online] Available at: https://www.dlrcoco.ie/en/county-development-plan/county-development-plan-2022-2028.

Department of Culture, Heritage and the Gaeltacht (2017). National Biodiversity Plan 2017 – 2021.

Department of Housing, Local Government and Heritage (2018). River Basin Management Plan 2018 – 2021.

Doogue, D., Nash, D., Parnell, J., Reynolds, S. and Wyse Jackson, P. (1998). Flora of County Dublin. The Dublin Naturalists' Field Club, Dublin.

Dublin Drainage Consultancy (2005). The Greater Dublin Strategic Drainage Study (GDSDS) Final Strategy Report.

EPA (2018). EPA Catchments. Information on catchments. Available at: https://www.catchments.ie/.

EPA (2022a). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

EPA (2022b). EPA Maps. Available at: gis.epa.ie/EPAMaps/

European Commission (2013a). Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.

European Commission (2013b). Interpretation Manual of European Union Habitats. Version EUR 28. European Commission.

European Commission (2017). Environmental Impact Assessment of Projects. Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU).

Farren, A., Prodöhl, P., Laming, P. and Reid, N. (2010). Distribution of the common lizard (*Zootoca vivipara*) and landscape favourability for the species in Northern Ireland. Amphibia-Reptilia, 31(3), 387-387.

Fingal County Council (2023). Fingal Development Plan 2023-2029. [Online] Available at: https://www.fingal.ie/development-plan.

Fitzpatrick, U., Murray, T.E. Paxton, R.J. and Brown, M.J.F. (2006). Building on IUCN National Red Lists to produce national lists of conservation priorities – a model using Irish bees (submitted to Conservation Biology).

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Heritage Council, Kilkenny, Ireland.

Fox, A. D. and Cham, S. A. (1994). Status, habitat use and conservation of the scarce blue-tailed damselfly Ischnura pumilio (Charpentier) (Odonata, Coenagrionidae) in Britain and Ireland. Biological Conservation, 68 (2), 115-122.

Gilbert, G., Gibbons, D.W. and Evans, J. (1998). Bird Monitoring Methods - A Manual of Techniques for Key UK Species. RSPB: Sandy.

Gilbert, G., Stanbury, A. and Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020–2026. Irish Birds 9: 523-544.

Hayden T. J. and Harrington, R. (2000). Exploring Irish Mammals. Town House 2000.

Highways Agency (2001a). Design Manual for Roads and Bridges (DMRB) Design Manual for Roads and Bridges: Volume 10: Environmental Design and Mitigation Section 4. Nature Conservation: Part 3, HA 80/99. Nature Conservation Advice in Relation to Bats. The Highways Agency.

Highways Agency (2001b). Design Manual for Roads and Bridges (DMRB) Design Manual for Roads and Bridges: Volume 10: Environmental Design and Mitigation Section 4. Nature Conservation: Part 4, HA 81/99. Nature Conservation Advice in Relation to Otters. The Highways Agency.

Highways Agency (2005). Design Manual for Roads and Bridges (DMRB) Design Manual for Roads and Bridges: Volume 10: Environmental Design and Mitigation Section 4. Nature Conservation: Part 7, HA 116/05; Nature Conservation Advice in Relation to Reptiles and Roads. The Highways Agency.

Institute of Air Quality Management (2020). A guide to the assessment of air quality impacts on designated nature conservation sites. Available at: https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2019.pdf.

Inland Fisheries Ireland (2010). Sampling Fish for the Water Framework Directive. Transitional Waters 2010-Liffey Estuary

Irish Wildlife Trust (2012). Cork City Urban Otter Survey 2011-2012. Irish Wildlife Trust.

Jacoby, D. and Gollock, M. (2014). *Anguilla anguilla*. The IUCN Red List of Threatened Species 2014: e.T60344A45833138

Keely, B (2008). Bat Survey report (Appendix 3 to EIS prepared by pH McCarthy for Dublin Road Improvement Scheme, Bray. Prepared for Dun Laoghaire Rathdown County Council).

Kelly F. L., Matson, R., Connor, L., Feeney, R., Morrissey, E., Wogerbauer C. and Rocks, K. (2012). Water Framework Directive Fish Stock Survey of Rivers in the Eastern River Basin District. Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin.

King, J., Marnell, F., Kingston, N., Rosell, R., Roche, W.K. and Cassidy, D. (2011). Ireland Red List No. 5: Fish, Amphibians & Reptiles. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland

Lockhart, N., Hodgetts, N. and Holyoak, D. (2012). Ireland Red List No.8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Macklin, R., Brazier, B. and Sleeman, P. (2019a). Dublin City otter survey. Report prepared by Triturus Environmental Ltd. for Dublin City Council as an action of the Dublin City Biodiversity Action Plan 2015-2020.

Macklin, R. & Brazier, B. (2019b). Otter survey of selected rivers in Dún Laoghaire-Rathdown County Council district with management recommendations. Report prepared by Triturus Environmental Ltd. for Dún Laoghaire-Rathdown County Council

Marnell, F. (2002). The distribution and habitat of the common lizard in Ireland. Bulletin of the Irish Biogeographical Society. 26: 75-82.

Marnell, F., Kelleher, C. and Mullen, E. (2022). Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Marnell, F., Looney, D. and Lawton, C. (2019). Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Matson, R., Delanty, K., Gordon, P., O'Briain, R., McCarthy, E., Cierpal, D., Connor, L., Corcoran, W., Coyne, J., McLoone, P., Morrisey-McCaffrey, E., Brett, T., Gavin, A and Kelly, F.L., (2019a) Sampling Fish in Rivers 2018 - Dargle, Factsheet No. 1.

Matson, R., Delanty, K., Gordon, P., O'Briain, R., McCarthy, E., Cierpal, D., Connor, L., Corcoran, W., Coyne, J., McLoone, P., Morrisey-McCaffrey, E., Brett, T., Gavin, A and Kelly, F.L., (2019b). Sampling Fish in Rivers 2018 - Dodder, Factsheet No. 2. National Research Survey Programme. Inland Fisheries Ireland.

Merne, O.J. and Madden, B. (2000). Breeding seabirds of Ireland's Eye, County Dublin. Irish Birds 6:495- 506.

Mitchell-Jones, A.J. & McLeish, A.P. (2004). The Bat Workers' Manual 3rd Edition..

Natural England (2016). The Ecological Effects of Air Pollution from Road Transport: An Updated Review.

Nagy, S. and Langendoen, T. (2018). Report on the Conservation Status of Migratory Waterbirds in the Agreement Area. Seventh Edition.

NBDC (2021). All-Ireland Pollinator Plan 2021-2025, National Biodiversity Data Centre Series No. 25, Waterford. March.

NBDC Online Database (2023). Online data available on flora and fauna of Ireland as held by the National Biodiversity Data Centre. Available at: https://maps.biodiversityireland.ie/.

Nelson, B., Ronayne, C. and Thompson, R. (2011). Ireland Red List No.6: Damselflies and Dragonflies (Odonata). National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (2007a). Circular Letter NPWS 2 / 07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species / applications for derogation licences.

NPWS (2007b). Circular Letter PD 2 / 07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites.

NPWS (2010). Circular NPW 1 / 10 & PSSP 2 / 10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities.

NPWS (2012). Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013a). Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013b). Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013c). Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013d). Conservation Objectives: Malahide Estuary SAC 000205. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013e). Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013f). Conservation Objectives: Lambay Island SAC 000204. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013g). Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013h). Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013i) Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013j) Conservation Objectives: Rockabill SPA 004014. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013k) Site Synopsis. Site Name: Howth Head SAC. Site Code: 000202. Version date: 12.08.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013l) Site Synopsis. Site Name: Bray Head SAC. Site Code: 000714. Version date: 23.09.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015a). Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015b). Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2016). Conservation Objectives: Howth Head SAC 000202. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017a) Conservation Objectives: Bray Head SAC 000714. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017b). Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017c). Conservation Objectives: Ireland's Eye SAC 002193. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2019a). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.

NPWS (2019b). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report.

NPWS (2019c). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report.

NPWS (2019d). Conservation Objectives: Ballyman Glen SAC 000713. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2019e). Conservation Objectives: Carriggower Bog SAC 000716. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2020a). Sandymount Strand / Tolka Estuary SPA 004024. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020b). Dalkey Islands SPA 0004172. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020c). North Bull Island SPA 0004006. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020d). Wicklow Mountains SPA 0004040. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020e). Baldoyle Bay SPA 0004016. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020f). The Murrough SPA 0004186. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020g). Howth Head Coast SPA 0004113. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020h). Ireland’s Eye SPA 0004117. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020i). Broadmeadow / Swords Estuary SPA 0004025. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020j). Rogerstown Estuary SPA 0004015. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020k). Lambay Island SPA 0004069. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020l). Skerries Islands SPA 0004122. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020m). Rockabill SPA 0004014. Natura 2000 – Standard Data Form. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020n). Conservation Objectives: Glen of the Downs SAC 000719. Version 1. Department of Housing, Local Government and Heritage.

NPWS (2021a) Conservation objectives for Knocksink Wood SAC [000725]. Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2021b). Conservation objectives for Glenasmole Valley SAC [001209]. Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2021c) Conservation Objectives for Rye Water Valley / Carton SAC [001398]. Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2022a). Conservation objectives for Dalkey Islands SPA [004172]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2022b). Conservation objectives for Wicklow Mountains SPA [004040]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2022c). Conservation objectives for The Murrough SPA [004186]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2022d). Conservation objectives for Howth Head Coast SPA [004113]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2022e). 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 (2022f). Conservation objectives for Lambay Island SPA [004069]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NPWS (2022g). Conservation objectives for Skerries Islands SPA [004122]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NPWS Online Database (2022). Online data available on Natura 2000 network of sites and on Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the National Parks and Wildlife Service. Available at: https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=8f7060450de3485fa1c1085536d477ba.

NRA (2005a). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.

NRA (2005b). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.

NRA (2006a). Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.

NRA (2006b). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.

NRA (2008a). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.

NRA (2008b). Environmental Impact Assessment of National Road Schemes – A Practical Guide. National Roads Authority.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Roads Schemes. Available at: https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf

NRA (2011). Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.

Öckinger, E., Dannestam A. and Smith, H. G. (2009). The importance of fragmentation and habitat quality of urban grasslands for butterfly diversity. Landscape and Urban Planning 93(1):31-37.

Ó'Neill, L., Veldhuizen, T., de Jongh, A. and Rochford, J. (2009). Ranging behaviour and socio-biology of Eurasian otters (Lutra lutra) on lowland mesotrophic river systems. European Journal of Wildlife Research. 55:363-370.

O'Neill, F.H., Martin, J.R. and McNutt, K.E. (2010) The digitisation of woodland habitats surveyed as part of the National Survey of Native Woodlands. Unpublished report submitted to the National Parks and Wildlife Services.

Perrin, P.M, Barron, S.J. and Martin, J.R. (2006). National Survey of Native Woodland in Ireland. Second Phase Report.

Perrin, P., M., Martin, J.R., Barron, S.J., O'Neill, F., McNutt, K. and Delaney, A. (2008) National Survey of Native Woodlans 2003-2008. Volume I: Main Report. A report submitted to the National Parks and Wildlife Services.

PH McCarthy (2008). EIS for Dublin Road Improvement Scheme, Bray. Prepared for Dún Laoghaire Rathdown County Council.

Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D. and Wilson, C.J. (2010). Ireland Red List No. 4 – Butterflies. Department of the Environment, Heritage, and Local Government, Ireland.

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. and Montgomery, W.I. (2013). National Otter Survey of Ireland 2010 / 12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Rich, C. and Longcore, T. (2005). Ecological Consequences of Artificial Night lighting. Island Press.

Roos, A., A. Loy, P. de Silva, P. Hajkova, and B. Zemanová (2015). *Lutra lutra*. In: IUCN 2015. The IUCN Red List of Threatened Species. Version 2015. Available at: www.iucnredlist.org.

Russ, J. (2012). British Bat Calls: A Guide to Species Identification. Pelagic Publishing, Exeter.

Scott Cawley Ltd. (2017). Natura Impact Statement – Information for Stage 2 Appropriate Assessment for the Proposed Residential Development St. Paul's College, Sybill Hill, Raheny, Dublin 5.

Shiel, C.B., Shiel, R.E. and Fairley, J.S. (1999). Seasonal changes in the foraging behaviour of Leisler's bats (*Nyctalus leisleri*) as revealed by radio-telemetry. Journal of Zoology: 249: 347-358.

Smith, G.F., O'Donoghue, P., O'Hora, K. and Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council Church Lane, Kilkenny, Ireland.

Scottish Natural Heritage (2016). Assessing Connectivity with Special Protection Areas (SPAs). June 2016 Version 3

Stace, C. A. (2019). New Flora of the British Isles. 4th Edition. C&M Floristics.

Svensson, L., Mullarney and K., Zetterstrom, D. (2010). Collins Bird Guide 2nd Ed. HarperCollins Publishers, London.

The Environment Agency (2010). Fifth Otter Survey of England 2009-2012. Full Technical Report. The Environment Agency, UK.

Tierney, N., Whelan, R., Boland, H. and Crowe, O. (2017). The Dublin Bay Birds Project Synthesis 2013-2016. BirdWatch Ireland, Kilcoole, Co. Wicklow.

Tong, Z., Baldauf, R. W., Isakov, V., Deshmukh, P. and Zhang, M. K. (2016). Roadside vegetation barrier designs to mitigate near-road air pollution impacts. Sci. Total Environ. 541, 920–927.

Transport Infrastructure Ireland (2020a). The Management of Invasive Alien Plant Species on National Roads - Technical Guidance. Transport Infrastructure Ireland Publications.

Transport Infrastructure Ireland (2020b). The Management of Invasive Alien Plant Species on National Roads – Standard.

Trinity College Campus (2017). Trinity Campus Pollinator Plan (CPP). Available at: https://naturalscience.tcd.ie/pollinator/conserve.php

Triturus Environmental Ltd. (2022). Aquatic baseline report for the BusConnects Dublin – Core Bus Corridor Infrastructure Works. Prepared by Triturus Environmental Ltd. for Scott Cawley Ltd. August 2022.

Waterways Ireland (2021). Angling on the Grand Canal. Available at: https://www.waterwaysireland.org/places-to-go/grand-canal/angling.

WCC (2010) County Wicklow Biodiversity Action Plan 2010-2015. [Online] Available at https://www.wicklow.ie/Living/Services/Arts-Heritage-Archives/Heritage/Natural-Heritage/Biodiversity-in-Wicklow/Biodiversity-Plan.

WCC (2022). Wicklow County Development Plan 2022 – 2028. [Online] Available at https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/National-Regional-County-Plans/Wicklow-County-Development-Plan-2022-2028/Stage-7

Wright, M., Goodman, P. and Cameron, T. (2010). Exploring Behavioural Responses of Shorebirds to Impulse Noise. Wildfowl (2010) 60: 150-167.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. and Wright, M. (2016). Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

Directives and Legislation

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive).

Council Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive).

Council Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (The Birds Directive).

Council Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the impacts of certain public and private projects on the environment.

Inland Fisheries Acts 1959 to 2019

S.I. No. 477/2011 – European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).

S.I. No. 235/2022 – Flora (Protection) Order, 2022.

S.I. No. 115/2021 – Planning and Development Act 2000 (Exempted Development) (No. 2) Regulations 2021.

Wildlife Acts 1976 to 2022