Chapter 12
Biodiversity

Contents

12. Biodiversity

12.1 Introduction

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

The likely significant effects of the Proposed Scheme on biodiversity during both the Construction Phase and the Operational Phase (including routine maintenance) have been assessed. The potential Construction Phase impacts assessed include impacts on air, water quality, habitats, and on flora and fauna from construction activities such as utility diversions, road resurfacing, and road realignments. 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 (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" (2013), Article 2 of the Convention on Biological Diversity, gives the following formal definition of biodiversity:

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

Alongside the term '*biodiversity*' the terms '*ecology*' and '*ecological*' are also used throughout this Chapter as broader terms to consider the relationships of biodiversity receptors to one another and 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 NTA and submitted with the application for approval, so as to enable the Board, ac competent authority, to carry out the assessments required pursuant to Article 6(3) of Council Directive 92/43/EEC

of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive" documents).

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

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

12.2.1 Ecological Survey Study Area

Ecological surveys were carried out for each of the biodiversity receptors listed in Table 12.1, within a specific study area (as described in Table 12.1 and illustrated in Figure 12.1.1, Figure 12.1.2 and Figure 12.5 in Volume 3 of this EIAR), and focused on assessing potential impacts within the Zone of Influence (ZoI) of the Proposed Scheme. The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (hereafter referred to as the CIEEM Guidelines) (CIEEM 2019) define the ZoI for a development as the area over which ecological features may be subject to significant impacts as a result of the Proposed Scheme and associated activities (see Section 12.3.1 for more detail on the ZoI as it relates to the Proposed Scheme and the various ecological receptors).

The ecological surveys were designed based upon the characteristics of the Proposed Scheme and its likely significant impacts on the baseline environment during Construction and 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/operation. The extent of the study area for habitats is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Rare and/or Protected Flora	The area within or immediately adjacent to the Proposed Scheme footprint where rare and/or protected flora could be directly or indirectly affected during construction / operation. The extent of the study area for rare and/or protected flora is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Fauna species other than those listed below (includes badger, otter, other protected mammal species, amphibians, and reptiles)	The area within or immediately adjacent to the Proposed Scheme footprint where fauna species could be directly or indirectly affected during construction / operation. The extent of the study area for fauna species (other than bats and breeding birds) is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Bats	The area suitable for roosting, foraging and/or commuting bats (e.g. bridges, hedgerows, treelines, woodland and watercourses) within or immediately adjacent to the Proposed Scheme footprint where bats could be directly or indirectly affected during construction / operation. The extent of the study area for bats is illustrated in Figure 12.1.1 in Volume 3 of this EIAR.
Wintering Birds	The area suitable for wintering birds within or immediately adjacent to the Proposed Scheme footprint where wintering birds could be directly affected during construction / operation. The extent of the study area for wintering birds is illustrated in Figure 12.1.2 in Volume 3 of this EIAR.

12.2.2 Relevant Guidelines, Policy and Legislation

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

- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (hereafter referred to as the CIEEM Guidelines) (CIEEM 2019);

- 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 during the Construction of National Road Schemes. National Roads Authority. (NRA 2005b);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes, National Roads Authority. (NRA 2006a);
- Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. National Roads Authority. (NRA 2006b);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009);
- The Management of Invasive Alien Plant Species on National Roads - Technical Guidance (TII 2020a)
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII 2020b)
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2008a);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA 2008b);
- Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (Collins 2016);
- The Bat Workers' Manual (Mitchell-Jones and McLeish 1999);
- Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals No. 25 (Kelleher and Marnell 2006);
- 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);
- 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); and
- All-Ireland Pollinator Plan 2021-2025, National Biodiversity Data Centre Series No. 25, Waterford. March 2021(NBDC 2022).

Policy and Planning Documents:

- Department of Culture, Heritage and the Gaeltacht (DCHG) National Biodiversity Plan 2017 - 2021 (DCHG 2017);
- Dublin City Council (DCC) Dublin City Development Plan 2016 - 2022 (DCC 2016);
- Dublin City Biodiversity Action Plan 2015 - 2020 (DCC 2015).
- South Dublin County Council (SDCC) South Dublin County Development Plan 2016-2020 (SDCC 2016); and
- South Dublin County Heritage Plan 2010-2015 (SDCC 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 2021;
- The Wildlife Acts 1976-2021;
- S.I. No. 356/2015 - Flora (Protection) Order, 2015 (hereafter referred to as the Flora Protection Order); and
- Inland Fisheries Acts 1959 to 2017.

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 2022);
- Online data records available on the National Biodiversity Data Centre Database (NBDC online database 2021 and updated 2022);
- Ordnance Survey Ireland (OSI) orthophotography (from 1995 to 2012) for the Proposed Scheme study area;
- Bus Connects Drone Imagery, surveyed 2020 (NTA 2020);
- Records of rare and/or protected species for the 10km (kilometre) grid squares O03, O13 and O23, held by the NPWS;
- Habitat and species Geographic Information System (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 2020);
- Information on the status of European Union (EU) protected habitats and species in Ireland (NPWS 2019a, NPWS 2019b and NPWS 2019c); and
- Information on light-bellied brent goose inland feeding sites (Scott Cawley Ltd. 2017).

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

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

A desk study was carried out to identify all hydrological crossing points within the footprint of the Proposed Scheme. No in-stream works are proposed, and the desk study identified no sites where water bodies may be subject to significant disturbance as a consequence of the Proposed Scheme. As such, instream aquatic habitat surveys were not necessary.

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 2021

Survey	Survey Date(s)	Surveyor Reference
Habitat survey	June to August 2018 August 2020	Scott Cawley Ltd.
Mammal surveys (excluding bats)	June to August 2018 August 2020 October 2020	Scott Cawley Ltd.
Bat surveys:	Walked transect activity surveys June to August 2018 September and October 2019 June and July 2020 August 2021 Identification of potential roost features (PRFs) June to August 2018 August 2020	Scott Cawley Ltd.
Wintering bird survey	November 2020 to February 2021 November 2021 to March 2022	Scott Cawley Ltd.
Amphibian habitat suitability assessment	June to August 2018 August 2020	Scott Cawley Ltd.
Reptile habitat suitability assessment	June to August 2018 August 2020	Scott Cawley Ltd.

12.2.3.3 Habitat Survey

Habitat surveys were carried out by Scott Cawley Ltd., between June and August 2018, and in August 2020. 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 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 and suitable lands e.g. greenfield sites immediately adjacent were surveyed for badger *Meles meles* and otter *Lutra lutra* activity as part of the multidisciplinary walkover survey, undertaken between June and August 2018, and in August 2020. The presence / absence of these species was surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings as well as by direct observation. In addition, the study area was surveyed for the presence of badger sett and otter holts. Where present, any evidence of use was recorded.

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*. 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 2019, 2020 and 2021 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.

12.2.3.5.1 Bats – Walked Transect Surveys

Walked bat activity transect surveys were conducted along preselected transect routes at three locations along the Proposed Scheme. Transect routes were located at R833 Coldcut Road adjacent Palmerstown Lawn, referred to as CBC0007BT001, R833 Ballyfermot Road adjacent to Markievicz Park, referred to as CBC0007BT002, and Grattan Crescent adjacent to Grattan Crescent Park, referred to as CBC0007BT003. The walked transect routes are shown on Figure 12.1.1 in Volume 3 of this EIAR.

Walked transect surveys comprised four visits to each transect route across three seasons; autumn, spring and summer (as guided by Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2016) (see Table 12.2 for specific dates. Surveys were conducted in June to August 2018, September and October 2019, and July 2020. Transect CBC0007BT001 was surveyed in all four survey seasons, with Transect CBC0007BT002 and Transect CBC0007BT003 being surveyed in autumn of 2019, spring and summer 2020. Surveys commenced approximately 30 minutes after sunset to ensure that bats had emerged from their roosts. Walked transects were conducted at CBC0007BT002 in August 2021, to capture any potential bat emergence activity within the Mount la Salle grounds adjacent to the Proposed Scheme. Surveys commenced approximately 15 minutes before sunset to ensure that any roost emergence would be captured.

Surveys involved the surveyor walking each transect route at a slow pace using with a handheld ultrasound bat detector (Elekon Batlogger M) to record any bat species present. All bat calls were analysed using Elekon BatExplorer software. Calls were manually identified against species descriptions provided within British Bat Calls - A Guide to Species Identification (Russ 2012).

12.2.3.5.2 Bats - Tree Surveys

Trees located within the footprint of the Proposed Scheme were assessed for their potential to support roosting bats (i.e. Potential Roost Features (PRFs)) as part of the multidisciplinary walkover survey carried out between June and August 2018 and August 2020.

A number of trees located across 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 winter birds located within or directly adjacent to the Proposed Scheme. This included a review of recent aerial photography and known inland feeding sites for the SCI bird species light-bellied brent goose (Scott Cawley Ltd. 2017).

The desk study identified three sites along or adjacent to the Proposed Scheme with potential for wintering birds that would be subject to direct habitat loss. These sites are located adjacent to Ballyfermot College of Further Education (BCFE) on R112 Kylemore Road referred to as CBC0007WB001, at Longmeadow's Park on Sarsfield

Road, referred to as CBC0007WB002, and at Liffey Gaels GAA Club grounds, referred to as CBC0007WB003. The sites were surveyed twice a month, between the months November 2020 and February 2021, and October 2021 and March 2022. The results of the desk study and field surveys have informed the assessment of potential impacts on wintering bird species arising from the Proposed Scheme. See Figure 12.1.2 in Volume 3 of this EIAR for

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 *et al.* 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 multi-disciplinary walkover surveys undertaken between June and August 2018 and in August 2020.

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 multi-disciplinary walkover surveys undertaken between June and August 2018 and in August 2020.

12.2.4 Appraisal Method for the Assessment of Impacts

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

- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- EPA Advice Notes (EPA 2015);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022);
- CIEEM Guidelines (CIEEM 2019); and
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009).

12.2.4.1 Valuing the Ecological Receptors

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

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

In accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009), biodiversity features within the ZoI of the Proposed Scheme which are '*both of sufficient value to be material in*

decision making and likely to be affected significantly' are deemed to be KERs. These are the biodiversity receptors which may be subject to likely significant impacts from the Proposed Scheme, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of Local Importance (Higher Value) or greater.

12.2.4.2 Characterising and Describing the Impacts

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

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

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

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

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

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

12.2.4.3 Impact Significance

In determining impact significance, the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009) and the CIEEM Guidelines (CIEEM 2019) were followed, which requires examination of the following two key elements:

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

12.2.4.3.1 Integrity

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

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

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

12.2.4.3.2 Conservation Status

The definitions for conservation status given in the Habitats Directive, in relation to habitats and species, are also used in the CIEEM Guidelines (CIEEM 2019) and the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009):

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

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

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

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

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

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

According to the CIEEM Guidelines (2019) and the Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009) methodology, if it is determined that the integrity and/or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e. local, county, national, international). In some cases, an impact may not be significant at the geographic scale at which the ecological feature has been valued but may be significant at a lower geographical level. For example, a particular impact may not be considered likely to have a negative effect on the overall conservation status of a species which is considered to be internationally important. However, an impact may occur at a local level on this internationally important species. In this case, the impact on an internationally important species is considered to be significant at only a local, rather than international level.

12.3 Baseline Environment

The Proposed Scheme is approximately 9.2km long from end to end and will commence on the Fonthill Road at the tie in point with the new Liffey Valley Shopping Centre Bus Interchange and Road Improvement Scheme. The route will continue along the distributor road to the west and south of Liffey Valley Shopping Centre in a southerly direction towards Coldcut Road. From here it will join the R833 Coldcut Road and continue to the bridge over the M50, subsequently turning onto the R833 Ballyfermot Road. The Proposed Scheme will travel through Ballyfermot Village and continue onto the Sarsfield Road, whilst city bound general traffic will be diverted via Le Fanu Road and Kylemore Road back to Ballyfermot Road.

The Proposed Scheme will continue along Ballyfermot Road and Sarsfield Road, turning right at the junction with Con Colbert Road before turning right again onto Grattan Crescent. At the intersection of Grattan Crescent and Emmet Road the Proposed Scheme will travel along Emmet Road, Old Kilmainham, Mount Brown and James's Street. From here the Proposed Scheme will join Thomas Street, Cornmarket and go along High Street to the junction with Nicholas Street and Winetavern Street where it will join the existing traffic management regime in the City Centre and terminates at the end of High Street.

Habitats present at Liffey Valley are dominated by buildings and artificial surfaces, residential estates, dry meadows and grassy verges, scrub, and treeline habitats associated with land use adjacent to Fonthill Road. As the Proposed Scheme extends eastward from the M50 to Ballyfermot along R833 Coldcut Road, residential estates and buildings and artificial surfaces dominate, with amenity grassland, hedgerows and treelines interspersed in between hard standing. The landscape remains similar throughout the Proposed Scheme as it continues along R833 Ballyfermot Road, with scattered trees and parkland, unmanaged grassland, and amenity grassland, often bordered with treelines, interspersed between residential estates at Drumfinn Avenue, and Markievicz Park. Amenity grasslands dominate along the northern border of the Proposed Scheme along Sarsfield Road with playing pitches at Longmeadow's pitch and putt and Liffey Gaels GAA the most prominent sites, while residential estates are predominantly found to the south of the Proposed Scheme. Mixed broadleaf woodlands are scarce among the urban landscape, though they are present in small stands at R833 Coldcut Road and Mount La Salles convent, R833 Ballyfermot Road.

The remainder of the Proposed Scheme from Sarsfield Road to R108 High Street is dominated by urban habitats such as residential, buildings and artificial surfaces with green spaces that are present dominated by amenity grassland and scattered trees and parkland at Grattan Crescent Park and various sites adjacent to R810 Emmet Road. Freshwater habitats are present at sections of the Proposed Scheme, such as the Camac_040 crossing at R810 Emmet Road and again adjacent to the junction of R810 Emmet Road and the R811 South Circular Road. Scrub habitat can be found interspersed between residential estates and buildings and artificial surfaces that dominate R810 Old Kilmainham as it joins R810 James's Street and R810 Thomas Street. The remainder of the Proposed Scheme is dominated by buildings and artificial surfaces with amenity grassland landscaping, flowerbeds and borders, and scattered trees and parkland are common.

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 has 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 Table 12.1 (e.g. surface water quality effects of a sufficient magnitude can extend, and affect, receptors at significant distances downstream).

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

The unmitigated hydrogeological ZoI for the Proposed Scheme may extend further then the footprint of the Proposed Scheme, and is dependent on ground conditions, design measures and construction activities. A study area is defined as 250m (metres) either side of the Proposed Scheme boundary (see Chapter 14 (Land, Soils, Geology & Hydrogeology) in Volume 3 of this EIAR for more detail).

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

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 shown in Figure 12.2 in Volume 3 of this EIAR, and the marine environment of Dublin Bay. The ZoI for impacts to aquatic fauna species, such as Atlantic salmon *Salmo salar* and lamprey species *Lampetra* spp., is limited to those water courses that will be crossed by the Proposed Scheme or water bodies to which runoff from the Proposed Scheme could drain to during construction.

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

Waterbody Name	Connectivity to the Proposed Scheme
Liffey_180 (also known as the Quarryvale River)	*Approximately* 500m from the Proposed Scheme
Liffey_190	*Approximately* 180m from the Proposed Scheme
Camac_040	Crosses the Proposed Scheme (existing road crossing at Golden Bridge River Camac at R810 Emmet Road, Inchicore
Liffey Estuary Upper	A*pproximately* 200m north of the scheme terminus at the end of High Street.
Liffey Estuary Lower	A*pproximately* 1.4km downstream from Proposed Scheme
Dublin Bay	A*pproximately* 8.1km downstream from Proposed Scheme. Hydrologically connected to the Proposed Scheme via Ringsend Wastewater Treatment Plant, and the River Liffey receiving surface water system, including Ringsend WwTP.
Grand Canal	*Approximately* 500m from the Proposed Scheme. However, there is no hydrological connection shown in the existing drainage

The ZoI for small mammal species, such as the pygmy shrew, would be expected to be limited to no more than approximately 100m from the Proposed Scheme boundary due to their small territory sizes and sedentary lifecycle. The ZoI for otters, badgers, stoat, and hedgehogs may extend over greater distances than small mammal 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 the Proposed Scheme boundary) for badgers and otters has been defined in accordance with the Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2005b) and the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2006b) and is considered to be of a precautionary distance. During construction-related disturbance, the screening effect provided by surrounding vegetation and buildings would likely reduce the actual distance of the ZoI for badgers and otters.

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

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

The ZoI in relation to disturbance 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 by Cutts *et al.* (2009) and Exploring Behavioural Responses of Shorebirds to Impulsive Noise by 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 are likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity (British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228-1) (BSI 2008)) are generally below 60dB or, in most cases, are approaching the 50dB threshold.

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

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

12.3.2 Desk Study

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

12.3.3 Local Biodiversity Areas

The Dublin City Biodiversity Action Plan 2015 – 2020 (DCC 2015) highlights a number of areas considered to be of biodiversity value present within the DCC administrative boundary. These areas that are located within the ZoI of the Proposed Scheme are provided below:

- Dublin City's Green Infrastructure Network. Habitats within the Proposed Scheme which are considered to contribute to the Green Infrastructure Network include grassland, hedgerows, treelines and woodlands, which support a range of species and act as ecological links/corridors across the wider landscape.
- Dublin City's network of parks and public green spaces, such as War Memorial Park support a variety of species and is considered to be a valuable biodiversity resource; and
- Dublin City's network of rivers, streams and riparian zones. The Proposed Scheme will cross the Camac_040 and Poddle_010. These watercourses support a range of riverine bird species, such as kingfisher *Alcedo atthis*, and fish species. The Proposed Scheme will terminate adjacent to the River Liffey, which is noted as being a highly significant regional salmonid catchment for species of Atlantic salmon *Salmo salar* and brown trout *Salmo trutta.* It also supports an active otter *Lutra lutra* population.

The South Dublin County Council Development Plan 2016-2022 (SDCC 2016) highlights a number of areas considered to be of biodiversity value present within the boundaries of SDCC. These areas that are located within the ZoI of the Proposed Scheme are provided below:

- The South Dublin County Development Plan 2016-2022 highlights the Liffey Valley as a Landscape Character Area with objectives to protect and enhance the outstanding natural character and amenity of the area (SDCC 2016); and
- Liffey Valley was designated by a Special Amenity Area Order (SAAO) by Dublin County Council in 1990. It traverses the county boundaries of both SDCC and FCC. It is an objective for the CDP to 'protect and enhance the outstanding character and amenity of the Liffey Valley'.

12.3.4 Designated Areas for Nature Conservation

12.3.4.1 European Sites

The Proposed Scheme does not overlap with any European site. The nearest European site to the Proposed Scheme is South Dublin Bay and River Tolka Estuary SPA, which is located approximately 3.3km away and is also hydraulically connected to the Proposed Scheme approximately 6km downstream of the Proposed Scheme

terminus. This is followed by South Dublin Bay SAC, which is located approximately 6.5km downstream of the Proposed Scheme terminus.

There are eight European sites located in Dublin Bay that are hydrologically connected to the Proposed Scheme. These European Sites are North Dublin Bay SAC, South Dublin Bay SAC, Howth Head SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Howth Head Coast SPA, and Dalkey Island SPA. European sites will be hydrologically connected to the Proposed Scheme via three watercourses i.e. the Liffey_180, Liffey_190 and the Camac_040, and the Ringsend WWTP.

There are thirteen SPAs designated for SCI species that are known to forage and/or roost at inland sites across Dublin City. These include Malahide Estuary SPA, Baldoyle Bay SPA, Rogerstown Estuary SPA, Skerries Islands SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Ireland's Eye SPA, Lambay Island SPA, Howth Head Coast SPA, Dalkey Islands SPA, Rockabill SPA, Wicklow Mountains SPA and The Murrough SPA. There are 25 European sites (SACs or SPAs) located within the vicinity of the Proposed Scheme. These are listed in Table 12.5 and illustrated in Figure 12.3 in Volume 3 of this EIAR. Table 12.5 lists these sites, their distance from the Proposed Scheme, and the sites' designations (Qualifying Interests (QIs) / Special Conservation Interests (SCIs)). There are 17 of these European sites located within the ZoI of the Proposed Scheme (see Table 12.5).

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

Table 12.5: European Sites (SACs and SPAs) Located Within the ZoI (highlighted in light blue), and Those in the Wider Area, of the Proposed Scheme Boundary

Site Name	Distance	Designation – QIs or SCIs
SAC		
South Dublin Bay SAC [000210]	*Approximately* 4km 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]. Source: Conservation Objectives: South Dublin Bay SAC 000210. Version 1. (NPWS 2013a) and Natura 2000 – Standard Data Form (NPWS 2020a)
North Dublin Bay SAC [000206]	*Approximately* 6.3km northeast 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]. Source: Conservation Objectives: North Dublin Bay SAC 000206. Version 1. (NPWS 2013b) and Natura 2000 – Standard Data Form (NPWS 2020b)
Rye Water Valley/Carton SAC [003198]	*Approximately* 6.5km 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]. Source: Conservation Objectives for Rye Water Valley/Carton SAC [003198]. Generic Version 6.0 (NPWS 2021a) and Natura 2000 – Standard Data Form (NPWS 2019e)

Site Name	Distance	Designation – QIs or SCIs
Glenasmole Valley SAC [001209]	*Approximately* 9.3km south of the Proposed Scheme	Annex I Habitats: • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]; • *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]; and • Petrifying springs with tufa formation (*Cratoneurion*) [7220]. Conservation objectives for Glenasmole Valley SAC [001209]. Generic Version 7.0. DCHG (NPWS 2021b) and Natura 2000 – Standard Data Form (NPWS 2021c)
Baldoyle Bay SAC [000199]	*Approximately* 11.2km northeast 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]. Source: Conservation Objectives: Baldoyle Bay SAC 000199. Version 1. (NPWS 2012b) and Natura 2000 – Standard Data Form (NPWS 2020c)
Wicklow Mountains SAC [002122]	*Approximately* 11.3km south of the Proposed Scheme	Annex I Habitats: • Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]; • Natural dystrophic lakes and ponds [3160]; • Northern Atlantic wet heaths with *Erica tetralix* [4010]; • European dry heaths [4030]; • Alpine and Boreal heaths [4060]; • Calaminarian grasslands of the *Violetalia calaminariae* [6130]; • Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]; • Blanket bogs (* if active bog) [7130]; • Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110]; • Calcareous rocky slopes with chasmophytic vegetation [8210]; • Siliceous rocky slopes with chasmophytic vegetation [8220]; and • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]. Annex II Species: • Otter *Lutra lutra* [1355]. Source: Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. (NPWS 2017a) and Natura 2000 – Standard Data Form (NPWS 2018)
Howth Head SAC [000202]	*Approximately* 12km northeast of the Proposed Scheme	Annex I Habitats: • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and • European dry heaths [4030]. Source: Conservation Objectives: Howth Head SAC 000202. Version 1. (NPWS 2016) and Natura 2000 – Standard Data Form (NPWS 2021d)
Rockabill to Dalkey Island SAC [003000]	*Approximately* 12.1km east of the Proposed Scheme	Annex I Habitats: • Reefs [1170]. Annex II Species: • Harbour porpoise *Phocoena phocoena* [1351]. Source: Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. (NPWS 2013c) and Natura 2000 – Standard Data Form (NPWS 2019f)
Malahide Estuary SAC [000205]	*Approximately* 13.9km northeast of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]; • Mediterranean salt meadows (*Juncetalia maritimi*) [1410]; • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]; and • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]. Source: Conservation Objectives: Malahide Estuary SAC 000205. Version 1. (NPWS 2013d) and Natura 2000 – Standard Data Form (NPWS 2020d)

Site Name	Distance	Designation – QIs or SCIs
Ireland's Eye SAC [000203]	*Approximately* 15.2km northeast of the Proposed Scheme	Annex I Habitats: • Perennial vegetation of stony banks [1220]; and • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]. Source: Conservation Objectives: Ireland's Eye SAC 002193. Version 1. (NPWS 2017b) and Natura 2000 – Standard Data Form (NPWS 2020e)
Rogerstown Estuary SAC [000208]	*Approximately* 18km northeast 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]. Source: Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1. (NPWS, 2013e) and Natura 2000 – Standard Data Form (NPWS 2019g)
Lambay Island SAC [000204]	*Approximately* 22.5km from the Proposed Scheme	Annex I Habitats: • Reefs [1170] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Annex II Species: • Grey seal *Halichoerus grypus* [1364] • Harbour seal *Phoca vitulina* [1365] Source: Conservation objectives for Lambay Island SAC [000204]. Version 1.0. (NPWS 2013f) and Natura 2000 – Standard Data Form (NPWS 2019h)
Special Protection Areas		
South Dublin Bay and River Tolka Estuary SPA [004024]	*Approximately* 3.3km northeast 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]. Source: Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. (NPWS 2015a) and Natura 2000 – Standard Data Form (NPWS 2021e)

Site Name	Distance	Designation – QIs or SCIs
North Bull Island SPA [004006]	*Approximately* 6.3km northeast 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]. Source: Conservation Objectives: North Bull Island SPA 004006. Version 1. (NPWS 2015b) and Natura 2000 – Standard Data Form (NPWS 2020f)
Baldoyle Bay SPA [004016]	*Approximately* 11.4km northeast 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]. Sources: Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. (NPWS 2013g) and Natura 2000 – Standard Data Form (NPWS 2020g)
Wicklow Mountains SPA [004040]	*Approximately* 11.3km south of the Proposed Scheme	• Merlin *Falco columbarius* [A098]; and • Peregrine *Falco peregrinus* [A103]. Source: Conservation Objectives: Wicklow Mountain SPA 004040. Generic Version 7.0. (NPWS 2022a) and Natura 2000 – Standard Data Form (NPWS 2020h)
Malahide Estuary SPA [004025]	*Approximately* 13.9km northeast 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]. Sources: Conservation Objectives: Malahide Estuary SPA 004025. Version 1. (NPWS 2013h) and Natura 2000 – Standard Data Form (NPWS 2021f)
Howth Head Coast SPA [004113]	*Approximately* 14.6km east of the Proposed Scheme	• Kittiwake *Rissa tridactyla* [A188]. Source: Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 8.0. (NPWS 2022b) and Natura 2000 – Standard Data Form (NPWS 2020i)

Site Name	Distance	Designation – QIs or SCIs
Dalkey Island SPA [004172]	*Approximately* 13.8km east of the Proposed Scheme	• Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and • Arctic Tern *Sterna paradisaea* [A194]. Source: Conservation Objectives for Dalkey Islands SPA [004172]. Generic Version 8.0. (NPWS 2022c) and Natura 2000 – Standard Data Form (NPWS 2020j)
Ireland's Eye SPA [004117]	*Approximately* 15km north east of the Proposed Scheme	• Cormorant *Phalacrocorax carbo* [A017]; • Herring Gull *Larus argentatus* [A184]; • Kittiwake *Rissa tridactyla* [A188]; • Guillemot *Uria aalge* [A199]; and • Razorbill Alca torda [A200]. Source: Conservation objectives for Ireland's Eye SPA [004117]. Generic Version 8.0. (NPWS 2022d) and Natura 2000 – Standard Data Form (NPWS 2020k)
Rogerstown Estuary SPA [004015]	*Approximately* 18.3km northeast 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]. Source: Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. (NPWS, 2013i) and Natura 2000 – Standard Data Form (NPWS, 2020l)
Lambay Island SPA [004069]	*Approximately* 22.4km northwest the Proposed Scheme	• 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]. Source: Conservation objectives for Lambay Island SPA [004069]. Generic Version 7.0. (NPWS 2022e) and Natura 2000 – Standard Data Form (NPWS 2020m)
Skerries Islands SPA [004122]	*Approximately* 27.9km northwest 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]; • Herring Gull *Larus argentatus* [A184]. Source: Conservation Objectives: Skerries Islands SPA 004122. Generic Version 7.0. (NPWS, 2022f) and Natura 2000 – Standard Data Form (NPWS 2020n)
Rockabill SPA [004014]	*Approximately* 28.5km north east of the Proposed Scheme	• Purple Sandpiper *Calidris maritima* [A148; • Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and, • Arctic Tern *Sterna paradisaea* [A194]. Source: Conservation Objectives: Rockabill SPA [004014]. Version 1. (NPWS, 2013j) and Natura 2000 – Standard Data Form (NPWS, 2020o)

Site Name	Distance	Designation – QIs or SCIs
The Murrough SPA [004186]	*Approximately* 30.5km south east of the Proposed Scheme	• Red-throated Diver *Gavia stellata* [A001]; • Greylag Goose *Anser anser* [A043]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Wigeon *Anas penelope* [A050]; • Teal *Anas crecca* [A052]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; • Herring Gull *Larus argentatus* [A184]; and, • Little Tern *Sterna albifrons* [A195]. Source: Conservation Objectives: The Murrough SPA 004186. Generic Version 6.0. (NPWS 2022g) and Natura 2000 – Standard Data Form (NPWS 2020p)

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

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

In addition to NHAs, pNHAs are sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. pNHAs are offered protection in the interim period under the development plans in circumstances which requires that planning authorities must give due regard to their protection in planning policies and decisions. The Proposed Scheme lies within the administrative boundaries of South Dublin County Development Plan 2016-2022 (SDCC 2016) and Dublin City County Development Plan 2016-2022 (DCC 2016).

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

The closest pNHA to the Proposed Scheme is the Grand Canal pNHA which is located approximately 385m to the south of the Proposed Scheme. This is followed by the Liffey Valley pNHA which is located approximately 830m north of the Proposed Scheme and the Royal Canal pNHA, which is located approximately 2.2km north of the Proposed Scheme. The Grand Canal pNHA lies within the administrative boundary of both South Dublin County Development Plan (SDCC, 2016) and Dublin City Development Plan 2016-2022 (DCC, 2016), while the Liffey Valley pNHA lies along the administrative boundary of both Dublin City Development Plan 2016-2022 (DCC, 2016) and Fingal County Development Plan 2017-2023 (FCC 2017).

There are six pNHAs that are located downstream of the Proposed Scheme in Dublin Bay. These pNHAs are North Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA, Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, and South Dublin Bay pNHA. These sites are hydrologically connected to the Proposed Scheme via the Liffey_180, Liffey_190, Camac_040 and the Ringsend WWTP. These pNHAs lie within the administrative boundaries of the Dublin City County Development Plan 2016-2022 and/or Fingal County Development Plan 2017-2023 (FCC 2017).

There is one NHA and twelve pNHAs designated for wintering bird species that are known to forage and/or roost at inland sites across Dublin City. These include Skerries Islands NHA, Malahide Estuary pNHA, Baldoyle Bay pNHA, Rogerstown pNHA, North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA, Lambay Island pNHA, Howth Head pNHA and The Murrough pNHA.

There is one NHA and 27 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. 16 of these are located within the ZoI of the Proposed Scheme (see Table 12.6).

These pNHAs are valued as being of National Importance.

Table 12.6: pNHAs and NHAs Located Within the ZoI of the Proposed Scheme Boundary (highlighted in light blue), and Those in the Wider Area of the Proposed Scheme Boundary

Site Name	Distance	Description
NHAs		
Skerries Islands NHA [000204]	*Approximately.* 27.9km north east of the Proposed Scheme	Listed under similar conservation objectives as its SAC designations. See Table 12.5 under Skerries Islands SPA
pNHAs		
Liffey Valley pNHA [000128]	*Approximately*800m north 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.
Grand Canal pNHA [002104]	*Approximately*340m south of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
Royal Canal pNHA [002103]	*Approximately*2.15km north of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
South Dublin Bay pNHA [000210]	*Approximately*4km east of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA
Dolphins, Dublin Docks pNHA [000201]	*Approximately*5km east of the Proposed Scheme	Listed under similar conservation objectives as its SPA designations. See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
Dodder Valley pNHA [000991]	*Approximately*5.6km south of the Proposed Scheme	The last remaining stretch of natural river bank vegetation on the River Dodder in the built-up Greater Dublin Area (GDA).
Booterstown Marsh pNHA [001205]	*Approximately*5.85km southeast of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
North Dublin Bay pNHA [000206]	*Approximately*3km north east of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA
Santry Demesne pNHA [000178]	*Approximately*6.3km north of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, and woodland
Rye Water Valley/Carton pNHA [001398]	*Approximately*6.5km west of the Proposed Scheme	Listed under similar conservation objectives as its SAC designations. See Table 12.5 under Rye Water Valley / Carton SAC
Fitzsimon's Wood pNHA [001753]	*Approximately*8.5km southeast of the Proposed Scheme	Birch woodland, which is very rare in County Dublin.
Glenasmole Valley pNHA [001209]	*Approximately*9.3km south of the Proposed Scheme	Listed under similar conservation objectives as its SAC designations. See Table 12.5 under Glenasmole Valley SAC
Lugmore Glen pNHA [001212]	*Approximately*8.35km south of the Proposed Scheme	Presence of the rare Red Data Book species Yellow Archangel (*Lamiastrum galeobdolon*).
Baldoyle Bay pNHA [000199]	*Approximately*11.2km of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under Baldoyle Bay SAC and Baldoyle Bay SPA
Feltrim Hill pNHA [001208]	*Approximately*11.4km north of the Proposed Scheme	Good example of knoll-reef phenomenon. Previously known to contain two rare plant species, namely spring squill *Scilla verna* and long-stalked crane's-bill *Geranium columbinum*
Sluice River Marsh pNHA [001763]	*Approximately*11.9km northeast of the Proposed Scheme	Freshwater marsh
Dingle Glen pNHA [001207]	*Approximately*12.8km south of the Proposed Scheme	Variety of habitat present, including woodland

Site Name	Distance	Description
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	*Approximately*11km southeast 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. Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under Rockabill to Dalkey Island SAC and Dalkey Islands SPA
Ballybetagh Bog pNHA [001202]	*Approximately*13.8km south of the Proposed Scheme	Marshland
Malahide Estuary pNHA [000205]	*Approximately*13.9km northwest of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under Malahide Estuary SAC and Malahide Estuary SPA
Rogerstown Estuary pNHA [00208]	*Approximately*18km northwest of the Proposed Scheme	Listed under similar conservation objectives as its SPA designations. See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Kilteel Wood pNHA [001394]	*Approximately*15.2km south west of the Proposed Scheme	A good example of deciduous woodland comprised mostly of Oak *Quercus spp*. and Birch *Betula pubescens*
Loughlinstown Woods pNHA [001211]	*Approximately*14.1km south of the Proposed Scheme	Demesne-type mixed woodland
Howth Head pNHA [000202]	*Approximately*11.8km northeast of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under Howth Head SAC and Howth Head Coast SPA
Ireland's Eye pNHA [000203]	*Approximately*15.2km west of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under Ireland's Eye SAC and Ireland's Eye SPA
Portraine Shore pNHA [001215]	*Approximately*18.2km northwest of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Lambay Island pNHA [000204]	*Approximately*22.55km north east of the Proposed Scheme	Listed under similar conservation objectives as its SAC and SPA designations. See Table 12.5 under Lambay Island SAC and Lambay Island SPA
The Murrough pNHA [004186]	*Approximately 28.8*km south east of the Proposed Scheme	Listed under similar conservation objectives as its SPA designations See Table 12.5 under The Murrough SPA

12.3.4.3 Other Designated Sites

Other designations recognised in the wider Greater Dublin Area including RAMSAR wetlands sites and Dublin Bay Biosphere are considered in terms of the overlap with European and National sites, whilst the 3 Special Area Amenity Order are local to specific Bus Connects corridors but are nonetheless captured in the overall EIAR biodiversity assessment and Natura Impact Statement by virtue of overlapping nature designations, namely European and Nationally designated sites.

12.3.4.3.1 RAMSAR Sites

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

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

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

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

12.3.4.3.2 UNESCO Dublin Bay Biosphere

Dublin Bay was initially recognised by UNESCO for its rare and internationally important habitats and species of wildlife. The North Bull Island supports a variety of plants and wildlife including an internationally significant population of Brent geese that overwinters in the bay. UNESCO's concept of a Biosphere has evolved to include not just areas of ecological value but also the areas around them and the communities that live and work within these areas. Dublin Bay Biosphere Reserve now extends to over 300 km2 of marine and terrestrial habitat encompassing North Bull Island and ecologically significant habitats such as the Tolka and Baldoyle Estuaries, Howth Head, Dalkey Island, Killiney Hill and Booterstown Marsh. Over 300,000 people live within the newly enlarged Biosphere.

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

12.3.4.3.3 Special Amenity Area Order

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

Three such special amenity area orders have been recognised in Ireland, all of them in the Greater Dublin Area. They include:

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

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

12.3.5 Habitats

12.3.5.1 Overview

The results of the habitat surveys along the alignment of the Proposed Scheme are described below by habitat type, after Fossitt (Fossitt 2000). The habitats described below relate to habitat areas within or adjacent to the Proposed Scheme, as shown on Figure 12.5 in Volume 3 of this EIAR along with the full habitat survey results. The results and summary of the findings of the aquatic habitat surveys have been incorporated into the relevant habitat descriptions.

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

- Flower beds and borders (BC4);
- Stone walls and other stonework (BL1);
- Buildings and artificial surfaces (BL3);
- Tidal rivers (CW2);
- Exposed sand, gravel or till (ED1);

- Spoil and bare ground (ED2);
- Recolonising bare ground (ED3);
- Depositing / lowland rivers (FW2);
- Amenity Grassland (Improved) (GA2);
- Dry meadows and grassy verges (GS2);
- Residential;
- (Mixed) broadleaved woodland (WD1);
- Scattered trees and parkland (WD5);
- Hedgerows (WL1);
- Treelines (WL2);
- Scrub (WS1); 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.

12.3.5.2 Flower Beds and Borders (BC4)

This habitat includes ornamental planting associated with commercial developments or industrial complexes, and planting at roundabouts and along roadsides in suburban areas. This habitat type was identified in five locations across the Proposed Scheme, the largest areas of this habitat type are located at St. Audoen's Church, R108 High Street and Burke Place, adjacent to Mount Browne Road. Additional areas of this habitat were recorded at St. James Hospital, R839 Grattan Crescent and at the junction of R933 Ballyfermot Road and Clifden Road.

Ornamental species present at this habitat include bedding plants at St. Audoen's Church, R108 High Street, and Burke Place comprising of lavender *Lavandula sp.*, hydrangea *Hydrangea sp.* and rose species *Rosa sp.*

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

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

12.3.5.3 Stone Walls and Other Stonework (BL1)

Stone walls were present in four locations across the Proposed Scheme, comprising either property boundaries or roadside boundaries. The largest area of this habitat was located along at the junction of R839 Grattan Crescent and Sarsfield Road. Additional discrete areas were located at St. Audoen's church, R108 High Street and St. Laurence's Road.

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

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

12.3.5.4 Buildings and Artificial Surfaces (BL3)

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

This habitat type was also found in association with the following habitats; flower beds and borders (BC4), ornamental/non-native shrub (WS3), amenity grassland (GA2), Exposed sand, gravel or till (ED1), spoil and bare ground (ED2), recolonising bare ground (ED3), hedgerows (WL1), and scrub (WS1).

This habitat type is of Negligible Ecological Value due to being a built / artificial surface and devoid of vegetation.

12.3.5.5 Tidal Rivers (CW2)

This habitat type is present in the Liffey Estuary Upper, located adjacent to the terminus of the Proposed Scheme at Winetavern Street. This section of the estuary is approximately 40-45m wide and has an average depth of approximately 4-5m with high retaining quay walls either side of the channel.

The EPA segments of the River Liffey, which are contained within the study area, are Liffey_180 and Liffey_190. Liffey_180 segment is 24.7km and consists of the main channel of the river from Lucan and Chapelizod, the Rusk River tributary (from Dunboyne to Lucan) and a number of other minor tributaries (Hermitage River, Annfield River, Quarryvale River, Astagob River, unnamed River at Carpenterstown, Longmeadow Stream and Glenaulin Stream). Liffey_190 segment is 3.2km between Chapelizod and Islandbridge, consisting of the small section of the main channel of the River Liffey and tributaries, Magazine Stream and Creosote Stream. Both segments catchment contributions are considered to be primarily urban.

The Liffey_180 flows into Liffey_190 and both run almost parallel to the Proposed Scheme, within the 500m study area and travel the whole length of the route, including the point at which it enters the Liffey Estuary Upper adjacent to the Dublin University Boat Club. The Proposed Scheme does not cross Liffey_180, Liffey_190 or Liffey Estuary Upper at any point along its route.

The Liffey_180 has Unassigned WFD status and is At Risk of not achieving Good status by 2027. Significant pressures have been identified including urban wastewater from SWOs and urban runoff from diffuse sources causing nutrient and organic pollution. The Liffey_190 has a Moderate WFD status and is also At Risk of not achieving Good status by 2027. A range of significant pressures in relation to industry have been identified, in addition to waste, urban wastewater from SWOs and urban runoff from diffuse sources.

Liffey Estuary Upper is a transitional waterbody and is within the Liffey Nutrient Sensitive Area. It is fed by the Camac_040, Liffey_190 and Poddle_010 and flows into Liffey Estuary Lower before reaching Dublin Bay. Liffey Estuary Upper has a Good WFD status and is At Risk of not achieving the WFD objective of Good status by 2027, 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 Liffey Estuary Lower is classified as ‘Good’ status for the period 2013 to 2018 and is not deemed ‘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 Liffey Estuary Lower corresponds to the Annex I habitat Estuaries [1130] and its location overlaps with the current favourable reference range and distribution 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 International Ecological Importance.

12.3.5.6 Exposed Sand, Gravel or Till (ED1)

This habitat type was assigned to habitats which consisted of till or boulder clay. An area of exposed sand, gravel or till was identified at R108 High Street and adjacent to Liffey Valley Shopping Centre. This habitat consists of gravel, spoil heaps containing railway ballast and rubble. This habitat type was also found in association with buildings and artificial surfaces (BL3).

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

12.3.5.7 Spoil and Bare Ground (ED2)

This habitat type was present Liffey Valley Shopping Centre, R833 Ballyfermot Road, Con Colbert Road and R839 Grattan Crescent throughout the Proposed Scheme in small areas of bare ground, often associated with access ways, such as gravel driveways. Areas of bare ground, which have recently been sown with grass but are not yet adequately vegetated were also classified as being spoil and bare ground habitat.

Plant species recorded within this habitat include Hawksbeard *Crepis sp*., rosebay willowherb *Chamaenerion angustifolium,* Canadian fleabane *Erigeron canadensis*, fescue *Festuca sp.,* Yorkshire-fog *Holcus lanatus*, ribwort plantain *Plantago lanceolata*, tormentil *Potentilla erecta*, broad-leaved dock *Rumex obtusifolius*, common dandelion *Taraxacum officinale agg*., and common valerian *Valeriana officinalis*.

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

12.3.5.8 Recolonising Bare Ground (ED3)

This habitat type was assigned to areas of disturbed ground and/or artificial surfaces which have been recolonised by plants, and vegetation cover is now greater than 50%. This habitat type was identified in one location at the junction of R810 Old Kilmainham and R811 South Circular Road.

Most of the vegetation recorded were ruderal species commonly found in this habitat type.

Typical species recorded included crepis species, rosebay willowherb, Canadian fleabane, fescue species, Yorkshire-fog, ribwort plantain, tormentil, broad-leaved dock, common dandelion, and common valerian.

This habitat type also occurred in mosaics with the following habitat types; buildings and artificial surfaces (BL3), spoil and bare ground (ED2) and scrub (WS1).

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

12.3.5.9 Depositing / Lowland Rivers (FW2)

This habitat type refers to the Liffey_180 and the Camac_040 which are classified as depositing / lowland rivers. These habitats are present at multiple locations across the Proposed Scheme and are discussed individually below.

The River Camac is a significant tributary of the River Liffey. It rises in the west of Dublin city and flows through Saggart, Clondalkin, Inchicore and Kilmainham before entering the Liffey Estuary Upper just downstream from Heuston Station. The EPA segment of the River Camac within the study area is Camac_040. This section of the River is 13.6km and includes the primary segment of the river from Clondalkin to where it joins the river Liffey at Heuston Station. Segment Camac_040 also includes a number of significant and minor tributaries including; Ballymount Stream, Robinhood Stream, Walkinstown Stream and Drimnagh Castle or Walkinstown Stream. The Proposed Scheme will cross the Camac_040 at Golden Bridge, R810 Emmet Road, Inchicore, where the river flows adjacent to commercial and residential development and has been heavily modified through channelisation. From this point, the river travels along the northern boundary of the Proposed Scheme for approximately 2km, where the landscape changes to scattered trees and parkland (WD5) and trees overhang the waterway as the River Camac flows adjacent to Grattan Crescent Park and Turvey park. It then diverts north to join the Liffey Estuary Upper. The Camac_040 section of the river has a Poor WFD status and is At Risk of not achieving Good status by 2027. A range of significant pressures have been identified, including culverting causing alteration to habitats, urban wastewater from SWOs and urban runoff from diffuse sources. The Camac_040 is classified as ‘Unsatisfactory’ status for the period 2013-2018 and is deemed ‘At Risk’ of failing to meet its requirements under the Water Framework Directive (Matson *et al*. 2019). The most recent Biological Q Value assessment of the River Camac was in 2019. Four stations were monitored along the length of the watercourse, Q3 being the lowest assigned Q Value.

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

12.3.5.10 Amenity Grassland (Improved) (GA2)

Amenity grassland was a commonly recorded habitat across the Proposed Scheme. It is present in small areas located across the entirety of the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat included Drumfinn Avenue, Ballyfermot, De La Salle, Ballyfermot Road, and numerous sites adjacent to the Proposed Scheme along R833 Ballyfermot Road, and adjacent to Fonthill Road at Liffey Valley Shopping Centre.

Grass species present included perennial rye-grass *Lolium perenne*, Yorkshire-fog, wall barley and annual meadow-grass *Poa annua*, while forb species present included yarrow *Achillea millefolium*, burdock *Arctium sp*. common knapweed *Centaurea nigra*, birds-foot trefoil *Lotus corniculatus,* ribwort plantain, creeping cinquefoil *Potentilla reptans,* common ragwort *Jacobaea vulgaris,* common dandelion, white clover *Trifolium repens*, common nettle *Urtica dioica*, yellow-wort *Blackstonia perfoliate,* and red dead-nettle *Lamium purpureum.*

This habitat type often occurred in mosaics with buildings and artificial surfaces (BL3), flower beds and borders (BC4), ornamental / non-native shrub (WS3), treelines (WL2), dry meadows and grassy verges (GS2) and mixed broadleaved woodland (WD1).

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

12.3.5.11 Dry Meadows and Grassy Verges (GS2)

This habitat type is comprised of unmanaged grassland areas including areas of parkland following a low maintenance regime and roadside verges. This habitat type was recorded in nine areas of varying sizes located across the Proposed Scheme. Prominent areas of this habitat were identified at Longmeadow's Park, Sarsfield Road (illustrated in Figure 12.5 in Volume 3 of this EIAR).

Grass species present included perennial rye-grass, Yorkshire-fog, wall barley and annual meadow-grass *Poa annua*, while forb species present included yarrow, burdock, common knapweed, birds-foot trefoil, ribwort plantain, creeping cinquefoil, common ragwort, common dandelion, white clover, common nettle, yellow-wort, red dead-nettle, vetch species *Vicia sp.* and speedwell species *Veronica sp.*

This habitat type also occurred in mosaics with buildings and artificial surfaces (BL3), amenity grassland (GA2) and treelines (WL2).

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

12.3.5.12 Residential

This non-Fossitt classification is used to represent residential properties along the Proposed Scheme corridor and generally consists of a mosaic of buildings and artificial surfaces (BL3), amenity grassland (GA2), flower beds and borders (BC4), ornamental shrubs (WS3) and hedgerows (WL1).

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 Ecological Importance (Lower Value).

12.3.5.13 (Mixed) Broadleaved Woodland (WD1)

This habitat was identified at two locations along the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest area of this habitat type was located bordering Mount La Salle former monastery on R833 Ballyfermot Road, with an additional linear strip of mixed broadleaf woodland present at R833 Coldcut Road associated with roadside planting.

Tree species recorded at these locations include horse chestnut *Aesculus hippocastanum*, alder *Alnus glutinosa,* hazel *Corylus avellana*, holly *Ilex aquifolium*, pine species *Pinus sp.*, hawthorn *Crataegus monogyna*, elder *Sambucus nigra*, and rowan *Sorbus aucuparia*.

Where present understories and ground flora species include burdock, yarrow, common thistle *Circium vulgare,* ivy, Yorkshire-fog, St. John's wort *Hypericum sp.,* rose species *Rosa sp*., smooth sow-thistle *Sonchus oleraceus*, and common nettle.

This habitat type also occurred as a mosaic with amenity grassland (GA2).

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

12.3.5.14 Scattered Trees and Parkland (WD5)

This habitat classification describes areas of scattered trees, standing alone or in small clusters, which are a prominent structural or visual feature of the habitat. This habitat type was identified at eight locations across the proposed scheme associated with 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 Cherry Orchard Hospital, Blackditch Road, St. Laurence's Road, and Liffey Gaels GAA Club at Sarsfield Road.

Tree species identified at these locations include Norway maple *Acer platanoides*, field maple *Acer campestre*, sycamore *Acer pseudoplatanus*, red maple *Acer rubrum,* horse chestnut, grey alder *Alnus incana*, downy birch *Betula pubescens*, red birch *Betula occidentalis,* hornbeam *Carpinus Fastigiata*, ash *Fraxinus excelsior*, London plane *Platanus × acerifolia*, poplar species *Populus sp*., cherry *Prunus Kanzan*, cherry laurel *Prunus laurocerasus*, oak species *Quercus sp*., crack willow *Salix euxina*, willow species *Salix sp*., elder, whitebeam *Sorbus aria,* yew *Taxus baccata*, small-leaved lime *Tilia cordata*, elm species *Ulmus sp.* The understory was commonly comprised of yarrow, ribwort plantain, common dandelion, white clover, common nettle, red dead-nettle, speedwell species, common thistle, ivy, Yorkshire-fog, St. John's wort, rose species, smooth sow-thistle, and common nettle. Grasses present include perennial rye-grass, Yorkshire-fog and wall barley.

This habitat type also occurred in mosaics with treelines (WL2).

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

12.3.5.15 Hedgerows (WL1)

Hedgerows were identified in four 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. Substantial areas of this habitat are present at Liffey Valley Shopping Centre, R833 Coldcut Road and R833 Ballyfermot Road.

The species composition varied greatly within this habitat type. Tree and shrub species consist of Norway maple, field maple, sycamore, horse chestnut, grey alder, downy birch, hornbeam, ash, London plane, poplar species, cherry species, cherry laurel, oak species, willow species, elder, whitebeam, small-leaved lime, hawthorn, brambles *Rubus fruticosus* and dogwood species *Cornus sp.*

Ground flora and forb species consist of colt's-foot *Tussilago farfara,* common nettle, curled dock *Rumex crispus*, ivy, yarrow, and cock's-foot *Dactylis glomerata*.

This habitat type also occurred in mosaics with the following habitats; amenity grassland (GA2), scrub (WS1), ornamental shrubs (WS3), treelines (WL2) and buildings and artificial surfaces (BL3).

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

12.3.5.16 Treelines (WL2)

This habitat is comprised of narrow rows or single lines of trees which are greater than 5m in height. This habitat type was recorded widely across the study area of the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). In the context of the Proposed Scheme, treeline habitat is typically urban street planting along footpaths / strips of amenity grassland and road edges. Substantial areas of this habitat are present at R833 Coldcut Road, R833 Ballyfermot Road, Sarsfield Road and Con Colbert Road.

Species frequently recorded include Norway maple, field maple, sycamore, horse chestnut, birch species, hornbeam, ash, London plane, poplar species, cherry species, oak species, willow species, elder, small-leaved lime and hawthorn.

The understory consists of a variety of species including colt's-foot, common nettle, and curled dock.

This habitat type also occurred in mosaics with amenity grassland (GA2), and treelines (WL2).

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

12.3.5.17 Scrub (WS1)

Scrub was identified in twelve locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat were located at Fonthill Road adjacent to Liffey Valley Shopping Centre, R833 Coldcut Road, Kennelsfort Road Upper and Brookfield Road. These appeared to be undeveloped areas or abandoned sites.

Species recorded consisted of maple species, yarrow, cow parsley *Anthriscus sylvestris*, kidney vetch *Anthyllis vulneraria,* yellow-wort, butterfly bush *Buddleja davidii*, creeping thistle *Cirsium arvense*, common thistle, dogwood species, cotoneaster species, cock's-foot, Canadian fleabane, spurge species *Euphorbia sp*., Yorkshire-fog, St. John's wort species, soft rush *Juncus effusus*, bitter vetch *Lathyrus linifolius,* perennial ryegrass, birds-foot trefoil, greater trefoil *Lotus pedunculatus*, mayweed species *Matricaria sp.,* medick *Medicago lupulina*, ribbed melliot *Melilotus officinalis*, winter heliotrope *Petasites pyrenaicus*, ribwort plantain, tormentil, selfheal *Prunella vulgaris*, Japanese rose, rose species, bramble, broad-leaved dock, goat willow, marsh woundwort *Stachys palustris*, chickweed *Stellaria media*, common dandelion, white clover and gorse *Ulex sp*.

This habitat type also occurred in mosaics with hedgerows (WL1).

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

12.3.5.18 Ornamental / Non-Native Shrub (WS3)

Areas of ornamental / non-native shrub were generally associated with amenity and landscape planting at commercial properties. Substantial areas of this habitat type bordered areas of buildings and artificial surfaces habitat at Liffey Valley Shopping Centre, Fonthill Road, R833 Ballyfermot Road and R810 Emmet Road.

Species identified include maple species, purple maple *Acer palmatum 'Atropurpureum',* spotted laurel *Aucuba japonica*, dogwood species, cotoneaster species, fuchsia species *Fuschia sp*., St. John's wort species, holly, lavender species, cherry, cherry laurel, Japanese rose, rose species, and small-leaved lime.

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

12.3.6 Rare and Protected Plant Species

Protected plant species listed on the Flora (Protection) Order, 2015 were not identified within the footprint of the Proposed Scheme during field surveys.

The desk-based review returned records of a total of six species listed on the Flora (Protection) Order across the study area (i.e. Grid Squares O03, O13) and are listed in Appendix 12.1 in Volume 4 of this EIAR. Records within close proximity to the Proposed Scheme include one record of betony *Betonica officinalis*, hairy violet *Viola hirta* and meadow barley *Hordeum secalinum* within 1km north of the Proposed Scheme, at Phoenix park (Grid O1034), and multiple records of opposite-leaved pondweed *Groenlandia densa* south of the Proposed Scheme at the Grand canal. Both hairy violet and meadow barley have 'red list status' on Irelands Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al.*2016).

One species listed as 'Vulnerable' within Ireland's Red List No. 10: Vascular Plants (Wyse Jackson *et al.* 2016) was returned from the desk study within 1km of the Proposed Scheme. Records of yellow archangel *Lamiastrum galeobdolon* subsp. *montanum* were recorded at Islandbridge approximately 365m north of the Proposed Scheme. This species was not recorded within the footprint of the Proposed Scheme during the field surveys.

Three species listed as within Ireland Red List No. 8: Bryophytes (Lockhart *et al.* 2012) were returned from the desk study within 1km of the Proposed Scheme. Records of lance-leaved pottia *Tortula lanceola*, classified as "Critically Endangered" and returned three historical records in Leixlip and in Grid O13. Tall aloe-moss *Aloina ambigu*a, classified as "Endangered" returned one record at Grid O13. Thread-moss *Bryum torquescens*, classified at "Vulnerable", returned two records at Grid O03 of the Proposed Scheme. These species were not recorded within the footprint of the Proposed Scheme during the field surveys.

12.3.7 Non-Native Invasive Plant Species

There was one non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 identified along the Proposed Scheme. The locations of this non-native invasive plant species are summarised below in Table 12.7 and shown on Figures 12.6 in Volume 3 of this EIAR.

The desk study returned records of a total of 19 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 across the wider study area (i.e. Grid Squares O03, O13) and are listed in Appendix A12.1 in Volume 4 of this EIAR. Records within 1km of the Proposed Scheme include 13 listed species (NBDC 2020). These species were not present within the footprint of the Proposed Scheme.

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
CBC0007IAPS001	Japanese knotweed *Reynoutria japonica*	Stand observed in a private property along St. Laurence's Road.
CBC0007IAPS002	Japanese knotweed *Reynoutria japonica*	Stand observed in a private property along St. Laurence's Road.
CBC0007IAPS003	Japanese knotweed *Reynoutria japonica*	Stand observed in a private property along St. Laurence's Road.
CBC0007IAPS004	Japanese knotweed *Reynoutria japonica*	Stand observed in a private property opposite Liffey Gaels GAA Club, Kilmainham adjacent to Sarsfield Road R833.

12.3.8 Mammals

12.3.8.1 Bats

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

Bat surveys were carried out across four seasons between 2018 and 2021 (as described in Section 12.2.3.5 in the preparation of this EIAR. Three transects were surveyed within the footprint of the Proposed Scheme, including along the R833 Coldcut Road adjacent Palmerstown Lawn, referred to as CBC0007BT001, along R833 Ballyfermot Road adjacent to Markievicz Park, referred to as CBC0007BT002 and along R839 Grattan Crescent adjacent to Grattan Crescent Park, referred to as CBC0007BT003. The results of these are described in Section 12.3.8.1.1 to Section 12.3.8.1.8. The results of these surveys are also presented in Figures 12.7.1 in Volume 3 of this EIAR. Transect routes CBC0007BT002 (Markievicz Park) and CBC0007BT003 (Grattan Crescent Park) were

subject to three survey seasons between 2019 and 2020 to accommodate scheme changes. While CBC0007BT002 was subject to additional surveys in 2021 to capture additional land take proposed at Mount La Salle Convent along R833 Ballyfermot Road adjacent to Markievicz Park.

The structure of this section is such that each bat species is described in turn. The results of the various surveys are presented to allow an understanding of each species in terms of its distribution across the Proposed Scheme.

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

12.3.8.1.1 Leisler's Bat *Nyctalus leisleri*

Leisler's bat was recorded in two of the three transects surveyed between 2019 and 2021; CBC0007BT002 (Markievicz Park) and CBC0007BT003 (Grattan Crescent Park). A total of 10 recordings of Leisler's bat were identified in these locations between 2019 and 2020. Leisler's bat activity was highest along CBC0007BT003 (Grattan Crescent Park), with six bat passes attributed to this species occurring along treelines here. All activity at CBC0007BT003 (Grattan Crescent Park) was recorded in the spring of 2020 with no activity observed in autumn 2019 or summer 2020. At CBC0007BT002 (Markievicz Park) the majority of activity was recorded in autumn of 2019 with no activity observed in spring or summer survey season in 2020, while 6 bat passes attributed to this species were recorded in the summer 2021 surveys. 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). This includes two records of live sightings within 1km of the proposed scheme, these include records at Kylemore Drive, Ballyfermot in 2011 (Grid O098331) and at Suir Road in 2008 (Grid O1233) (NBDC 2020).

12.3.8.1.2 Common Pipistrelle Bat *Pipistrellus pipistrellis*

Common pipistrelle bat was recorded in all three of the transects surveyed between 2018 and 2021; CBC0007BT001 (Palmerstown Lawn), CBC0007BT002 (Markievicz Park) and CBC0007BT003 (Grattan Crescent Park). A total of 20 recordings of common pipistrelle bat were identified in these locations between 2018 and 2021. Common pipistrelle bat activity was highest at CBC0007BT003 (Grattan Crescent Park), with eight bat passes attributed to this species occurring here. Common pipistrelle bat activity was highest in autumn 2019 at CBC0007BT002 (Markievicz Park) and CBC0007BT003 (Grattan Crescent Park) with a combined total of 12 bat passes along both transects. CBC0007BT001 (Palmerstown Lawn), had one bat pass attributed to common pipistrelle bat in 2018 and there were two bat passes attributed to this species along CBC0007BT002 (Markievicz Park) in summer of 2020. No activity was recorded for spring 2020 at any of the three transects. The summer 2021 surveys at CBC0007BT002 (Markievicz Park) recorded five bat passes attributed to this species. The results of the bat surveys as they relate to the 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). This includes one record of live sightings within 1km of the proposed scheme, these include records at Liffey Valley Grid O070350 (NBDC 2020).

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 2km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes live records at Grand canal (NBDC 2020).

12.3.8.1.4 Soprano Pipistrelle Bat *Pipistrellus pygmaeus*

Soprano pipistrelle bat was recorded in two of the three transects surveyed between 2018 and 2020; CBC0007BT002 (Markievicz Park) and CBC0007BT003 (Grattan Crescent Park). There was one bat pass attributed to soprano pipistrelle bat identified at this location between 2018 and 2020, while there was five bat passes attributed to soprano pipistrelle identified at this location during the summer 2021 surveys. There was one bat pass attributed to soprano pipistrelle along CBC0007BT003 (Grattan Crescent Park), in spring 2020. 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 common pipistrelle bat were recorded during any of the surveys for the Proposed Scheme.

The desk study found that soprano pipistrelle bats are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes two records of live sightings within 1km of the proposed scheme, these include records at Liffey Valley (Grid O070350) and at Palmerstown (Grid O0834) (NBDC 2020).

12.3.8.1.5 Unidentified Pipistrelle Species

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

Unidentified pipistrelle bat passes were recorded in two locations surveyed between 2018 and 2021; CBC0007BT002 (Markievicz Park) and CBC0007BT003 (Grattan Crescent Park). A total of four unidentified bat passes were recorded in these locations between 2018 and 2020. There were two unidentified pipistrelle bat passes along CBC0007BT003 (Grattan Crescent Park) in autumn 2019. There were eight unidentified pipistrelles bat passes recorded along CBC0007BT002 (Markievicz Park); one in autumn 2019, one in spring 2020 and six in summer 2021. No activity was recorded for unidentified pipistrelle bats in 2018 or summer 2020. The results of the bat surveys as they relate to the unidentified pipistrelle bats are shown on Figure 12.7.1 in Volume 3 of this EIAR.

12.3.8.1.6 Brown Long-Eared Bat *Plecotus auratus*

Brown long-eared bat was not recorded across the study area of the Proposed Scheme during 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). This includes a record of one live sighting in Phoenix Park in 2007 (NBDC 2020).

12.3.8.1.7 Myotis Bat Species

Myotis bat species was identified in one location surveyed between 2018 and 2021 along CBC0007BT003 (Grattan Crescent Park). There was one unidentified *Myotis* species bat pass recorded in autumn 2019. The results of the bat surveys as they relate to *Myotis* bats are shown on Figure 12.7.1 in Volume 3 of this EIAR.

The desk study found that Daubenton's bat *Myotis daubentoniid* 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 records of live sightings of Daubenton's bat at Liffey Valley (Grid O070350) and Phoenix Park (Grid O117341) (NBDC 2020).

12.3.8.1.8 Potential Roost Features

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

Table 12.8: Summary of PRFs Recorded Within the Footprint of the Proposed Scheme

Reference	Species	Description
CBC0007PRF001	London Plane *Platanus x acerifolia* (Mature)	Knotholes
CBC0007PRF002	London Plane *Platanus x acerifolia* (Mature)	Cavities + knotholes

Note: A description of each different type of PRF is provided in Table 17.10 of Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals (Andrews 2018).

12.3.8.2 Badger

Badger, and their breeding and resting places, are legally protected under the Wildlife Acts.

No evidence of badger (e.g. setts or evidence of badger activity) were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme.

Despite this, badger are widely distributed throughout the GDA, often utilising public gardens and residential gardens. The desk study returned two records of badger located within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes roadkill at Con Colbert Road (Grid O116339) in 2016 and at the War Memorial Gardens (Grid O1133) (NBDC 2020). 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 Ecological Importance (Higher Value) due to the known presence of resident populations within the wider environment of the Proposed Scheme, and are valued as being of local importance as they are a Wildlife Act protected species.

12.3.8.3 Otter

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

No evidence of otter activity (e.g. sprainting posts), holts or couch sites were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme.

The desk study found that otter are known to occur within 1km of the Proposed Scheme, and across the wider study area along the River Liffey, the River Camac and the Grand Canal. Records of otter were returned along the Grand Canal at Suir Road and the River Liffey at Frank Sherwin Bridge, Chapelizod Road and downstream at Grand Canal Dock and the east-link toll bridge. The desk study did not return records for otter along the River Camac within close proximity to the Proposed Scheme. Otter are known to utilize upstream sections of the river at sites adjacent to Lansdowne Valley Park. The desk study did not return records for otter along the River Poddle within close proximity to the Proposed Scheme. Otter are known to utilize upstream sections of the river at Tymon Park, approximately 8.6km upstream of the Proposed Scheme. The River Liffey is known to support a local otter population with clusters of otter activity observed upstream of the Proposed Scheme at Waterstown Park, Palmerstown (Grid O088357), near Heuston Station (O136343), on Usher's Quay (O145342), and adjacent to the Proposed Scheme at War memorial gardens (Grid O121342). Records of otter have been the Grand Canal between Devoy Road (Grid O115329) and Inchicore at Suir Road (Grid O127331).

In an Irish context, the conservation concern of otter is 'Least Concern' (Marnell *et al*. 2019) due to population recoveries since 2009, however remains 'Near Threatened' at a European and Global context (IUCN Red List) (Roos *et al*. 2021) and is listed on Annex II and Annex IV of the Habitats Directive.

The Wicklow Mountains SAC is the closest European site designated for otter, located approximately 20km upstream of the Proposed Scheme (from the Liffey Estuary Lower) and is located within a different sub-catchment (Dodder_SC_010) to the Proposed Scheme (Liffey_SC_090). 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 interacts with the following watercourses: River Camac (Camac_040), Quarryvale Stream (Liffey_180), River Liffey (Liffey_180 & Liffey_190), Liffey Estuary Upper and Liffey Estuary Lower. Whilst these watercourses lie within the typical territorial ranges of otters, none of them share any hydrological connection to the Wicklow Mountains SAC- it is the River Dodder which provides the key hydrological pathway between the Wicklow Mountains SAC and Dublin City. Given the separation which exists between the Wicklow Mountains SAC and the Proposed Scheme the otter population in the vicinity of the Proposed Scheme is regarded to be distinct to that of the 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*. 2019), otters are known to occur across fourteen watercourses and the coastal habitat fringe across the Dublin City Council jurisdiction. Rivers which were subject to less human disturbance, and therefore held better quality otter habitat (e.g. Rivers Dodder, Tolka, Owenadoher, Liffey and Whitechurch), accounted for the majority of otter signs. Other watercourses, which are subject to greater anthropogenic pressures, such as the Litte Dargle, Camac, Santry, Slang and Poddle appeared to support far fewer otters (Macklin *et al*. 2019). It is therefore apparent that otters are abundant in the watercourses in and around Dublin City, particularly in areas with healthier fish stocks and which are more removed from anthropogenic pressures.

The Proposed Scheme will cross one watercourse; the River Camac, and will interact with the River Liffey via surface water discharges. Furthermore, the Proposed Scheme lies in close proximity to the Liffey Estuary Upper at its terminus near High Street. 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. 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 distinct from the Wicklow Mountains SAC population, is unlikely to be in the region of 1% of the national population, is known to be abundant in watercourses in and around Dublin City and is likely to be >1% of the County population.

12.3.8.4 Marine Mammals

The Proposed Scheme will terminate at R108 High Street approximately 200m from Liffey Estuary Upper. There were no dedicated marine mammal surveys carried out as part of the assessment due to the Proposed Scheme being located inland.

Harbour seal, grey seal, and harbour porpoise are known from Dublin Bay and these species are all protected under the Wildlife Acts and Annex II and Annex IV of the Habitats Directive while all cetacean species are also listed on Annex IV of the Habitats Directive. Harbour porpoise is a QI species designated as part of Rockabill to Dalkey Island SAC which is located approximately 12.1km east of the Proposed Scheme. Harbour seal and grey seal are listed QI species designated as part of Lambay Island SAC which is located 22.5km north 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 a 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 are considered to be of high conservation concern.

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

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

Bottle-nosed dolphin is common to Irish coastlines, particularly the west coast, throughout the year and are infrequently recorded within Dublin Bay. 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. This species is protected under Annex II and Annex IV of the Habitats Directive and the Wildlife Acts and as such the local population is valued as National Importance.

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

12.3.8.5 Other Mammal Species

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

- Pine Marten *Martes martes;*
- Red Squirrel *Sciurus vulgaris;* and
- Hedgehog *Erinaceus europaeus.*

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

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

12.3.9 Birds

12.3.9.1 Breeding Birds

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

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

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 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 67 breeding bird species across the study area (i.e. Grid Squares O03, O13). Records included 54 SCI species, 26 species listed under Annex I of the Birds Directive, and an additional 33 Red Listed and 55 Amber Listed species. This includes 19 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme.

Several bird species for which records were returned in the desk study are those typically found in coastal, estuarine and intertidal habitats, such as the Liffey Estuary and Dublin Bay. Many gull, auk, shearwater and tern species breed in steep inaccessible cliffs (i.e. Howth Head), offshore islands and Dublin Port. Seabirds such as terns, guillemots and kittiwakes nest on the cliffs and crevices of Rockabill Island SPA (Birdwatch Ireland 2020). Fulmar, shag, razorbill and gannet nest on the cliffs of Irelands Eye SPA, which also has numbers of large *larus* gulls, cormorant and puffin (Merne and Madden 2000). Gulls favour nesting along coasts on shingle and cliffs but may utilise inland public areas for scavenging and buildings for roof nesting (Birdwatch Ireland 2020). As such, some gull species may utilise buildings within the footprint of the Proposed Scheme for nesting. However, the majority of other species are not deemed likely to breed within the footprint of the Proposed Scheme.

The majority of records along the Proposed Scheme comprise bird species common to suburban habitats (including residential and parkland areas), such as gull and garden bird species. Residential habitats and parkland habitats were observed in several locations across the Proposed Scheme including Cherry Orchard hospital, Blackditch Road, Markievicz Park, Longmeadow's Park, St. Mary's Avenue, Grattan Crescent Park and War Memorial Park. These species therefore are likely to use lands within the footprint of the Proposed Scheme for breeding.

Breeding species which are associated with buildings were returned from the desk study including starlings, swifts, house martins and raptors (Birdwatch Ireland 2020), these species occurred across the larger study area (i.e. Grid Squares O13 and O03) and may therefore utilise buildings outside the footprint of the Proposed Scheme. There are records of kestrel at Palmerstown, sparrowhawk at Liffey Valley Park and Heuston Station, and Peregrine falcon at Oblate Park and Liffey Valley Park, as such these species may therefore utilise open green spaces and trees adjacent to the Proposed Scheme. No suitable habitat was identified for merlin within the footprint of the Proposed Scheme and desk study records of this species were confined to coastal areas (i.e. Grid Squares (O13) and therefore this species is not deemed likely to breed within the footprint of the Proposed Scheme.

Several species of warblers and raptors which favour woodlands, agricultural lands and upland heathland areas were identified during the desk study (Appendix A12.1. in Volume 4 of this EIAR). Agricultural lands and open areas were identified at locations north and west of the Proposed Scheme. As such, some of these species may utilise the lands at these locations. Due to the urban locality of the Proposed Scheme, these habitat types are not present or are highly fragmented. Suitable open habitat is located approximately within 1km north of the Proposed Scheme, within Phoenix Park and Farmleigh Woods. As such, these species are not deemed to be present in significant numbers, however they may be present in larger woodland areas surrounding the Proposed Scheme i.e. Longmeadow's Park, St. Mary's Avenue, Grattan Crescent Park, Chapelizod Bypass, War Memorial Gardens, and Royal Hospital Kilmainham (Birdwatch Ireland 2020).

Species that are known to utilise freshwater lakes, ponds, canals, and rivers in urban habitats include waterfowl, wagtails, swans, ducks, grey herons, little egrets, little grebe and kingfisher (Appendix A12.1 in Volume 4 of this EIAR). Suitable habitats located within close proximity to the Proposed Scheme include: the River Liffey at Irish National War Memorial Gardens with known populations of mute swan, wagtails and kingfisher; the River Annfield at Old Lucan Road, and the River Camac at Kilmainham containing populations of waterfowl, wagtails and park and garden birds.

Rivers are important nesting and foraging sites for kingfisher and many of the species listed below within the vicinity of the Proposed Scheme (Table 12.9). The Proposed Scheme will cross the Camac_040 at R810 Emmet Road.

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
Common kestrel *Falco tinnunculus* (K.)	Palmerstown O03X	Red (B)	-	
Common kingfisher *Alcedo atthis* (KF)	Palmerstown O0933	Amber (B)	✓	River Boyne and River Blackwater SPA c.27.8km
Common linnet *Carduelis cannabina* (L.)	Across the Proposed Scheme	Amber (B)	-	
Common snipe *Gallinago gallinago* (SN)	Palmerstown Lower Grid O081356	Red (B/W)	-	
Common starling *Sturnus vulgaris* (SG)	Across the Proposed Scheme	Amber (B)	-	
Common swift *Apus apus* (SI)	Kilmainham Grid O13G Liffey Valley Park O083357	Red (B)	-	
Eurasian sparrowhawk *Accipiter nisus* (SH)	Heuston Station Grid O134342 Liffey Valley Park Grid O083357	Green (B)	-	
European greenfinch *Carduelis chloris* (GR)	Across the Proposed Scheme	Amber (B)	-	
European robin *Erithacus rubecula* (R.)	Across the Proposed Scheme	Green (B)	-	
Goldcrest *Regulus regulus (*GC)	Across the Proposed Scheme	Amber (B)	-	
Grey heron *Ardea cinerea* (H.)	Throughout the River Liffey	Green (B)	-	Wexford Harbour and Slobs SPA approximately95.7km
Grey wagtail *Motacilla cinerea* (GL)	Liffey Valley Park Grid O083357	Red (B)	-	
House martin *Delichon urbicum* (HM)	Liffey Valley Park Grid O083357	Amber (B)	-	
House sparrow *Passer domesticus* (HS)	Liffey Valley Park Grid O083357	Amber (B)	-	
Little egret *Egretta garzetta* (ET)	Chapelizod Grid O122339 War Memorial Garden Grid O122339	Green (B)	✓	
Little grebe *Tachybaptus ruficollis* (LG)	Palmerstown Grid O0935	Green (B/W)	-	Wexford Harbour and Slobs SPA approximately 95.7km
Mallard *Anas platyrhynchos* (MA)	Rive Liffey Grids O063357 & O135343	Amber (B)	-	Dundalk Bay SPA c.56.6km
Meadow pipit *Anthus pratensis* (MP)	Liffey Valley Park Grid O083357	Red (B)	-	
Mistle thrush *Turdus viscivorus* (M.)	Liffey Valley Park Grid O083357	Green (B)	-	
Mute swan *Cygnus olor* (MS)	River Liffey Grid O135343	Amber (B/W)	-	
Peregrine falcon *Falco peregrinus* (PE)	Oblate Park Grid O1133 Liffey Valley Park Grid O0835	Green (B)	✓	Wicklow Mountains SPA c.11.6km
Skylark *Alauda arvensis* (S.)	Liffey Valley Park Grid O083357	Amber (B)	-	
Stonechat *Saxicola torquata* (SC)	Palmerstown Grid O03S	Green (B)	-	

12.3.9.2 Wintering Birds

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

Wintering bird surveys were carried out for the Proposed Scheme at three locations; adjacent to Ballyfermot College of Further Education (BCFE) on R112 Kylemore Road referred to as CBC0007WB001, at Longmeadow's Park on Sarsfield Road, referred to as CBC0007WB002 and at Liffey Gaels GAA Club grounds on Con Colbert Road referred to as CBC0007WB003, see Figure 12.1.2 in Volume 3 of this EIAR. Wintering bird surveys were

terminated mid-season for CBC0007WB001 following removal of this site as a potential construction compound. Species identified included herring gull, black-headed gull and common gull. Geese droppings were recorded on CBC0007WB003 twice over the course of the surveys undertaken during the 2021/22 winter survey.

Table 12.10 provides a summary of the findings of the winter bird surveys with respect to those species which are of highest conservation concern, and were recorded within winter bird survey sites.

Table 12.10: Wintering Birds of Conservation Concern Recorded at Sites CBC0007WB001, CBC0007WB002 and CBC0007WB003 During the Wintering Bird Survey

Common Name / Scientific Name / BTO Code	Activity and Distribution in the Study Area 2020 / 2021	Activity and Distribution in the Study Area 2021 / 2022	Conservation Importance		
			BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Herring gull / *Larus argentatus* (HG)	Two individuals feeding on the grassland adjacent to the BCFE CBC0007WB001	12 individuals foraging on grassland within Liffey Gaels GAA Club grounds at CBC0007WB003 (21/12/2021)	Amber (B)	-	Ireland's Eye SPA [004117]
Black-headed gull *Chroicocephalus ridibundus* (BH)	Two individuals foraging on grassland within Liffey Gaels GAA Club grounds at CBC0007WB003	19 birds loafing within Liffey Gaels GAA Club grounds at CBC0007WB003 (09/03/2022)	Amber (B/W)	-	✓
Common Gull *Larus canus* (CM)	Single individual foraging on grassland within Liffey Gaels GAA Club grounds at CBC0007WB003	Nine birds foraging on grassland within Liffey Gaels GAA Club grounds at CBC0007WB003 (28/02/2022)	Amber (B/W)	-	✓

Site conditions at BCFE (CBC0007WB001) were characterised by well-maintained amenity grassland managed through regular mowing. Grassland at Longmeadow (CBC0007WB002) was not regularly maintained by mowing and the site was partially covered by asphalt during the survey season. There was no access into this site and observations were made with binoculars through the fencing. No birds were recorded at CBC0007WB002 throughout the survey period. Liffey Gaels GAA Club grounds (CBC0007WB003) comprised recreational pitches, maintained through regular cutting. Disturbance was noted as high on this site due to animals (dogs off leash and horse grazing / walking), evidence of vehicles (motocross and quad bikes) and public disorder activities (fireworks and large material littering) being frequent.

A total of 294 light-bellied Brent goose droppings were recorded on CBC0007WB003 on the 21/12/2021 and 16 light-bellied Brent goose droppings were recorded here on 28/02/2022. No goose droppings were recorded here during the 2020-2021 survey season. This data suggests that the Liffey Gaels GAA pitches have recently started to be used on an infrequent basis by irregular numbers of light-bellied Brent geese, for foraging / loafing purposes. The inconsistency of recorded use of the site suggests that it is not a significant inland foraging resource for this SCI bird species and is more likely to be use sporadically / infrequently.

Wintering bird activity was low across all visits, see Figure 12.8 in Volume 3 of this EIAR for full survey results. Table 12.11 compares peak counts identified across surveys to their national and international populations.

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

Common Name / Scientific Name / BTO Code	Peak Count 2020 / 2021	Peak Count 2021 / 2022	Associated European Sites Within the ZoI	1% of International Population	1% of National Population
Herring gull *Larus argentatus* (HG)	2	12	Ireland's Eye SPA Lambay Island SPA Skerries Islands SPA	14,400	n/a
Black-headed gull *Chroicocephalus ridibundus* (BH)	2	19	South Dublin Bay and River Tolka Estuary SPA c.3.3km	31,000	n/a
Common Gull *Larus canus* (CM)	1	9	Dundalk Bay SPA c.58.5km	16,400	n/a

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 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 38 wintering bird species across the study area (Grid Squares O03, O13). Records included 54 SCI species, 26 species listed under Annex I of the Birds Directive, and an additional 33 Red Listed and 55 Amber Listed species. This includes 19 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme.

Records for wintering bird species returned in the desk study are those typically found in coastal, estuarine and intertidal habitats, such as the Liffey Estuary and Dublin Bay. These largely include seabirds, waders, waterfowl, ducks, geese, and gulls. With the exception of geese, gulls and waders utilising inland feeding sites throughout the winter months, these species are unlikely to utilise lands adjacent to the Proposed Scheme in large numbers.

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

The wider study area of Dublin Bay, located approximately 3.7 km east of the Proposed Scheme, is considered of significant ornithological importance as it supports an Internationally Important population of light-bellied brent goose, the SCI species may use open parkland and grassland adjacent to the study area for foraging purposes. A review of a study into light-bellied brent goose inland feeding sites (Scott Cawley Ltd. 2017) has identified one known inland wintering bird feeding sites within approximately 300m of the Proposed Scheme, at Ballyfermot / Le Fanu Park. The importance of terrestrial feeding sites have been categorised as follows:

- A site is considered to be of major importance if a peak count of site over 400 geese has been previously recorded at that site;
- A site is considered to be of high importance site if a peak count of between 51 to 400 geese has been previously recorded at that site;
- A site is considered to be of moderate importance if a peak count of between 1 to 50 geese has been previously recorded at that site (Benson 2009); and
- The Ballyfermot / Le Fanu Park wintering bird feeding site is approximately 150m south of R833 Ballyfermot Road and of major importance for brent goose.

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 Larus ridibundus (BH)	River Liffey Grid O134	Amber (B)	-	South Dublin Bay and River Tolka Estuary SPA c.7.2km
Common coot Fulica atra (CO)	Phoenix park O127347 Grand canal Grid O138326	Amber (B/W)	-	Lough Ennell SPA c.60.9km
Common Pochard Aythya ferina (PO)	Phoenix Park Grid O13H	Red (W)	-	Lough Ennell SPA c.60.9km
Common redshank Tringa totanus (RK)	Adamstown Grid O03G	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 4.2km
Common snipe Gallinago gallinago (SN)	Palmerstown Lower Grid O081356	Red (B/W)	-	-
Eurasian teal Anas crecca (T.)	Phoenix Park Grid O13C	Amber (B/W)	-	North Bull Island SPA c.7.3km
Eurasian wigeon Anas Penelope (WN)	Phoenix Park Grid O13C & O13H	Amber (W)	-	The Murrough SPA c.31.4km
Great black-backed gull Larus marinus (GB)	River Liffey Grid O135343 Liffey Valley Park Grid O083357	Green (B)	-	-
Herring Gull Larus argentatus (HG)	Heuston station Grid O1334	Amber (B/W)	-	Ireland's Eye SPA c.15.8km
Lesser Black-backed Gull Larus fuscus (LB)	Kilmainham Grid O1334	Amber (B/W)	-	Lambay Island SPA c.17.5km
Light-bellied brent goose *Branta bernicla* (BG)	Ballyfermot / Le Fanu Park Grid O0933	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA (c.3.9km)
Little egret Egretta garzetta (ET)	Chapelizod Grid O122339 River Liffey Lucan Grid O033355	Green (B)	✓	-
Little grebe Tachybaptus ruficollis (LG)	Phoenix Park Grid O127347 Palmerstown Grid O0935 Grand canal Grid O138326	Green (B/W)	-	Wexford Harbour and Slobs SPA approximately 95.7km

12.3.10 Reptiles

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

The desk study did not return records of common lizard within the wider study area. This species is strongly associated with heathland and coastal dune habitats; neither habitat types were identified within the Proposed Scheme boundary (Marnell 2002; Farren *et al.* 2010). However, it cannot be ruled out that these species are not in the wider study area.

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

12.3.11 Amphibians

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

Suitable amphibian habitat (i.e. vegetated river banks, surface water / drainage features with stagnant, relatively unpolluted water) was identified within the footprint of the Proposed Scheme. This includes scattered areas of vegetated riverbank along the Camac_040 and Liffey_190.

The desktop study returned records for common frog and smooth newt within 1km of the Proposed Scheme. This includes records of common frog at Kenelsfort Road Upper and records of smooth newt at Phoenix Park (NPWS 2019a; NPWS 2019c).

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

12.3.12 Fish

Fish species are protected under the Fisheries Acts and by fishing by-laws. Atlantic salmon, river lamprey and the brook lamprey are listed on Annex II of the EU Habitats Directive. Fish surveys were not carried out as part of the field surveys.

The Proposed Scheme will lie within the Liffey_SC_090 catchment. The EPA segments of the River Liffey which are contained within the study area are Liffey_180 and Liffey_190. Liffey_180 segment is 24.65km and consists of the main channel of the River Liffey from Lucan and Chapelizod. The River Liffey was surveyed by Inland Fisheries Ireland (IFI) during the monitoring season in 2014. Monitoring locations were at Lucan approximately 12km upstream of the Proposed Scheme with the site assigned an Ecological Fish Status of 'Good' (Kelly *et al.* 2015).

The River Camac catchment was surveyed by IFI in September 2017. Monitoring locations within close proximity to the Proposed Scheme included Yellow Meadow's, approximately 4.3km upstream of the Proposed Scheme and Lansdowne Valley approximately 30km upstream of the Proposed Scheme, with sites assigned an Ecological Fish Status of 'Moderate' and 'Poor' respectively (Matson *et al.* 2019). The River Camac forms a number of stocked fishing lakes in Corcaigh Park, Clondalkin (Angling Ireland, Corkagh Park Fishery),

The Camac_040 discharges into the Liffey Estuary Upper.

12.3.12.1 Salmonid Species

The desk study returned records for Atlantic salmon on the River Camac and Lower Liffey Estuary (Kelly *et al.* 2012). The River Liffey is a highly significant regional salmonid catchment for species of Atlantic salmon.

The River Camac is a recognised salmonid system, under significant ecological pressure as a result of its largely urban situation. Although considerable sections of main channel are culverted, lengths of this river that remain on the surface invariably support self-sustaining populations of brown trout *Salmo trutta* (Matson *et al*. 2018).

Atlantic salmon are valued as being of National Importance.

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

12.3.12.2 Lamprey Species

The desk study returned records for lamprey species on the River Camac and River Liffey (in the case of river Lamprey *Lampetra fluviatilis* only) (Kelly *et al*. 2012; IFI 2010). IFI surveys carried out during 2017 found Lamprey upstream of the Proposed Scheme in low numbers (Matson, *et al*. 2019). The River Camac is reported to contain juvenile lamprey, with suitable habitat located approximately 6.8km upstream of the Proposed Scheme at Corkagh Park (King *et al.* 2011). The desk study for the River Poddle returned no records for lamprey species.

Lamprey species are valued as being of National Importance.

12.3.12.3 European Eel

The desk study returned records for European eel *Anguilla Anguilla* on the River Camac at Riverside, Clondalkin approximately 4.9km upstream from the Proposed Scheme (King *et al.* 2011). The Liffey estuary serves as the natural linkage for eels migrating between freshwater and ocean environments, providing the necessary habitat for their transition.

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). The Liffey estuary serves as the natural linkage for European eel migrating between freshwater and marine environments.

European eel populations are valued as being of National Importance.

12.3.12.4 All Other Fish Species

Water sampling undertaken along the River Camac by IFI during 2011 resulted very low fish diversity, with only minnow *Phoxinus Phoxinus*, and three spined stickleback *Gasterosteus aculeatus*. The River Poddle returned low fish species diversity with three spined stickleback alone being recorded. Fish sampling records from the River Liffey included common goby *Pomatoschistus microps*, flounder *Platichthys flesus*, gadoid species, perch *Perca fluvialtilis*, pike *Esox lucius*, roach *Rutilus rutilus* and three-spined stickleback.

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

12.3.13 Invertebrates

12.3.13.1White Clawed Crayfish

White-clawed crayfish are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive. Ireland remains the only part of the EU with no introduced species of crayfish, as such is of key conservation concern.

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. The desk study shows that White-clawed Crayfish are known to occur within approximately 4km upstream of the Proposed Scheme, with a live record identified along the River Camac at Clondalkin (see Appendix 12.1 in Volume 4 of this EIAR). Healthy, white-clawed crayfish populations are known in the River Camac and selected tributaries upstream of the Proposed Scheme (Triturus 2020; Sweeney 2018). Due to the culverted nature of the Camac_040 at the crossing point of the Proposed Scheme, there is no suitable habitat for white-clawed crayfish within the footprint of the Proposed Scheme, or downstream of the Camac_040 crossing point. 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. The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned no records for freshwater mollusc species and will not be considered further.

12.3.13.3 Marsh Fritillary

The Marsh fritillary butterfly *Euphydras aurina* is legally protected under Annex II of the Habitats Directive. Surveys for marsh fritillary were not carried out as part of this assessment owing to the lack of likely suitable habitat. In an Irish context, the conservation status of this species in Ireland is designated as 'Vulnerable' (Regan *et al.* 2010).

The desk study (see Appendix A12.1 in Volume 4 of this EIAR) did not return records for marsh fritillary within the footprint of the Proposed Scheme. Desk study records in the wider area were largely historical (pre-1980s). Recent records for marsh fritillary were identified 7.8km east of the Proposed Scheme in North Bull Island.

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. These habitats were not recorded within the footprint of the Proposed Scheme. As such, marsh fritillary is not considered further in the assessment.

12.3.13.4 Other Invertebrates

The desk study returned records for 19 species listed on Ireland Red List No. 4 (Regan *et al.* 2010), Ireland Red List No. 6 (Nelson *et al.* 2011), and Regional Red List of Irish Bees 2006 (Fitzpatrick *et al*. 2006) within Grids O03 and O13 (see Appendix A12.1 in Volume 4 of this EIAR).

Butterfly are known to favour nectar-rich flowers which provide larval foodplants, preferred species include cock's-foot grass *Dactylis glomerata*, bird's-foot trefoil *Lotus corniculatus*, common nettle *Urtica dioica*, cuckoo flower *Cardamine pratensis*, garden nasturtium *Tropaeleum majus*, common holly *Ilex aquifolium* and common ivy *Hedera helix* (Butterfly Conservation Ireland 2020).

Corresponding habitats along the Proposed Scheme are located in parkland with scattered trees (WD5), dry meadows and grassy verges (GS2) and amenity grasslands (GA2); present within Royal Hospital Kilmainham and the Irish National War Memorial Gardens, and also in smaller areas along sections of Con Colbert Road, Kennelsfort Road lower, Drumfinn Avenue, Ballyfermot Road and Longmeadow's Park; where suitable grasses, birdsfoot 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.* 2090).

Bees favour sites with flowers including unimproved grasslands and hay meadows. These habitats were not recorded along the Proposed Scheme. The preferred foodplants for bees are native species with white, blue or yellow flowers (Fitzpatrick 2006). Small, fragmented sites where suitable floral species were recorded along the Proposed Scheme include areas ornamental flower beds (BC4) within residential gardens; parkland with scattered trees (WD5), and amenity grasslands (GA2).

Bumblebees may have large ranges and require large areas with varied habitats providing long flowering periods to support viable populations. Habitat fragmentation can isolate bee species, ultimately reducing gene flow and genetic diversity, increasing their vulnerability to other stressors such as disease and internal parasites. Species with specialist foodplants or limited dispersal abilities can be particularly vulnerable to habitat loss and degradation (Biesmeijer *et al*. 2006) leading to increasing dominance by a smaller number of generalist species.

Loss of natural and semi-natural habitats has been a key driver in pollinators who require a balanced diet from a range of plant species throughout their active foraging season which lasts from early spring until late autumn (TCD 2017). There are small, isolated and fragmented sites along the route of the Proposed Scheme including; wildflower areas in Markievicz Park and Phoenix Park managed by Dublin City Council and Farmleigh Estate managed by the Office of Public Works as part of the All-Ireland Pollinator Plan. Golf Course Superintendents Association of Ireland (GCSAI), green schools and Gaelic Athletic Association (GAA) are all partner organisations of the All-Ireland Pollinator Plan 2021-2025 (NBDC 2021).

These species favour species rich semi-natural grasslands and meadows, upland heath and sand dunes. Habitats within close proximity to the Proposed Scheme which correspond to species requirements include species poor dry meadows and grassy verges, and areas of ornamental planting along roadsides, parkland, and gardens. Such habitats are fragmented and highly disturbed and are therefore deemed unsuitable for significant populations of red-listed invertebrates (Biesmeijer *et al*. 2006; Öckinger *et al*. 2010). As such, other invertebrates are not considered further in the assessment.

12.3.14 Summary Ecological Valuation and Identification of KERs

Table 12.13 summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance. KERs are highlighted in blue in Table 12.13. Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of

assessing the impacts on what are determined to be important ecological or biodiversity features, as per the CIEEM Guidelines (CIEEM 2019) and the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009).

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

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

Habitats valued as being of a Local Importance (Lower Value) are not considered to be KERs in this assessment. This is not to say that they are of no biodiversity value, but that impacts on these habitat types in their local context are not likely to result in a significant effect on biodiversity. It should be noted that this relates to the impact on the habitat itself as distinct from considering the role these habitat types play in supporting KER fauna species. The impacts of the Proposed Scheme in that sense are captured and assessed under the relevant species' headings in Section 12.3.

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

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

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

Table 12.13: Summary of Ecological Valuation and Identification of KERs

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
North Dublin Bay SAC [000206]	International Importance	Yes
South Dublin Bay SAC [000210]	International Importance	Yes
Howth Head SAC [000202]	International Importance	Yes
Rockabill to Dalkey Island SAC [003000]	International Importance	Yes
Lambay Island SAC [000204]	International Importance	Yes
South Dublin Bay and River Tolka Estuary SPA [004024]	International Importance	Yes
North Bull Island SPA [004006]	International Importance	Yes
Baldoyle Bay SPA [004016]	International Importance	Yes
Dalkey Island SPA [004172]	International Importance	Yes
Howth Head Coast SPA [004113]	International Importance	Yes
Malahide Estuary SPA [004025]	International Importance	Yes
Rogerstown Estuary SPA [004015]	International Importance	Yes
Ireland's Eye SPA [004117]	International Importance	Yes
Lambay Island SPA [004069]	International Importance	Yes
Skerries Islands SPA [004122]	International Importance	Yes
Rockabill SPA [004014]	International Importance	Yes
The Murrough SPA [004186]	International Importance	Yes
All other SAC or SPA sites	International Importance	No – beyond ZoI
Skerries Island NHA [001218]	National Importance	Yes

Ecological Receptor	Ecological Valuation	KER?
Liffey Valley pNHA [000128]	National Importance	Yes
Grand Canal pNHA [002104]	National Importance	Yes
North Dublin Bay pNHA [000206]	National Importance	Yes
South Dublin Bay pNHA [000210]	National Importance	Yes
Dolphins, Dublin Docks pNHA [000201]	National Importance	Yes
Booterstown Marsh pNHA [001205]	National Importance	Yes
Baldoyle Bay pNHA [000199]	National Importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	National Importance	Yes
Malahide Estuary pNHA [000205]	National Importance	Yes
Howth Head pNHA [000202]	National Importance	Yes
Ireland's Eye pNHA [000203]	National Importance	Yes
Lambay Island pNHA [000204]	National Importance	Yes
Rogerstown Estuary pNHA [000208]	National Importance	Yes
Portraine Shore pNHA [001215]	National Importance	Yes
The Murrough pNHA [004186]	National Importance	Yes
All other NHA or pNHA sites	National Importance	No – beyond ZoI
Habitats		
Flower beds and borders (BC4)	Local Importance (Lower Value)	No
Stone walls and other stonework (BL1)	Local Importance (Lower Value)	No
Buildings and artificial surfaces (BL3)	Negligible Importance	No
Tidal rivers (CW2)	National Importance	Yes
Exposed sand, gravel or till (ED1)	Local Importance (Lower Value)	No
Spoil and bare ground (ED2	Local Importance (Lower Value)	No
Recolonising bare ground (ED3)	Local Importance (Lower Value)	No
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Yes
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
Scrub (WS1)	Local Importance (Lower Value)	No
Ornamental / non-native shrub (WS3)	Local Importance (Lower Value)	No
Flora Species		
Flora Species listed on the Flora Protection Order	National Importance	Yes
Flora Species on Irelands Red Lists (Vulnerable or of higher concern concern)	Local Importance (Higher Value)	Yes
All other non-Red listed flora species	Local Importance (Lower Value)	No
Non-native invasive plant species	N/A	No
Fauna Species		
Otter	County Importance	Yes
Bats	Local Importance (Higher Value)	Yes
Badger	Local Importance (Higher Value)	Yes
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Yes
SCI / Annex I bird species	International Importance	Yes
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Yes

Ecological Receptor	Ecological Valuation	KER?
Atlantic Salmon / Lamprey / European Eel	National Importance	Yes
All other fish species	Local Importance (Higher Value)	Yes
Marine Mammals (Annex II species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Yes
Marine mammals (all other marine mammals)	County Importance	Yes
Amphibians	Local Importance (Higher Value)	Yes
Reptiles	Local Importance (Higher Value)	Yes
All other non-Red listed Invertebrates and Insects	Local Importance (Lower Value)	No
Non-native invasive animal species	N/A	No
Local Biodiversity Areas		
Dublin City's Green Infrastructure Network	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 the Construction and Operational Phases, as follows.

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;
- Removal of trees and vegetation;
- Protection and/or diversion of buried services;
- Road widening, pavement reconstruction, and kerb improvements;
- Demolition of existing retaining walls;
- Installation of new bus stops and junction / roundabout modification;
- Property boundary reinstatement, signage replacement; installation of lighting columns; and
- Landscaping and tree planting, and reinstatement of temporary land acquisitions.

12.4.1.2 Drainage Infrastructure

The drainage system for the Proposed Scheme will discharge to two watercourses the Liffey_180 and Liffey 190, as well as Ringsend WwTP, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. For the Proposed Scheme, there will be a net increase of 15,035m^2 (9,188m^2 in Liffey_180 and 5,847m^2 in Liffey_190) in the impermeable area ultimately discharging to Dublin Bay. The drainage design principles ensure that all runoff from increases in impermeable areas will be attenuated and there will be no net increase in the surface water flow discharged to these receptors.

Full details of proposed drainage infrastructure are provided in Chapter 13 (Water) and the Proposed Surface Water Drainage Works Drawings (BCIDB-JAC-DNG_RD-0007_XX_00-DR-CD-9001) in Volume 3 of this EIAR.

12.4.1.3 Construction Compounds

Construction Compounds to facilitate construction works are proposed for 30 months. These include:

- Construction Compound 1 to be located along the Fonthill Road, within the grounds of Liffey Valley Retail Park;
- Construction Compound 2 to be located at lands adjacent to the Eir exchange building on the Coldcut Road, between Cloverhill Road and Ballyfermot Road;
- Construction Compound 3 to be located along the Con Colbert Road, before the junction with the Chapelizod Bypass, within Liffey Gaels Park.

12.4.1.4 Operational Phase

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

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

12.4.2 'Do Nothing' Scenario

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

The Baseline Environment (see Section 12.3) describes the existing land use surrounding the Proposed Scheme. The Greater Dublin Area is highly urbanised with existing trends resulting in added pressure to water resources and habitat losses to ongoing development. As the full extent of the Proposed Scheme passes through lands zoned under the Dublin City County Development Plan 2016 - 2022 (DCC 2016) and the South Dublin County Development Plan 2016-2022 (SDCC 2016), the current land use zonings provide the best indication of what the future short to medium-term biodiversity trends might be as they will influence and direct development in the surrounding area. Lands surrounding the Proposed Scheme are largely zoned for residential, commercial or industrial purposes. Current biodiversity trends are likely to continue in areas zoned for development, adding to pressures on waterbodies and habitat fragmentation. It is also likely that traffic numbers will continue to remain high on a road network with variable drainage control or pollution control measures, which may have effects on biodiversity receptors in the receiving environment.

However, any effects on biodiversity are likely to be moderated by the environmental protective policies in the Dublin City County Development Plan 2016 – 2022, the South Dublin County Development Plan 2016-2022 and overarching pollution control objectives in the River Basin Management Plan (RBMP) 2018-2021 (DHPLG 2018).

The interaction between the existing trends, future trends, and other plans or projects with the Proposed Scheme are considered and assessed further in Chapter 21 (Cumulative Impacts & Environmental Interactions).

12.4.3 Construction Phase

12.4.3.1 Designated Areas for Nature Conservation

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

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

12.4.3.1.1 European sites

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

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

- South Dublin Bay SAC [000210];
- North Dublin Bay SAC [000206];
- Howth Head SAC [000202];
- Rockabill to Dalkey Island SAC [03000];
- Lambay Island SAC [000204];
- Howth Head Coast SPA [004113];
- Skerries Islands SPA [004122];
- Lambay Island SPA [004069];
- Ireland's Eye SPA [004117];
- North Bull Island SPA [004006];
- South Dublin Bay and River Tolka Estuary SPA [004024];
- Dalkey Islands SPA [04172];
- Malahide Estuary SPA [004025];
- Baldoyle Bay SPA [004016];
- Rogerstown Estuary SPA [004122];
- Rockabill SPA [004014]; and
- The Murrough SPA [0004186].

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

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

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

Habitat degradation as a result of hydrogeological impacts and air quality impacts were scoped out from further assessment at the AA Screening stage. The nearest European site, is South Dublin Bay and River Tolka Estuary SPA which is located approximately 3.3km from the Proposed Scheme, and lies outside of the ZoI for these impacts. Therefore, there is no potential for an impact on European sites.

12.4.3.1.1.1 Habitat Loss and Fragmentation

The Proposed Scheme does not overlap with any European sites. The nearest European site is South Dublin Bay and River Tolka Estuary SPA, which is located approximately 3.3km from the Proposed Scheme. Therefore, there is no potential for direct habitat loss and fragmentation to occur. Habitat loss may occur indirectly as a consequence of severe habitat degradation arising from a reduction in water quality and/or a change to the hydrological regime, as described in the Section below.

SCI species for which SPAs in the vicinity of the Proposed Scheme have been designated (i.e. wintering birds) are known to utilise ex situ feeding sites in the Dublin area (i.e. North Bull Island SPA, South Dublin Bay and River Tolka SPA, Malahide Estuary SPA, Baldoyle Bay SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA and The Murrough SPA). The Proposed Scheme will result in the temporary loss of one inland site within the Proposed Scheme footprint suitable to support breeding gull and wintering bird species, i.e. Liffey Gaels GAA Club grounds on Con Colbert Road (referred to as CBC0007WB003). The wintering bird surveys recorded small numbers of several species, whose numbers were not significant with respect to their national and international populations, utilising this study area (see Table 12.10), as well as infrequent and irregular numbers of brent goose droppings during the 2021/ 2022 survey. The inconsistency of recorded use of the site suggests that it is not a significant inland foraging resource for these SCI bird species and is more likely to be used sporadically / infrequently. Nonetheless the Proposed Scheme will result (for the duration of the construction period) in the loss of sites suitable to support breeding and wintering SCI bird species.

In summary, therefore, there is potential for impacts on SCI species associated with SPAs to occur as a result of habitat loss / fragmentation.

Annex I habitats and Annex II species for which European sites are designated for within the ZoI of the Proposed Scheme will not result in any direct loss or fragmentation of habitat by virtue of the location of the Proposed Scheme and its construction.

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

The Proposed Scheme is hydrologically connected to Dublin Bay via the Liffey_180, Liffey_190, Camac_040 and 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
- The accidental spillage and/or leaks of containments (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 the downstream environment (i.e. Dublin Bay), within which European sites are located (i.e. North Dublin Bay SAC, South Dublin Bay SAC, Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA and Dalkey Islands SPA). This possible reduction in water quality (either alone or in combination with other pressures on water quality) could potentially 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 potentially negatively affect the quantity and quality of prey available to SCI bird species. These potential impacts could occur to such a degree that the conservation objectives of the North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, Lambay Islands SAC and Howth Head Coast SPA are undermined.

In a worst-case scenario, in the absence of mitigation measures, the release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during construction, 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 i.e. birds associated with Skerries Islands SPA, Rockabill SPA, Howth Head Coast SPA, Lambay Island SPA, Ireland's Eye SPA, North Dublin Bay SPA, South Dublin Bay and River Tolka Estuary SPA, Malahide Estuary SPA, Baldoyle Bay 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 possible reduction in water quality could result in the degradation of sensitive habitats present within downstream European sites, which in turn would negatively affect the SCI bird species that rely upon these habitats as foraging and/or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI and QI populations. In a worst-case scenario these potential impacts could occur to such a degree that the conservation objectives of the Skerries Islands SPA, Rockabill SPA, Lambay Island SPA, Ireland's Eye SPA, North Dublin Bay SPA, South Dublin Bay and River Tolka Estuary SPA, Howth Head Coast SPA, Malahide Estuary SPA, Rogerstown SPA, Dalkey Islands SPA, Murrough SPA, Rockabill to Dalkey Island SAC and Lambay Island SAC would be undermined.

12.4.3.1.1.3 Habitat Degradation as a Result of Hydrogeological Impacts

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

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

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

One invasive plant species, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 was identified within the Proposed Scheme during the field surveys, Japanese Knotweed (See Table 12.7). In addition, records of invasive species in the vicinity of the Proposed Scheme were returned from the desk study. Therefore, there is potential for invasive species to spread or be introduced, during construction, to terrestrial habitat areas in European sites downstream in Dublin Bay. (i.e. North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA). The introduction and/or spread of these invasive species to downstream European sites could potentially result in the degradation of existing habitats present, in particular coastal habitats not permanently or regularly inundated by seawater. These species may outcompete other native species present, negatively impacting the species composition, diversity and abundance and the physical structural integrity of the habitat. This in turn could potentially undermine the conservation objectives of these European sites.

It is not considered possible that the listed non-native invasive species could spread to aquatic and coastal European sites which are located a significant distance from the outfall locations of the Liffey_180, Liffey_190 and the Camac_040 (i.e. Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC and Dalkey Islands SPA), due to their aquatic nature and the terrestrial nature of Japanese Knotweed.

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

12.4.3.1.1.5 Habitat Degradation as a Result of Air Quality Impacts

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

The unmitigated ZoI for air quality effects arising from the Proposed Scheme has the potential to extend 50m from the Proposed Scheme boundary, and 500m from the construction compounds during the Construction Phase. There are no European sites present within these distances, and as such the Proposed Scheme has no potential to result in habitat degradation of the qualifying / special conservation interest species / habitats of South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC during the Construction Phase of the Proposed Scheme. Any potential for the Proposed Scheme to result in habitat degradation impacts on the QI / SCI species and/or QI habitats of South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC during the Construction Phase of the Proposed Scheme, is discussed fully in the NIS

12.4.3.1.1.6 Disturbance and Displacement Impacts

There are no European sites within the disturbance ZoI of the Proposed Scheme, However, several QI species are known to occur within the vicinity of the Proposed Scheme. Refer to Section 12.4.4.4 and Section 12.4.4.8 for more details with regards to potential construction impacts on QI mammals and fish, respectively.

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, Rogerstown Estuary SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA, and The Murrough SPA). These species include light-bellied brent goose, black-tailed godwit, curlew, oystercatcher, black-headed gull, lesser black-backed gull and herring gull. Suitable inland foraging / roosting sites, which these bird species utilise, are located within the potential ZoI of the Proposed Scheme.

In summary, therefore, there is potential for the Proposed Scheme to result in disturbance / displacement impacts on SCI populations associated with European sites. 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 13 pNHAs:

- Skerries Islands NHA [001218];
- Lambay Island pNHA [000204];
- Portraine Shore pNHA [001215];

- Howth Head pNHA [000202];
- Malahide Estuary pNHA [000205];
- North Dublin Bay pNHA [000206];
- Rockabill Island pNHA [000207];
- South Dublin Bay pNHA [000210];
- Dolphins, Dublin Docks pNHA [000201];
- Booterstown Marsh pNHA [001205];
- Ireland's Eye pNHA [000203];
- Dalkey Coastal Zone and Killiney Hill pNHA [001206];
- Baldoyle Bay pNHA [00199]; and
- Rogerstown Estuary pNHA [000208].

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

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 totality of habitat loss across the Proposed Scheme (not considering building and other hard standing areas) is approximately 2.8ha during the Construction Phase. This occurs in the form of permanent land take of edge habitats adjacent to the existing road network.

The habitat type tidal rivers (CW2), which is considered to be of International Importance given its Annex I status under the Habitats Directive (i.e. Estuaries [1130]) refers to the Liffey Estuary Lower which lies approximately 1.4km from the terminus of the Proposed Scheme. The habitat will not be directly affected by the construction of the Proposed Scheme and the scheme will not result in the permanent be loss of any of this habitat.

The habitat type depositing / lowland rivers (FW2) may also be indirectly affected by the Proposed Scheme and is considered to be of Local Importance (Higher Value). Watercourses within the vicinity of the Proposed Scheme include the following: Liffey_180, Liffey_190, and the Camac_040. Of these watercourses the following are crossed by the Proposed Scheme; Camac_040. 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.

Other habitat types considered to be of Local Importance (Higher Value) will be lost as a result of the Proposed Scheme. These include areas of (mixed) broadleaved woodland (WD1), scattered trees and parkland (WD5), hedgerow (WL1) and treeline (WL2) habitats. The overall total areas of the habitat types which overlaps with the Proposed Scheme boundary and will be directly lost as a result of the construction of the Proposed Scheme is provided in Table 12.14. The permanent loss of habitat types considered to be of Local Importance (Higher Value)

has the potential to affect the conservation status of each of these habitat types and, therefore, result in a significant negative effect at the local geographic scale.

The remaining areas within the footprint of the Proposed Scheme comprise of habitats considered to be of a Local Importance (Lower Value). These include, improved amenity grasslands (GA2), planted flowers beds (BC4), ornamental / non-native shrub (WS3), areas of disturbed ground (ED2 and ED3), scrub (WS1), hard standing (BL3), and dry meadows and grassy verges (GS2). 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 provided in Table 12.14.

The various KER habitat types and corresponding total areas which overlap with the Proposed Scheme boundary are summarised below in Table 12.14. 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.

Table 12.14: Extent of Habitat Loss by Type

Habitat Type	Extent of Permanent Habitat Loss	Extent of Temporary Habitat Loss
National Importance		
Tidal rivers (CW2) (corresponding to Annex I Estuaries [1130])	*No habitat loss*	*No habitat loss*
Local Importance (Higher Value)		
Scattered trees and parkland (WD5)	*Approximately 0.16*ha	*Approximately* 0.2ha
Hedgerows (WL1)	*Approximately 0.046*ha	*Approximately* 0.009ha
Treelines (WL2)	*Approximately 0.03*ha	*Approximately* 0.05ha
(Mixed) broadleaf woodland (WD1)	*Approximately* 0.15ha	*Approximately* 0.16ha
Depositing / Lowland Rivers (FW2)	*Approximately 5m*	*No habitat loss*
Local Importance (Lower Value)		
Amenity Grassland (GA2)	*Approximately* 2.05ha	*Approximately* 0.62ha
Flower beds and borders (BC4)	*Approximately* 0.002ha	*No habitat loss*
Spoil and bare ground (ED2)	*Approximately* 0.006ha	*Approximately* 0.04ha
Recolonising bare ground (ED3)	*Approximately* 0.0001ha	*Approximately* 0.03ha
Dry Meadows and Grassy Verges (GS2)	*Approximately* 0.15ha	*Approximately* 0.34ha
Residential	*Approximately* 0.04ha	*Approximately* 0.04ha
Scrub (WS1)	*Approximately* 0.14ha	*Approximately* 0.86ha
Ornamental / on-native shrub (WS3)	*Approximately* 0.04ha	*Approximately* 0.014ha

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

12.4.3.2.2 Habitat Degradation – Surface Water Quality

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

It is unlikely that a pollution event of such a magnitude would occur during construction or, in the unlikely event it did occur, it would be temporary in nature. Nevertheless, a precautionary approach has been adopted in the assessment of potential risk of impacts on water quality. Consequently, for the purposes of the EIA to be conducted by the Board (but not the screening for Appropriate Assessment), detailed mitigation measures are

proposed and considered 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.

During the Construction Phase, suspended solids, silt and other harmful materials generated as a result of proposed works could be released into the local drainage infrastructure and travel downstream, including, potentially, into the River Liffey or Lower Liffey Estuary. Cement based products used in the Construction Phase of the Proposed Scheme (e.g. concrete and/or bentonite which are highly corrosive and alkaline materials), if released into the surface water network may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality at a local geographic scale and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, transitional and coastal habitats downstream, in Dublin Bay, could also be affected.

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] and therefore, has the potential to result in a significant negative impact at a national scale in the case of the aquatic / wetland Annex I habitats located within the ZoI of the Proposed Scheme. The Liffey Estuary Lower is hydrologically connected to downstream habitats including mudflats (LS3 / LS4 / Annex I habitat Mudflats and sandflats not covered by seawater at low tide [1140]), and saltmarsh (CM1 and CM2 / Annex I habitats Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] and Mediterranean salt meadows (*Juncetalia maritimi*) [1410]) which may also be at risk of habitat degradation as a consequence of construction effects on surface water quality.

The mitigation measures that have been designed to avoid or reduce the potential impacts of the Proposed Scheme on surface water quality are presented in Section 12.5.

12.4.3.2.3 Habitat Degradation – Hydrological Regime

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

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

None of these are predicted to have any long-term effects that would give rise to a likely significant negative impact on any aquatic habitats or species through effects on the hydrological regime as the drainage design principles ensure that there will be no net increase in the surface water flow discharged to these receptors (for more detail refer to Chapter 13 (Water)).

12.4.3.2.4 Habitat Degradation – Groundwater

Any effects on the existing hydrogeological baseline supporting wetland habitats has the potential to negatively affect habitat extent and distribution, and vegetation structure and composition. The potential effects upon the existing hydrogeological regime are not necessarily limited to habitats within the Proposed Scheme boundary but can be far-reaching, with significant negative long-term effects.

By virtue of proximity and an assemblage of habitat types including ground water dependant habitats associated with Liffey Valley pNHA, the resulting significance is considered significant / moderate. 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. However, since any pumping is expected to be limited, localised and temporary, the magnitude of this impact is considered negligible.

As detailed in the Construction Environmental Management Plan (CEMP) for the Proposed Scheme, specific controls / mitigation measures, i.e. pollution control plan will be put in place to manage runoff and minimise

pollution to receiving waterbodies during the Construction Phase. There are no predicted impacts that could give rise to a likely significant negative impact on any aquatic habitats or species at any time scale (for more detail refer to Chapter 13 (Water)).

12.4.3.2.5 Habitat Degradation – Air Quality

As discussed in Section 7.4.2 of Chapter 7 (Air Quality), the Proposed Scheme has the potential to generate dust during construction works which could affect vegetation in habitat areas adjacent to the Proposed Scheme. Mitigation measures have been designed to contain dust emissions during construction (see Section 12.5.1.2.4).

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 above in Section 12.4.3.1.1.5, air quality modelling of 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 Proposed Scheme overall neutral or slightly beneficial, and short term. As such harmful effects on vegetation from these emissions are not likely.

12.4.3.2.6 Habitat Degradation – Non-Native Invasive Plant Species

Planting, dispersing, or allowing / causing the dispersal, spread or growth of certain non-native plant species is controlled under regulation 49 of the European Communities Birds and Natural Habitats Regulations, 2011; and refers to plant or animal species listed on the Third Schedule of those regulations (see also Section 12.3.7).

The accidental spread of such non-native invasive plant species as a result of construction works has the potential to impact on terrestrial habitats; potentially affecting plant species composition, diversity and abundance over the long-term. This is not only confined to habitats within and immediately adjacent to the footprint of the Proposed Scheme but also includes habitat areas located 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 significant negative effect, at geographic scales ranging from local to international. Four areas of non-native invasive plant species listed on the Third Schedule of the European Communities Birds and Natural Habitats Regulations, 2011 were identified along the Proposed Scheme. The species recorded here was Japanese knotweed. The desktop study revealed records for 13 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 within 1km 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, 2015 were recorded within or in close proximity to the Proposed Scheme. The desk study revealed records for three species listed on the Flora (Protection) Order, 2015 within 1km of the Proposed Scheme; betony, hairy violet and meadow barley, all recorded in Phoenix Park. Other flora species of conservation concern, although not listed on the Flora (Protection) Order, 2015, which are known to occur within 1km of the Proposed Scheme, include records for yellow archangel, Lance-leaved pottia, Tall aloe-moss and Thread-moss. There is no potential for direct impacts on any of the species listed above to occur as a consequence of the Proposed Scheme.

12.4.3.3.2 Habitat Degradation – Hydrological Regime

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

12.4.3.4 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. Two trees with Potential Roosting Features (PRFs) were identified within the footprint of the Proposed Scheme; two London Plane trees along R839 Grattan Crescent. However, it should be noted that the Proposed Scheme will not result in any direct impacts to these trees. The Proposed Scheme will not result in the loss of any breeding / resting sites for any bat species and therefore, there is no potential for likely significant effects on the conservation status of bats to occur at any geographic scale as a result of this potential direct impact.

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 foraging by all bat species recorded in the study area.

Suitable habitat for foraging and commuting bats within the footprint of the Proposed Scheme includes hedgerows, treelines, mixed broadleaved woodland, rivers, areas of parkland, and open grassland. The area of the habitats which will be lost as a result of the Proposed Scheme is provided in Table 12.14 and shown in the Landscape General Arrangement drawings [BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001] 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 quantity of suitable habitat, which will not be impacted, in the local vicinity.

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 Surveys for Professional Ecologists. Good Practice Guidelines. 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*.'

Notwithstanding the fact that there is evidence of bats foraging and commuting within the study area of the Proposed Scheme, particularly adjacent to Markievicz Park (CBC0007BT002) and along Grattan Crescent (CBC0007BT003). 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 the route.

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

Removal of suitable habitat for foraging and 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 0.7ha on a permanent basis and 1.64ha on a temporary basis. Habitat removal is within a highly disturbed urban environment with low numbers of bat species records, and, as such is not deemed to provide significant contributions to CSZs of roosts outside of the footprint of the Proposed Scheme. Therefore, the effect of habitat fragmentation and barrier effect associated with the construction of the Proposed Scheme is considered to be significant at the Local geographic scale.

12.4.3.4.1.3 Installation of Temporary Working and Site Compound Lighting Which May Cause Indirect Disturbance of Flight Patterns

Construction Compounds are proposed in the following three locations (see the General Arrangement Drawings [BCIDB-JAC-GEO_GA-0007_XX_00-DR-CR-9001] in Volume 3 of this EIAR);

- Construction Compound 1 to be located along the Fonthill Road, within the grounds of Liffey Valley Retail Park;
- Construction Compound 2 to be located at lands adjacent to the Eir exchange building on the Coldcut Road, between Cloverhill Road and Ballyfermot Road;
- Construction Compound 3 to be located along the Con Colbert Road, before the junction with the Chapelizod Bypass, within Liffey Gaels Park.

Security lighting will be installed in these Construction Compounds and will be in operation for the duration of construction (i.e. 30 months), thereby temporarily increasing the level of artificial lighting in these areas. Artificial lighting within suitable habitat may result in avoidance behaviour by bats, and could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Given the suburban setting of these proposed Construction Compounds, and limited foraging resources in the existing environment, bats in the area are not deemed to be present in high numbers and would be habituated to some level of artificial lighting. Provided security lighting does not involve high intensity lighting (e.g. floodlighting) the impact of increased artificial lighting at Construction Compounds is considered to be significant at the local level only.

Construction works will typically be undertaken during normal daylight working hours, and therefore the requirement for lighting to accommodate construction works during night-time, in areas where existing light levels are low, will be limited. Therefore, the effect of temporary lighting effects associated with the Construction Phase of the Proposed Scheme is considered to be significant at the local level only.

12.4.3.4.2 Badger

Multi-disciplinary surveys did not confirm any badger setts or evidence of badger within the footprint of the Proposed Scheme.

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

12.4.3.4.2.1 Loss of Foraging Habitat and Breeding / Rest Sites

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

Construction may result in the permanent loss of 2.7ha (hectares) of suitable foraging / commuting habitat for badgers (e.g. amenity grassland, scattered trees and parkland, dry meadows and grassy verges, scrub, mixed broadleaved woodland and treelines / hedgerows). In addition, the provision of Construction Compounds for the duration of the Construction Phase will result in the temporary loss of 0.98ha of the following habitats, which could be used by commuting / foraging badgers; scrub and amenity grassland.

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

12.4.3.4.2.2 Disturbance / Displacement

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

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

Disturbance and displacement effects on badger may also be the result of increased artificial lighting during construction. Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore 2005). Although the majority of the Proposed Scheme corridor is already lit artificially, the proposal may result in the introduction of artificial lighting to previously unlit areas, if the proposed Construction Compounds require security lighting for the duration of construction. Many of the locations proposed for Construction Compounds are composed of suitable foraging or commuting habitat for badger (scrub and dry meadows and grassy verges). If high-intensity, non-directional security lighting (e.g. floodlighting) is installed in these proposed Construction Compounds, light spill into adjacent areas could render these areas unsuitable for foraging badger. Therefore, lighting associated with the Construction Phase of the Proposed Scheme could result in a negative effect on badgers, albeit temporary in nature and significant at the local level.

12.4.3.4.3 Otter

It is possible that otter will establish new holt or couch sites within the ZoI of the Proposed Scheme before construction works commence, and this scenario has been taken into account in the mitigation strategy (refer to Section 12.5.1.4.3).

12.4.3.4.3.1 Loss of Breeding / Resting Sites

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

12.4.3.4.3.2 Loss / Fragmentation of Foraging / Commuting Habitat

Evidence of otter was not recorded within or in close proximity to the Proposed Scheme during the field surveys undertaken. However, based on the results of the desk study, otter are known to utilise the River Liffey, Grand Canal and upstream sections of the River Camac. In addition, otter frequently use the Lower Liffey Estuary for commuting and foraging purposes, with holts identified at Dublin Port (Macklin *et al.* 2019).

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

The Proposed Scheme is not expected to result in any loss / fragmentation to habitats used by otter. As the Proposed Scheme does not include any works to watercourses or associated riparian vegetation in the vicinity of the Proposed Scheme. 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 and Food Source Degradation – Water Quality

During construction, 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.

During construction suspended solids, silt and other harmful materials generated as a result of proposed works could be released into the local drainage infrastructure and travel downstream, including, potentially, into the River Liffey or Lower Liffey Estuary. Cement based products used in the Construction Phase of the Proposed Scheme (e.g. concrete which is highly corrosive and alkaline material), if released into the River Liffey and/or Liffey Estuary Lower may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on food supply.

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

Mitigation measures have been designed to protect water quality during construction (see Section 12.5.1.4.3).

12.4.3.4.3.4 Habitat Severance / Barrier Effect

Proposed works in the vicinity of surface water features (e.g. works along R810 Emmet Road which crosses the Camac_040) could result in a barrier effect to local otters, if present, at least temporarily.

However, given that otter are generally nocturnal in habit and works will typically be carried out during normal daylight working hours, affected otters would be expected to habituate to the altered landscape and any resulting

barrier effect would be temporary in nature (see below on disturbance / displacement and the habituation of otters to disturbance).

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

12.4.3.4.3.5 Disturbance / Displacement

The results of the desk study did not reveal the presence of otter holts within 1km of the Proposed Scheme. However, it is reasonable to assume that otter holts are present in the wider environment. 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.

Construction activities in the vicinity of watercourses near the Proposed Scheme will include footway renewal and carriageway resurfacing (Camac_040). Noise and vibrations associated with these works will have the potential to create disturbance and displacement within the vicinity of the works. Noise levels produced by these construction works will be 79dB at 10m from the Proposed Scheme boundary, see Chapter 9 (Noise & Vibration). As such disturbance for mammals is estimated to reach 150m from the Proposed Scheme (See Section 12.3.1 for description of ZoI). Active otter holts are outside of this ZoI, disturbance effects from the Proposed Scheme are not deemed to cause displacement affects leading to abandonment of holts.

Otter are known to tolerate human disturbance under certain circumstances (Bailey & Rochford 2006, The Environment Agency 2010, Irish Wildlife Trust 2012). There are numerous records of otter within the urban Dublin area, which suggests a relatively high level of habituation to human disturbance and noise by otter (Macklin *et al*. 2019). As construction works will typically be undertaken during normal daylight working hours and otter are generally nocturnal in habit, and that otter can (in many circumstances) tolerate high levels of human presence and disturbance, displacement of otter from their habitat is extremely unlikely to affect the local otter population. Therefore, disturbance during construction, as a result of increased human presence, is not likely to have a significant effect on the species' conservation status and will not result in a likely significant negative effect, above the local 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 & Longcore 2005). The majority of the Proposed Scheme corridor is already lit artificially and therefore it is reasonable to assume that otter in the vicinity are habituated to some degree of artificial lighting. The proposal may result in the introduction of artificial lighting to previously unlit areas, if the proposed Construction Compounds require security lighting for the duration of construction. Given the fact that the locations of proposed Construction Compounds are removed from any watercourses, lighting during construction is not considered likely to result in any significant effect to otters in the vicinity.

12.4.3.4.4 Marine Mammals

12.4.3.4.4.1 Habitat and Food Resource Degradation – Water Quality

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

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

Habitat degradation as a result of effects on surface water quality during the Construction Phase has the potential to affect the species' conservation status and result in a likely significant negative effect, at a local geographic

scale. This is in consideration of the temporary nature and scale of the proposed effect, and the availability of suitable habitat in Dublin Bay.

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

12.4.3.4.5 Other Mammals

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

12.4.3.4.5.1 Habitat Loss

The construction of the Proposed Scheme will result in the permanent loss of suitable habitat for small mammals located within the boundary of the Proposed Scheme. Given the relatively low numbers of individuals of each species that are likely to be affected (i.e. pine marten, red squirrel, hedgehog 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.

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 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 therefore is unlikely to 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 small 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 Appropriate Assessment for the purposes of Article 6(3) of the Habitats Directive) considered the potential for the Proposed Scheme to affect the bird species listed as SCIs of European sites. The assessment is set out in the NIS and for the reasons detailed therein, it is concluded that the Proposed Scheme would not affect their breeding colonies or have any long-term effects on the local breeding populations. Therefore, for these species, the Proposed Scheme will not affect the conservation status of the breeding populations and will not have any adverse effects on the integrity of European sites.

12.4.3.5.1.1 Habitat Loss and Loss of Breeding / Resting Sites

The Proposed Scheme will result in the loss of breeding bird nesting and foraging habitat within the footprint of the Proposed Scheme. The areas of habitat loss within the Proposed Scheme boundary are provided in Section 12.4.3.2 and tabulated in Table 12.14 for all KER habitat types. These areas comprise a total area of approximately 0.08ha of hedgerows and treelines (also KERs), approximately 0.16ha mixed broadleaved woodland (KER) and approximately 0.15ha of scattered trees and parkland habitats. In addition, there are areas of scrub, ornamental / non-native shrub, amenity grassland, and dry meadows & grassy verges habitats (approximately 2.4ha in total area) within the footprint of the Proposed Scheme, which are not KERs in their own right due to their limited botanical value. However, these 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:

- Amenity grassland habitat at Liffey Gaels Park on the R844 Con Colbert Road, which will be removed to accommodate a proposed Construction Compound;
- Scrub habitat along R833 Coldcut Road, near the junction with Kennelsfort Road, which will be removed to accommodate a proposed Construction Compound;
- Small areas of mixed broadleaved woodland along R833 Ballyfermot Road near the former De La Salle School;
- Small strips of scattered trees and parkland at various locations along the Proposed Scheme;
- Treeline habitat along the central median and in the road verge of Sarsfield Road;
- Treeline habitat along R833 Ballyfermot Road; and;
- Small area of mixed broadleaved woodland habitat along R833 Coldcut Road.

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 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 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 0.3km 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 Phoenix Park; Collinstown Park; Hermitage Park; King's Hospital School; Hermitage Golf Club; Liffey Valley pNHA; Irish National War Memorial Gardens; Dublin Zoo; Merrion Square; St. Stephen's Green; and; Iveagh Gardens;
- Wildfowl and Waterbird habitat within the Lower Liffey Estuary and wider Dublin Bay area, such as Bull Island; and
- Sections of the Grand Canal.

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.

12.4.3.5.1.2 Mortality Risk

In the absence of mitigation measures, if vegetation clearance works were to be undertaken during the bird breeding season (i.e. March to August, inclusive) it is possible that nest sites holding eggs or chicks will be destroyed and birds killed.

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

However, in the longer-term this would be unlikely to affect the ranges of the breeding bird species recorded in the study area nor would it be likely to affect the long-term viability of the local populations. Mortality of birds during site clearance works is not predicted to significantly affect the conservation status of any of the breeding bird species present within the study area at any geographic scale. In any event, mitigation measures will be implemented to reduce the potential mortality risk presented by any clearance works (see Section 12.5.1).

12.4.3.5.1.3 Disturbance / Displacement

The noise, vibration, increased human presence and the visual deterrent of construction traffic, associated with site clearance and construction will disturb breeding bird species and is likely to displace breeding birds from habitat areas adjacent to the footprint of the Proposed Scheme. Areas of suitable habitat for breeding birds in the vicinity of the Proposed Scheme include Grattan Crescent Park, Markievicz Park, Irish National War Memorial Park, and woodland, treeline and hedgerow habitat. However, there is an existing relatively high level of human disturbance within the immediate environment of the Proposed Scheme (e.g. R833 Ballyfermot Road and inner city areas such as R810 James Street and R810 Thomas Street) and as such it is likely that breeding species present are habituated to a certain degree of disturbance. The magnitude of the impact will be dependent on the type of construction works and their duration; general construction activities will have a less pronounced affect than blasting, in terms of its ZoI, but will be on-going from periods of up to 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 two to nine month disturbances in each section of the Proposed Scheme.

Areas within the Proposed Scheme, which will be subject to construction activities which generate noise levels greater than 50dB (e.g. road widening and utility diversion, retaining walls, etc.) will result in a greater magnitude of effect on the baseline environment. Although it is not possible to quantify the magnitude of this potential impact (or the potential effect zone) with precision, it could potentially extend for several hundred metres from the Proposed Scheme. The results of noise modelling carried out for the Proposed Scheme confirmed that, at 150m, noise levels for all construction activities will be below 60dB (see Chapter 9 (Noise & Vibration)). Given the temporary to short-term nature of the construction works, coupled with the existing levels of disturbance within these urban areas, disturbance or displacement effects 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 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.

12.4.3.5.2 Wintering Birds

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

12.4.3.5.2.1 Habitat Loss and/or Disturbance / Displacement

Potential impacts may arise due to the direct temporary loss of feeding habitat at Liffey Gaels Park off the R833 Con Colbert Road (approximately 0.442ha in total area), to accommodate a proposed Construction Compound.

The temporary loss of suitable GA2 habitat at the proposed Liffey Gaels Park Construction Compound is not deemed to have a significant impact on the wintering bird population at any geographical scale due to the following reasons:

- Relatively low frequency of occurrence of these bird species on lands located within the Liffey Gaels Park grounds, signifying that these species do not regularly use or rely upon these lands as foraging and/or roosting habitat, and are likely to use other suitable sites available in the wider area on a similar or more regular basis (See Table 12.10);
- Relatively low peak flocks recorded on lands located within the footprint of the Proposed Scheme, especially when compared to 1% of both their international flyway and national populations (See Table 12.11), signifying that these sites are not significantly important to the overall population of each respective bird species, and are likely to use other suitable sites available in the wider area on a similar or more regular basis;
- The availability of large areas of suitable foraging and/or roosting habitat for these SCI bird species in the wider locality of the Proposed Scheme, including those in closer proximity to nearby SPAs. These include other similar public amenity grassland parks and sports pitches such as those discussed below. It is very likely that bird species currently utilise these and other suitable lands in the wider area to a similar and/or greater intensity during the 30 months in which the proposed Liffey Gaels Park Construction Compound will be in use; and
- Temporary increase in noise, vibration and/or human activity levels during the Construction Phase and Operation Phase of the Proposed Scheme could result in the disturbance to and/or displacement of wintering bird species present within the footprint and/or the vicinity of the Proposed Scheme.

Assessment of construction related noise disturbance to wintering waterbirds is based on the research presented in Cutts *et al.* (2009) and Wright *et al*. (2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds, i.e. birds becoming alert and some behavioural changes (e.g. reduced feeding activity), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity as per BS 5228 (BSI 2008) are generally below 60dB or, in most cases, are approaching the 50dB threshold. 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)). As such, disturbance effects for general construction activities across the majority of the Proposed Scheme would not be expected to extend beyond a distance of approximately 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond.

None of the construction activities would be expected to result in any more than a moderate level of disturbance effect on wintering birds at distances beyond 150m. At 150m, noise levels are below 60dB or, in most cases, are approaching the 50dB threshold. Imperceptible, or no, effects would be expected for those noise levels. Any landscape features, vegetation cover or buildings between the Proposed Scheme boundary and identified winter

bird sites would contribute to further reducing the ambient noise at any given distance. Therefore, 300m is considered to be a precautionary buffer in defining the ZoI of disturbance effects.

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

Following the completion of construction (i.e. the Operational Phase), 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 review are typically found in coastal, estuarine and intertidal habitats including the Liffey Estuary and Dublin Bay, and therefore will not be impacted directly during construction. Certain species, such as light-bellied Brent geese, often forage on inland sites in the Greater Dublin Bay Area. Suitable sites are usually composed of open parkland / playing pitches. The following known inland wintering bird feeding sites are known to occur within approximately 300m of the Proposed Scheme, and birds here could be displaced during construction works:

- Ballyfermot / Le Fanu Park (major importance).

This wintering bird feeding site is approximately 150m south of R833 Ballyfermot Road.

The following four 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 sites listed above, would be displaced to the following known sites:

- Palmerstown/ Glenaulin Park (unknown importance);
- Crumlin / Good Counsel GAA (high importance);
- Dolphin's Barn/ Dolphin's Road (high importance); and
- Crumlin / Brickfields Park (high importance).

Noise modelling carried out for the Proposed Scheme found that at 150m, noise levels are below 60dB or, in most cases, are approaching the 50dB threshold. Therefore, noise produced as a result of construction activities would not provoke more than a moderate effect / level of response from birds at Ballyfermot / Le Fanu Park. In the unlikely event that wintering birds are disturbed during construction, they will likely be displaced to suitable sites in the surrounding environment, such as those listed above, and therefore impacts are not considered to be significant beyond the local level. Therefore, in consideration of these factors, the loss of suitable foraging and/or roosting habitat within the Proposed Scheme boundary that is utilised by wintering birds and an increase in short-term disturbance or displacement effects will not affect the conservation status of any wintering bird species and will not result in a likely significant negative effect, above the local scale.

12.4.3.5.2.2 Habitat Degradation – Surface Water Quality

As discussed in Section 12.4.3.2.2 under Habitat Degradation – Surface Water Quality, the Construction Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies, with a consequent effect on wintering birds either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

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

Habitat degradation as a result of effects on surface water quality during construction has the potential to result in a likely significant negative effect, at a local geographic scale. Mitigation measures have been designed to

protect water quality during construction (see Chapter 13 (Water), and the CEMP (Appendix A5.1 in Volume 3 of this EIAR).

12.4.3.6 Reptiles

There were no reptile species recorded during the multi-disciplinary surveys and no suitable habitat confirmed within the footprint of the Proposed Scheme. The desk study did not return records for reptile species protected under the Wildlife Acts within the footprint of the Proposed Scheme or wider surrounding area. However, it cannot be ruled out that these species are not in the wider area.

12.4.3.6.1 Disturbance & Mortality Risk

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

12.4.3.6.2 Habitat Severance / Barrier Effect

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

12.4.3.7 Amphibians

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

12.4.3.7.1 Disturbance & Mortality Risk

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

12.4.3.7.2 Habitat Severance / Barrier Effect

The temporary to short-term physical disruption of the existing landscape during site clearance and construction will fragment habitat used by amphibians. As a temporary to short-term impact, this is unlikely to present a significant barrier to the movement of the species such that it would affect the local 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.

12.4.3.8 Fish

12.4.3.8.1 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 construction.

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

Desk study records, as presented in Section 12.3.12.1, revealed that the River Camac is known to support populations of Atlantic salmon and brown trout. Furthermore, the River Liffey is recognized as a highly significant regional salmonid catchment for species of Atlantic salmon. The River Camac is important in that it is an urban system, much of which is culverted, for which the overground sections continue to support a self-sustaining population of brown trout. This, coupled with the fact that salmonid species are protected under both national and international legislation, means that habitat degradation, as a result of effects on surface water quality on the River Camac or River Liffey during construction, has the potential to result in a likely significant effect at the County geographic scale on salmonid species.

River lamprey are known to occur in the River Camac and River Liffey, as outlined in the desk study. Suitable lamprey habitat occurs in upstream sections of the River Camac, approximately 6.8km upstream of the Proposed Scheme. 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 geographic scale on lamprey species, given the habitat value present and their protection under the Habitats Directive.

The results of the desk study revealed that eel is known to occur in the River Camac, upstream of the Proposed Scheme. In addition, the Liffey estuary serves as the gateway for European 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 geographic scale given the fact that the other fish species in question are common in Irish waters and not of conservation concern.

12.4.3.9 Invertebrates

The desk study did not return records for any rare / protected invertebrate species within 1km of the Proposed Scheme. Therefore, no impacts are predicted.

12.4.3.10 Summary of Predicted Construction Phase Impacts (Pre-Mitigation)

Table 12.15: Summary of Predicted Construction Phase Impacts

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Designated Areas for Nature Conservation			
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species), Disturbance and Displacement	Likely significant effect at the international geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international geographic scale
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species), Disturbance and Displacement)	Likely significant effect at the international geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international geographic scale
Rockabill SPA Rockabill Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Dalkey Island SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international geographic scale
The Grand Canal pNHA	National Importance	Habitat Degradation (non-native invasive plant species)	Likely significant effect at the national geographic scale
Habitats (Outside of Designated Areas for Nature Conservation)			
Tidal rivers (CW2)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Depositing/lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Fauna Species			
Bats	Local Importance (Higher Value)	Habitat loss / fragmentation; Disturbance / displacement	Likely significant effect at the local geographic scale
Badger	Local Importance (Higher Value)	Disturbance / displacement	Likely significant effect at the local geographic scale
Otter	County Importance	Habitat degradation (hydrology; disturbance / displacement)	Likely significant effect at the local geographic scale
Marine mammals	International – National Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
SCI bird species	International Importance	*See SPAs above*	*See SPAs above*
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the county geographic scale
Annex fish species (Atlantic salmon, river lamprey)and European eel	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
All other fish species	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale

12.4.4 Operational Phase

12.4.4.1 Designated Areas for Nature Conservation

12.4.4.1.1 European sites

12.4.4.1.1.1 Habitat Loss and Fragmentation

The potential for impacts on SCI bird populations for which SPAs are designated has been provided in the 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.

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

The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include:

- The release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and
- The accidental spillage and/or leaks of containments (e.g. fuel and oils) into receiving waters.

The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge point and therefore impact the downstream environment (i.e. Dublin Bay), within which a number of European sites are located. This reduction in water quality (either alone or in combination with other pressures on water quality) could result in the degradation of sensitive habitats present within these European sites, which in turn would negatively affect the QI habitat and/or species and SCI bird species that rely upon these habitats as foraging and/or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI bird species. These potential impacts could occur to such a degree that the conservation objectives of the North Dublin Bay SAC, South Dublin Bay SAC, Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, Baldoyle Bay SPA, Malahide Estuary SPA, Rogerstown Estuary SPA and The Murrough SPA are undermined.

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

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

There are four areas of Japanese knotweed, a species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 present within, or in close proximity to, the Proposed Scheme. See Table 12.7). In addition, records of invasive species in the vicinity of the Proposed Scheme were returned from the desk study. Therefore, there is potential for invasive species to spread or be introduced, during routine maintenance / management works, to terrestrial habitat areas in European sites downstream in Dublin Bay. (i.e. North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA). The introduction and/or spread of these invasive species to downstream European sites could potentially result in the degradation of existing habitats present, in particular coastal habitats not permanently or regularly inundated by seawater. These species may outcompete other native species present, negatively impacting the species composition, diversity and abundance and the physical structural integrity of the habitat. This in turn may result in the degradation of the existing habitats and therefore undermine the conservation objectives of these European sites.

It is considered unlikely that invasive species could spread to European sites which are located a significant distance from the outfall locations of the Liffey_180, Liffey_190, Camac_040, Liffey Estuary Upper, Liffey Estuary or the Ringsend WWTP (i.e. Howth Head SAC, Howth Head Coast SPA, Rockabill to Dalkey SAC and Dalkey Islands SPA.

12.4.4.1.1.4 Disturbance and Displacement Impacts

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

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

12.4.4.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

The potential impacts on European sites arising from the Proposed Scheme, outlined above in Section 12.4.3.1.1, may also negatively affect the following pNHA and NHA sites, which are located within the boundaries of European sites and designated for similar reasons: Skerries Islands NHA, Lambay Island pNHA, Portraine Shore pNHA,

Ireland's Eye pNHA, Howth Head pNHA, Malahide Estuary pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Baldoyle Bay pNHA, Rockabill Island pNHA North Dublin Bay pNHA, Booterstown Marsh pNHA, Dolphins, Dublin Docks pNHA, Rogerstown Estuary pNHA and South Dublin Bay pNHA. The respective European sites are provided in Table 12.5. The Proposed Scheme also has the potential to affect biodiversity in a broader sense than only the QIs / SCIs of those European sites. Where biodiversity receptors in these pNHAs do not form part of the QIs / SCIs in the NIS assessment, they are considered under the other individual impact assessment headings for each KER below. Potential impacts arising from the Proposed Scheme on these pNHA sites would result in a likely significant negative effect at a national geographic scale.

12.4.4.2 Habitats

12.4.4.2.1 Habitat Degradation – Surface Water Quality

There will be drainage outfalls to the Liffey_180 and Liffey_190 during the Operational Phase of the Proposed Scheme. Surface water runoff from the Proposed Scheme could contain harmful compounds such as hydrocarbons, heavy metals and particulate matter, which would be derived from the internal combustion engines of vehicles using the route. These harmful compounds have the potential to affect the water quality of the waterbodies within the ZoI of the Proposed Scheme, as well as affecting aquatic flora and fauna located therein.

Where there is an increase in impermeable surface area, the drainage design principles ensure that there will be no net increase in the surface water flow discharged to these receptors (See Chapter 4 (Proposed Scheme Description) for more detail on drainage design).

Sections of the Proposed Scheme that do not increase impermeable surface area, will continue to discharge, directly to the receiving surface water network. Watercourses located within the hydrological ZoI of the Proposed Scheme include the Liffey_180, Liffey_190 and the Camac_040.

During operation, water runoff from the Proposed Scheme will discharge to the existing surface water drainage network. Sustainable Drainage Systems (SuDS), including Grass Surface Water Channels, Swales and bio-retention areas / rain gardens, filter drains, tree pits and oversized pipes are proposed in suitable locations along the Proposed Scheme (e.g., in the central median and along road verges). The inclusion of these SuDS systems will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 13 (Water).

The effects of habitat degradation as a result of impacts to surface water quality are not considered to be significant at any geographic scale. The Proposed Scheme will not exacerbate the existing surface water quality conditions. It will, in fact, result in a beneficial imperceptible impact on surface water quality in receiving water bodies due to the inclusion of SuDS, where appropriate. SuDS measures will reduce the volume of surface water runoff and concentrations of harmful compounds, such as hydrocarbons, heavy metals and particulate matter that would be derived from the internal combustion engines of vehicles using the route, being discharged into receiving waterbodies. Furthermore, it is anticipated that there will be a small beneficial impact on discharges to receptors due to the traffic reduction and treatment of runoff. This impact will be permanent; however, the predicted reduction in car use is small (less than 1.0% modal shift). As such, the impact would be beneficial, long-term and imperceptible (See Chapter 13 (Water) for more details). Habitat degradation, as a consequence of operational effects on surface water quality, is therefore not likely to be significant at any geographic scale.

Mitigation measures to maintain SuDS are provided in Section 12.5.2.

12.4.4.2.2 Habitat Degradation – Hydrological Regime

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

12.4.4.2.3 Habitat Degradation – Air Quality

As discussed in Section 7.4.2.1 of Chapter 7 (Air Quality), the air dispersion modelling assessment has found that the Proposed Scheme will be neutral overall in the study area. Therefore, there will be no significant negative effect, at any geographic scale.

12.4.4.2.4 Habitat Degradation – Non-native Invasive Plant Species

One invasive plant species, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011, was identified within the Proposed Scheme during the field surveys (See Table 12.7). In the absence of mitigation, there is potential for routine maintenance works to inadvertently spread contaminated vegetation cuttings both within the Proposed Scheme boundary, and within the immediate vicinity.

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

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, 2015 were recorded within the Proposed Scheme during field surveys. However, records for the following protected terrestrial species were returned from the desk study; betony, hairy violet and meadow barley, all found in Phoenix Park. Other species of conservation concern, which are known to occur within 1km of the Proposed Scheme include yellow archangel and bryophyte species such as Lance-leaved pottia, tall aloe-moss and thread-moss.

Operational impacts on these terrestrial species can be excluded as they are not located within the footprint of the Proposed Scheme, or immediately adjacent to it. Therefore, it can be concluded that there is no potential for the operation of the Proposed Scheme to result in any significant effects on rare and protected plant species.

12.4.4.4 Mammals

12.4.4.4.1 Bats

12.4.4.4.1.1 Indirect Disturbance of Flight Patterns Due to Operational Lighting

Bat activity was recorded at all locations surveyed. Additional permanent lighting features within suitable habitat may result in avoidance behaviour by bats. Such displacement (which would be a matter of metres) could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and 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 along existing road networks are not considered to be significant at any geographic scale. This is because the lighting strategy involves the use and upgrade of existing lighting infrastructure and given that artificial lighting is already in place along the Proposed Scheme, bat species who utilise the area would already be habituated to some level of artificial lighting. The effects of operational artificial lighting on bat species is therefore not considered to be significant at any geographic scale.

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 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.

The Proposed Scheme, for the most part, will consist of upgrading existing infrastructure. 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. Therefore, the effect of habitat severance / barrier effect on badger from the Proposed Scheme is not considered to be significant at any geographic scale.

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 & Longcore 2005).

There is some need for additional new lighting or relocation of existing lighting to be installed as part of the proposed design. The lighting design of the Proposed Scheme controls light emissions such that along the majority of the alignment light spill does not extend beyond the Proposed Scheme boundary and where it does, this is at tie-ins with the existing road network or at residential properties. There are no badger setts within the Proposed Scheme boundary and the only area with known badger activity is the open land spreading beyond Hermitage golf-course (typically away from the built N4 corridor), approximately 1.5km north-west of the Proposed Scheme boundary.

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

12.4.4.4.3 Otter

No evidence of otter was recorded along the Proposed Scheme during surveys undertaken. However, based on the results of the desktop study, otter are known to occur within the wider vicinity, particularly along the River Liffey and upstream sections of the River Camac (See Section 12.3.8.3 for details). Therefore, potential impacts on this species cannot be excluded, and are discussed below.

12.4.4.4.3.1 Habitat Severance / Barrier Effect

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

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

12.4.4.4.3.2 Disturbance / Displacement

Nocturnal mammals, such as the otter, would be likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore 2005). Permanent lighting is proposed along all of the Proposed Scheme footprint, however, it should be noted that the majority of the Proposed Scheme corridor is already lit artificially, and so otter in the area would be habituated to some degree of artificial lighting. The Proposed Scheme will not result in the introduction of artificial lighting into previously unlit areas, but rather the lighting strategy involves the upgrading / slight relocation of existing lighting columns.

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 likely long-term significant negative effect, at any geographic scale.

12.4.4.4.3.3 Habitat and Food Source Degradation – Surface Water Quality

As discussed in Section 12.4.3.2 under Habitat Degradation – Surface Water Quality, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on otter either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

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

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the ZoI of the Proposed Scheme include the Liffey_180, Liffey_190 and the Camac_040

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

12.4.4.4.3.4 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.

12.4.4.4.4 Marine Mammals

12.4.4.4.4.1 Surface Water Quality Impacts and Prey Abundance

As discussed in Section 12.4.3.2 under Habitat Degradation – Surface Water Quality, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on marine mammals either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

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

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the hydrological ZoI of the Proposed Scheme include three watercourses i.e. the Liffey_180, Liffey_190 and the Camac_040.

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

12.4.4.4.5 Other Mammals

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

12.4.4.4.5.1 Habitat Severance / Barrier Effect

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

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

12.4.4.4.5.2 Mortality Risk

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

12.4.4.4.5.3 Light Spill

Nocturnal mammals are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore 2005). Permanent lighting is proposed along all of the Proposed Scheme Corridor. However, it should be noted that the majority of the Proposed Scheme corridor is already lit artificially, and so mammals in the area would be habituated to some degree of artificial lighting. Furthermore, the Proposed Scheme will not result in the introduction of artificial lighting into previously unlit areas, but rather the lighting strategy involves the upgrading / slight relocation of existing lighting columns.

Lighting associated with the operation of the Proposed Scheme is not likely to affect the conservation status of other mammal species in the vicinity and therefore, will not result in a likely long-term significant negative effect, at any geographic scale.

12.4.4.5 Birds

12.4.4.5.1 Breeding Birds

12.4.4.5.1.1 Disturbance / Displacement

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

It is also important to note that the majority of the Proposed Scheme is located within a highly urbanised environment, and therefore 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.

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 12.4.4.1.1.2 under Habitat Degradation – Surface Water Quality, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on breeding 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. The proposed road drainage system incorporates a variety of drainage measures including, kerb and gully drainage, carrier drains, tree pits, sealed pipes, swales / carrier drains, filter drains, attenuation areas and pollution control as required in accordance with DMRB and CIRIA design standards. Pollution Control will be achieved during the conveyance of the road runoff to the attenuation features along the gullies and pipes to grassed swales / carrier drains and filter drains where the drainage is allowed filter through the vegetation and filter medium. The attenuation ponds will include a forebay and oil / petrol interceptor at each outfall location. Any section of drainage where there are no swales or filter drains will also have an oil / petrol interceptor installed at the outfall. The oil / petrol interceptors will be designed as per DMRB HD 33/15 (TII 2015b) and CIRIA 142 (CIRIA 1994). A minimum class 2 bypass interceptor will be installed where required. Where there is treatment by filtration in a swale, tree pit or filter drain an oil / petrol interceptor will not be required. Details of SuDS measures are described in Chapter 4 (Proposed Scheme Description).

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the hydrological ZoI of the Proposed Scheme include three watercourses i.e. the Liffey_180, Liffey_190 and the Camac_040.

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

12.4.4.5.2 Wintering Birds

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

12.4.4.5.2.1 Disturbance / Displacement

During operation, the Proposed Scheme has the potential to disturb and displace wintering bird species from their habitat near the Proposed Scheme boundary due to an increase in noise, human activity and visual disturbance associated with increased human presence and increased bus flow. Although the operational disturbance / displacement effect cannot be quantified with precision. It is expected to be much less than the 300m ZoI associated with construction works as 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. 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 sites 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. As any operational noise increases are not likely to alter the existing baseline noise effect on wintering birds in the locality, effects of noise disturbance can also be excluded.

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

12.4.4.5.2.2 Habitat Degradation – Surface Water

There will be drainage outfalls to the Liffey_180, Liffey_190 and Camac_040 during the Operational Phase of the Proposed Scheme. As discussed in Section 12.4.4.1.1.2 under Habitat Degradation – Surface Water Quality, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on 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. The proposed road drainage system incorporates a variety of drainage measures including, kerb and gully drainage, carrier drains, tree pits, sealed pipes, swales / carrier drains, filter drains, attenuation areas and pollution control as required in accordance with DMRB and CIRIA design standards. Pollution Control will be achieved during the conveyance of the road runoff to the attenuation features along the gullies and pipes to grassed swales / carrier drains and filter drains where the drainage is allowed filter through the vegetation and filter medium. The attenuation ponds will include a forebay and oil / petrol interceptor at each outfall location. Any section of drainage where there are no swales or filter drains will also have an oil / petrol interceptor installed at the outfall. The oil / petrol interceptors will be designed as per DMRB HD 33/15 (TII 2015b) and CIRIA 142 (CIRIA 1994). A minimum class 2 bypass interceptor will be installed where required. Where there is treatment by filtration in a swale, tree pit or filter drain an oil / petrol interceptor will not be required. Further details of SuDS measures are described in Chapter 4 (Proposed Scheme Description).

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the hydrological ZoI of the Proposed Scheme include the Liffey_180, Liffey_190 and the Camac_040.

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

12.4.4.6 Reptiles

No evidence of any protected reptile species, such as common lizard, was identified along the Proposed Scheme during the surveys undertaken. No suitable reptile habitat was identified within the study area. However, impacts on this protected species cannot be excluded and have therefore been assessed on a precautionary basis.

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

12.4.4.6.2 Mortality Risk

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

12.4.4.7 Amphibians

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

12.4.4.7.1 Habitat Severance / Barrier Effect

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

As the Proposed Scheme, for the most part, will consist 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

There will be drainage outfalls to the Liffey_180, Liffey_190 and Camac_040 during the Operational Phase of the Proposed Scheme. As discussed in Section 12.4.4.1.1.2 under Habitat Degradation – Surface Water Quality, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in

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

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the hydrological ZoI of the Proposed Scheme include the Liffey_180, Liffey_190 and the Camac_040.

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

12.4.4.8 Fish

12.4.4.8.1 Habitat Degradation – Surface Water

There will be drainage outfalls to the Liffey_180, Liffey_190 and Camac_040 during the Operational Phase of the Proposed Scheme. As discussed in Section 12.4.4.1.1.2 under Habitat Degradation – Surface Water Quality, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could potentially result in contamination of receiving water bodies. This could result in significant negative impacts on breeding 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. The proposed road drainage system incorporates a variety of drainage measures including, kerb and gully drainage, carrier drains, tree pits, sealed pipes, swales / carrier drains, filter drains, attenuation areas and pollution control as required in accordance with DMRB and CIRIA design standards. Pollution Control will be achieved during the conveyance of the road runoff to the attenuation features along the gullies and pipes to grassed swales / carrier drains and filter drains where the drainage is allowed filter through the vegetation and filter medium. The attenuation ponds will include a forebay and oil / petrol interceptor at each outfall location. Any section of drainage where there are no swales or filter drains will also have an oil / petrol interceptor installed at the outfall. The oil / petrol interceptors will be designed as per DMRB HD 33/15 (TII 2015b) and CIRIA 142 (CIRIA 1994). A minimum class 2 bypass interceptor will be installed where required. Where there is treatment by filtration in a swale, tree pit or filter drain an oil / petrol interceptor will not be required. Details of SuDS measures are described in Chapter 4 (Proposed Scheme Description).

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the hydrological ZoI of the Proposed Scheme include three watercourses i.e. the Liffey_180, Liffey_190 and the Camac_040.

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

12.4.4.9 Invertebrates

The desk study did not return results for any rare / protected invertebrate species within 1km of the Proposed Scheme. Therefore, no impacts are predicted.

12.4.4.10 Summary of Predicted Operational Phase Impacts (Pre-Mitigation)

Table 12.16: Summary of Predicted Operational Phase Impacts

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Designated Areas for Nature Conservation			
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	No significant residual effect
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	No significant residual effect
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Rockabill SPA Rockabill Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Dalkey Island SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology)	No significant residual effect
The Grand Canal pNHA	National Importance	Habitat Degradation (non-native invasive plant species)	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Habitats (Outside of Designated Areas for Nature Conservation)			
Tidal rivers (CW2)	National Importance	Habitat degradation (non-native invasive plant species)	No significant residual effect
Depositing/lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (non-native invasive plant species)	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat Degradation (non-native invasive plant species)	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat Degradation (non-native invasive plant species)	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat Degradation (non-native invasive plant species)	No significant residual effect
Treelines (WL2)	Local Importance (Higher Value)	Habitat Degradation (non-native invasive plant species)	No significant residual effect

12.5 Mitigation and Monitoring Measures

12.5.1 Construction Phase

Where deemed necessary a suitably experienced and qualified ecologist will be employed by the appointed contractor. The ecologist will advise the appointed contractor on ecological matters during construction, communicate all findings in a timely manner to the NTA and statutory authorities, acquire any licenses / consents required to conduct the work, and supervise and direct the ecological measures associated with the Proposed Scheme.

12.5.1.1 Designated Areas for Nature Conservation

12.5.1.1.1 European Sites

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

- Measures to protect surface water quality during construction; and
- Measures to prevent the spread of invasive species to downstream European sites.

12.5.1.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on NHA and pNHAs within the ZoI are as per those for European sites as the boundaries coincide with 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 and NHA at the national geographic scale.

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

12.5.1.2 Habitats

12.5.1.2.1 Habitat Loss & Fragmentation

Where practicable, areas of vegetation including habitats of Local Importance (Higher Value), such as mixed broadleaved woodland, scattered trees and parkland, treelines and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, will be retained. Proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor, shown as design mitigation, is listed below and displayed on the Landscaping General Arrangement drawings [BCIDB-JAC-ENV_LA-0007_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.

Vegetation to be retained is shown in further detail on the Landscape General Arrangement Drawings [BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001] in Volume 3 of this EIAR.

To mitigate the loss of habitat, proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor listed below and displayed on the Landscaping General Arrangement [BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001] in Volume 3 of this EIAR.

- 354 street trees planted;
- 220m of proposed hedgerow;
- 5,092m^2 of proposed species rich grassland;
- 1,971m^2 of proposed ornamental planting; and
- 1,958m^2 of proposed amenity grassland planting.

12.5.1.2.2 Habitat Degradation – Surface Water Quality

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

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

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

12.5.1.2.2.1 Site Specific Mitigation Measures – Construction Compound LV3

Activities within construction compound LV3 will be largely controlled as set out in the general measures in the SWMP. In addition, all surface water drains in the vicinity will be identified by the appointed contractor and either stopped up or bunded on the side closest to the Construction Compound. The perimeter wall along the pavement significantly reduces the risk of any silty water runoff or spillages reaching the surface water drains in the road; this will be retained in so far as is reasonably practicable. Where it is required to be removed, for example to facilitate access to the site, this will be done as far from the surface water gullies as is practicable.

Protection measures as set out above will reduce the risk of contaminants reaching the surface water system. The appointed contractor will ensure that appropriate spill control equipment is available, to control any spillages to the gullies should a spillage occur. The CEMP includes an Environmental Incident Response Plan, which will apply for the management of any incidents that may occur.

12.5.1.2.3 Habitat Degradation – Groundwater

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

- The construction management of the site will be implemented by the appointed contractor will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites –Guidance for consultants and contractors (Masters-Williams *et al*. 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination; and

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

The mitigation measures to protect groundwater quantity and quality during the Construction Phase are also outlined in Section 14.5.1 in Chapter 14 (Land, Soils, Geology & Hydrogeology) and Appendix A5.1 CEMP in Volume 4 of this EIAR. This includes control measures for the loss or damage of topsoil, and the pollution of soil and groundwater.

12.5.1.2.4 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 around the Construction Compound.

12.5.1.2.5 Habitat Degradation – Non-Native Invasive Plant Species

During the interim between the original non-native invasive species surveys which identified one non-native invasive species within the Proposed Scheme, and commencement of construction, it is possible that newly established Third Schedule non-native invasive species may have become established 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 the CEMP in Appendix A5.1 of Volume 4 of this EIAR).

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

- Where a pre-construction invasive species re-survey has confirmed the presence of previously identified Third Schedule non-native invasive species, or identifies newly established non-native invasive species within the footprint of the Proposed Scheme, the ISMP produced will provide a detailed description of the infestations (e.g. approximate area of the respective colonies (m^2), where feasible; approximate total number of stems, pattern of growth and information on other vegetation present), and where necessary, include calculations of volumes of infested soils to be excavated.
- The ISMP will be finalised following the pre-construction survey as advised by a suitably qualified specialist, with regard to the guidance on The Management of Invasive Alien Plant Species on National Roads (Technical Guidance) (TII 2020a; 2020b) and other species-specific guidance documents including those listed in the ISMP, as necessary.

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

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

12.5.1.3 Rare and Protected Plant Species

No impacts are predicted for any rare and protected flora species. Therefore, no mitigation is proposed.

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 places an onus of due diligence on anyone proposing to carry out works that might result in such damage or destruction. A derogation may be granted by the Minister where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range.

A total of two trees, London Plane *Platanus x acerifolia* (Mature) on Grattan Crescent were identified in trees within the footprint of the Proposed Scheme during the multidisciplinary surveys to contain PRFs (see Figure 12.7.2 in Volume 3 of this EIAR). These will not be removed during the Construction Phase of the Proposed Scheme, and the following mitigation measures will be followed:

- Retained trees with PRFs will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches, or root system of the tree which could disturb roosting bats. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist;
- Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it;
- The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) or concrete washout areas will not be undertaken within 10m of any retained trees, hedgerows and treelines;
- A qualified arborist engaged by the appointed contractor will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Scheme footprint but whose RPA is impacted by the works;
- Where works are required within the RPA, the mitigation measures as set out in the method statement within the Arboricultural Impact Assessment (refer to Appendix A17.1 in Volume 4 of this EIAR) will be implemented; and
- There will be no additional lighting within 5m of the PRF during the Construction Phase of the Proposed Scheme to avoid potential disturbance to roosting bats.

12.5.1.4.1.2 Habitat Loss & Fragmentation

Where practicable, habitats of importance to bats such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. These areas of vegetation to be retained are shown on the Landscaping General Arrangement Drawings [BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001] in Volume 3 of this EIAR.

To minimise the loss of habitat associated with the Proposed Scheme, there are also areas within the Proposed Scheme footprint which are included for mitigation planting where general construction works will not be undertaken. Proposed planting incorporated into the Proposed Scheme will be implemented, shown as design mitigation, is listed below and displayed on the Landscaping General Arrangement Drawings [BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001] in Volume 3 of this EIAR:

- 354 street trees planted; and
- 220m of proposed hedgerow.

Many species may not roost near a road development due to disturbance (e.g. high levels of artificial lighting). Whilst the planting is not likely to fully offset the loss of foraging and commuting habitat it is likely to provide additional foraging habitat after trees and hedgerows grow to a sufficient maturity.

12.5.1.4.1.3 Indirect Disturbance of Flight Patterns as a Result of Lighting During Construction

The appointed contractor in liaison with the suitably qualified licensed ecologist(s) will ensure that lighting at the construction compound, and active work areas in proximity to known bat activity, will be designed to minimise light spill and be cognisant of light-spill onto these areas.

Notwithstanding the urban / peri-urban location of the Proposed Scheme and existing public illumination, there are areas of open and linear vegetation features that provide for bats. However, during construction, the use of security lighting such as that around the Construction Compound and or additional lighting required for night-time works could impact on commuting / foraging territory.

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

Mitigation measures to reduce light spill will include the following:

- The use of sensor / timer triggered lighting;
- LED luminaires to be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights to be considered to minimise light spill;
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed; and
- Where night time works are required the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works (especially works carried adjacent to watercourses with known bat activity).

12.5.1.4.2 Badgers

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

12.5.1.4.2.1 Disturbance / Displacement

Although there were no signs of badger recorded during field surveys, 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 during the Construction of National Road Schemes (NRA 2005b).

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

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

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

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

12.5.1.4.3 Otter

Otter are listed on Annex II and Annex IV of the EU Habitats Directive. Otter 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, along the River Liffey and the Grand Canal. Otter are also known to occur along the River Camac, although the desk study did not return records of otter on these watercourses in close proximity to the Proposed Scheme.

12.5.1.4.3.1 Habitat Degradation / Reduced Prey Availability – Water Quality

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

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

12.5.1.4.3.2 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. Therefore, the NTA will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed within 12 months prior to any construction works commencing.

The presence of any new holt / couch sites will be treated and/or protected in accordance with the Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA 2006b).

12.5.1.4.3.3 Measures to Prevent Injury / Mortality Impacts

As detailed above in Section 12.5.1.4.3.2, 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 2008c).

12.5.1.4.4 Marine Mammals

12.5.1.4.4.1 Habitat and Food Resource Degradation – Water Quality

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

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

12.5.1.4.4.2 Other Mammal Species

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

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 13 (Water).

12.5.1.5 Birds

12.5.1.5.1 Breeding Birds

12.5.1.5.1.1 Habitat Degradation – Water Quality

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

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

12.5.1.5.1.2 Mortality Risk

Where practicable, vegetation (e.g. hedgerows, trees, scrub and grassland) will not be removed, between the 1 March and 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 3 days of the nest survey, otherwise repeat surveys will be required. Vegetation clearance will not commence where nests are present, works will resume when birds have fledged and nests are no longer in use, or an agreement is reached with NPWS.

12.5.1.5.1.3 Disturbance / Displacement

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

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

The use of noise generating equipment shall be tempered by the use of modern machinery that shall have appropriate noise restrictors for use in urban situations. Furthermore, the location of equipment that has the potential to cause long-term noise impacts, shall be sited in such a manner so that noise baffling screening reduces noise spill to adjacent coastal areas of open ground.

12.5.1.5.1.4 Habitat Loss & 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-ENV_LA-0007_XX_00-DR-LL-9001] in Volume 3 of this EIAR.

Planting of treeline, hedgerow and grassland habitats within the Proposed Scheme footprint will be carried out by the appointed contractor, as detailed in the landscape drawings (Refer to the Landscaping General Arrangement drawings [BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001] in Volume 3 of this EIAR for locations.

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

12.5.1.5.2 Wintering Birds

12.5.1.5.2.1 Habitat Degradation – Water Quality

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

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

12.5.1.5.2.2 Measures to Prevent Disturbance and Displacement Impacts During Construction

The following mitigation measures will be put in place at the Liffey Gaels Park Construction Compound by the appointed contractor to minimise disturbance to SCI bird species:

- The appointed contractor will undertake the establishment of the Construction Compound outside of the wintering bird season (October to March), where practicable. However, where the construction programme does not allow this seasonal restriction to be observed, then the construction compound will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to establishment. Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken.
- Hoarding of the Construction Compound will be in place prior to the arrival of wintering birds and will be retained on all sides of the compound for the duration of the works.
- The use of lighting at Construction Compounds where required shall be such that it is not excessively tall thus providing an obstacle to low-flying birds potentially moving between feeding sites. Furthermore, and where security lighting is not required, lighting should not be continuously on when compound is closed. Sensor-operated lighting timers as necessary should be installed.

- In addition to lighting at the Construction Compound aligning with Section 12.5.1.4.1.3 the lighting column heights will be considered by the appointed contractor, so as not to act as an obstacle to birds.

12.5.1.6 Reptiles

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

12.5.1.7 Amphibians

12.5.1.7.1 Habitat Loss, Disturbance and Mortality Risk

No amphibian species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme; however, some suitable amphibian breeding habitats were noted along the Proposed Scheme as noted in Section 12.3.11.

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

- In the case of common frog, any frog spawn, tadpoles, juvenile or adult frogs present will be captured, under a licence from NPWS and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat, beyond the ZoI of the Proposed Scheme;
- In the case of smooth newt, individuals will be captured, under a licence from NPWS, and removed from affected habitat either by hand net or by trapping and translocated to the nearest area of available suitable habitat, beyond the ZoI of the Proposed Scheme. If used, the type and design of traps shall be approved by the NPWS. This is a standard and proven method of catching and translocating smooth newt;
- If the size or depth of the habitat feature is such that it cannot be determined by a visual survey whether all amphibians have been captured, the suitably qualified ecologist engaged by the appointed contractor will advise on the appropriate course of action to confirm that no amphibian species remain. If drainage of the habitat feature is deemed to be the appropriate course of action, any mechanical pumps used will have a screen fitted, and be sited, such that no amphibian species can be sucked into the pump mechanism; and
- Any capture and translocation works shall be undertaken immediately in advance of site clearance / construction works commencing.

12.5.1.7.2 Habitat Degradation – Surface Water Quality

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

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

12.5.1.8 Fish

12.5.1.8.1 Habitat Degradation – Surface Water Quality

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

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

12.5.1.9 Invertebrates

The construction of the Proposed Scheme is not expected to result in any impacts to rare or protected invertebrate species. Therefore, no mitigation is proposed.

12.5.2 Operational Phase

12.5.2.1 Designated Areas for Natura Conservation

12.5.2.1.1 European Sites

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

- Measures to protect surface water quality during operation;
- Measures to re-establish vegetation in timely manner; and
- Measures to prevent the spread of invasive species to downstream European sites.

12.5.2.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on pNHAs and NHA within the ZoI are as set out for European sites as the boundaries of the pNHAs and NHA follow those of the SACs and SPAs. Therefore, the mitigation measures outlined in Section 12.5.1.1.1, and as detailed in the NIS (which accompanies the application for approval), will prevent the Proposed Scheme resulting in a significant negative effect on these pNHAs.

12.5.2.2 Habitats

12.5.2.2.1 Habitat Degradation – Surface Water Quality

The proposed SuDS drainage system, as shown in Proposed Surface Water Drainage Works drawings [BCIDB-JAC-DNG_RD-0007_XX_00-DR-CD-9001] in Volume 3 of this EIAR), will be installed by the appointed contractor during the Construction Phase.

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. The increase in surface water run-off from the increase in impermeable area will be managed for the Proposed Scheme by the appointed contractor through a combination of bioretention areas and filtration drains. Where no new paved areas are proposed, the existing drainage network will be retained and utilised. The effective implementation of these measures will ensure that there is no increase in existing runoff rates from newly paved areas and appropriate treatment to ensure runoff quality. The range of measures including SuDS installed during the Construction Phase will reduce both the volume and rate of surface waters discharging into the existing surface water drainage network, as well as improving the environmental quality of any such discharges during the Operational Phase of the Proposed Scheme.

These standard drainage design controls have been proven through widespread use in developments across the country. The proposed SuDS drainage system incorporated into the engineering design of the site are common drainage systems that are used in most development types. They are proposed and designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS 2005). Once the Proposed Scheme is in operation, the Local Authority will be required to implement a maintenance and inspection regime (and/or emergency repairs if necessary). No additional mitigation is required.

12.5.2.2.2 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.

12.5.2.3 Rare and Protected Flora Species

No impacts on rare and protected flora species are predicted as a result of the Operation Phase of the Proposed Scheme. Therefore, no mitigation is proposed.

12.5.2.4 Mammals

12.5.2.4.1 Bats

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

12.5.2.4.2 Badgers

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

12.5.2.4.3 Otter

12.5.2.4.3.1 Habitat Degradation / Reduced Prey Availability – Surface Water Quality

Refer to Section 12.5.2.2.1.

12.5.2.4.4 Marine Mammals

12.5.2.4.4.1 Habitat Degradation / Reduced Prey Availability – Water Quality

Refer to Section 12.5.2.2.1.

12.5.2.4.5 Other Mammals Species

The operation of the Proposed Scheme is not predicted to result in any significant effects to populations of other protected / rare 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

Refer to Section 12.5.2.2.1.

12.5.2.5.2 Wintering Birds

12.5.2.5.2.1 Habitat Degradation – Surface Water

Refer to Section 12.5.2.2.1.

12.5.2.6 Reptiles

The Operation 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

12.5.2.7.1.1 Habitat Degradation – Surface Water

Refer to Section 12.5.2.2.1.

12.5.2.8 Fish

12.5.2.8.1.1 Habitat Degradation – Surface Water

Refer to Section 12.5.2.2.1.

12.5.2.9 Invertebrates

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

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 geographic scale on the KERs identified (see Table 12.17 and Table 12.18) on its own, or cumulatively together with other proposed developments during the Construction Phase.

Table 12.17: Summary of Construction Phase Significant Residual Impacts

Ecological Receptor	Ecological Valuation	Predicted Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Designated Areas for Nature Conservation				
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Predicted Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
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), Disturbance and Displacement	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), Disturbance and Displacement	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species), Disturbance and Displacement)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international to national geographic scale	No significant residual effect
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
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
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Dalkey Island SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology), Disturbance and Displacement	Likely significant effect at the international to national geographic scale	No significant residual effect
The 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

Ecological Receptor	Ecological Valuation	Predicted Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Habitats (Outside of Designated Areas for Nature Conservation)				
Tidal rivers (CW2)	National Importance	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Depositing/lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	Likely significant residual 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	Likely significant residual effect at the local geographic scale
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
Fauna Species				
Bats	Local Importance (Higher Value)	Habitat loss / fragmentation; Disturbance/displacement	Likely significant effect at the local geographic scale	No significant residual effect
Badger	Local Importance (Higher Value)	Disturbance / displacement	Likely significant effect at the local geographic scale	No significant residual effect
Otter	County Importance	Habitat degradation (hydrology; disturbance/displacement)	Likely significant effect at the local geographic scale	No significant residual effect
Marine mammals	International to County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
SCI bird species	International Importance	*See SPAs Section 12.3.4*	*See SPAs Section 12.3.4*	*See SPAs Section 12.3.4*
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (Habitat Degradation (hydrology)) Likely significant residual effect at the local geographic scale (Habitat Loss; Mortality risk; Disturbance / Displacement)
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Annex fish species (Atlantic salmon)	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Non-Annex fish species (e.g. brown trout, European eel)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

12.6.2 Operational Phase

Following the implementation of the mitigation measures outlined in Section 12.5, the Proposed Scheme will not result in any significant residual effect on the KERs identified (see Table 12.13) on its own, or cumulatively together with other proposed developments during the Operational Phase.

Table 12.18: Summary of Operational Phase Significant Residual Impacts

Ecological Receptor	Ecological Valuation	Predicted Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Designated Areas for Nature Conservation				
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA 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	No significant residual effect
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
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

Ecological Receptor	Ecological Valuation	Predicted Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
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
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Dalkey Island SPA Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	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
The Grand Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Habitats (Outside of Designated Areas for Nature Conservation)				
Tidal rivers (CW2)	National Importance	Habitat degradation (non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Depositing/lowland rivers (FW2)	Local Importance (Higher Value)	Habitat degradation (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
Fauna Species				
Otter	County Importance	Habitat degradation / reduced prey availability (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine mammals	International to County Importance	Habitat degradation / reduced prey availability (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
SCI bird species	International Importance	*See SPAs Section 12.3.4*	Likely significant effect at the local geographic scale	No significant residual effect
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Predicted 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
Annex fish species (Atlantic salmon)	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Non-Annex fish species (e.g. brown trout, European eel)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local 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. & 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. & Rochford, J. (2006). Otter Survey of Ireland 2004/2005 Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

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. & Kunin, W.E. (2006). Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands. Science, 313, 351– 354.

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

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

BCI (2020/1) Bat Conservation Ireland Database.

BSBI (2020) Botanical Society of Britain and Ireland Maps [Online] Available from https://bsbi.org/maps

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

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

Chartered Institute of Ecology and Environmental Management (2019). Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

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

Construction Industry Research & Information Association (CIRIA) (1994). CIRIA Report 142 - Control of Pollution from Highway Drainage Discharges

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

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

DCC (2016). Dublin City Development Plan 2016-2022. [Online] Available from data.gov.ie/dataset/sustainable-urban-drainage-sytems-suds-resgister-and-map

DCHG (2017). National Biodiversity Plan 2017 – 2021.

DHPLG (2018). River Basin Management Plan 2018 – 2021.

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

Dublin Drainage Consultancy (2005). Greater Dublin Strategic Drainage Study (GDSDS)

EPA (2015). Advice Notes for Preparing Environmental Impact Statements. Draft. September 2015.

EPA (2020). EPA Maps. Available at gis.epa.ie/EPAMaps/

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

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

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

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

FCC (2017) Fingal County Development Plan 2017-2023.

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

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

Gilbert, G., Gibbons, D. W. & Evans, J. (1998). Bird Monitoring Methods. RSPB, Sandy.

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

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

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

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

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

IFI (2010). Inland Fisheries Ireland Biosecurity Protocol for Field Survey Work. Inland Fisheries Ireland, Dublin, Ireland.

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

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

Kelleher, C. & Marnell, F. (2006). Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Kelly F. L., Matson, R., Connor, L., Feeney, R., Morrissey, E., Wogerbauer C. & Rocks, K. (2012). Water Framework Directive Fish Stock Survey of Rivers in the Eastern River Basin District, 2011. Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin.

Kelly, F.L., Connor, L., Matson, R., Feeney, R., Morrissey, E., Coyne, J. and Rocks, K. (2015) Sampling Fish for the Water Framework Directive - Summary Report 2014. Inland Fisheries Ireland, Citywest Business Campus, Dublin 24, Ireland.

King, J., Marnell, F., Kingston, N., Rosell, R., Roche, W.K. & Cassidy, D. (2011). Ireland Red List No. 5: Fish, Amphibians & Reptiles. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland

Lockhart, N., Hodgetts, N. & Holyoak, D. (2012). Ireland Red List No.8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Macklin, R., Brazier, B. & Sleeman, P. (2019). Dublin City otter survey. Report prepared by Triturus Environmental Ltd. for Dublin City Council as an action of the Dublin City Biodiversity Action Plan 2015- 2020.

Marnell, F. (2002). The distribution and habitat of the common lizard, in Ireland. Bulletin of the Irish Biogeographical Society. 26: 75-82.

Marnell, F., Looney, D. & Lawton, C. (2019). Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Masters-Williams H, Heap H, Kitts H, Greenshaw L, Davis S, Fisher P, Hendrie M and Owens D (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532D), CIRIA, London

Matson, R., Delanty, K., Gordon, P., O'Briain, R., McCarthy, E., Cierpal, D., Connor, L., Corcoran, W., Coyne, J., McLoone, P., Morrisey-McCaffrey, E., Brett, T., Gavin, A & Kelly, F.L., (2019). Sampling Fish in Rivers 2018 - Dodder, Factsheet No. 2. National Research Survey Programme. Inland Fisheries Ireland.

Merne, O.J. & Madden, B. (2000). Breeding seabirds of Ireland's Eye, County Dublin. Irish Birds 6:495- 506.

Mitchell-Jones, A.J. & McLeish, A.P. (1999). The Bat Workers' Manual.

NBDC Online Database (2022). Online data records available on the National Biodiversity Data Centre Database. Available at https://maps.biodiversityireland.ie/ [Accessed 3rd February 2022]

Nelson, B., Ronayne, C. & Thompson, R. (2011). Ireland Red List No.6: Damselflies & Dragonflies (Odonata). National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (2007a). Circular Letter NPWS 2/07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species / applications for derogation licences.

NPWS (2007b). Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites.

NPWS (2012a). Article 12 Spatial Data. Available at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-12-data

NPWS (2012b) Conservation Objectives: Baldoyle Bay SAC 000199. Version 1.0. National Parks and WildlifeService, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013a). Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013b). Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013c). Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013d) Conservation Objectives: Malahide Estuary 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 (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: Wicklow Mountains SAC 002122. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017b) Conservation Objectives: Ireland's Eye SAC 002193. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2018) Natura 2000 – Standard Data Form. Wicklow Mountains SAC 002122. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

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). Article 17 – Spatial Data Habitats (for 2019) [Online] Available from https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17

NPWS (2019e) Natura 2000 – Standard Data Form. Rye Water Valley / Carton SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2019f) Natura 2000 – Standard Data Form. Rockabill to Dalkey Island SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2019g) Natura 2000 – Standard Data Form. Rogerstown Estuary SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2019h) Natura 2000 – Standard Data Form. Lambay Island SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020a) Natura 2000 – Standard Data Form. South Dublin Bay SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020b) Natura 2000 – Standard Data Form. North Dublin Bay SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020c). Natura 2000 – Standard Data Form. Baldoyle Bay SAC 000199. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020d). Natura 2000 – Standard Data Form. Malahide Estuary SAC 000199. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020e) Natura 2000 – Standard Data Form. Ireland's Eye SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020f). Natura 2000 – Standard Data Form. North Bull Island SPA 0004006. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020g). Natura 2000 – Standard Data Form. Baldoyle Bay SPA 004016. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020h). Natura 2000 – Standard Data Form. Wicklow Mountains SPA 004040. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020i). Natura 2000 – Standard Data Form. Howth Head Coast SPA 0004113. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020j). Natura 2000 – Standard Data Form. Dalkey Islands SPA 0004172. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020k). Natura 2000 – Standard Data Form. Ireland's Eye SPA 0004117. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020l). Natura 2000 – Standard Data Form. Rogerstown Estuary SPA 0004015. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020m). Natura 2000 – Standard Data Form. Lambay Island SPA 0004069. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020n). Natura 2000 – Standard Data Form. Skerries Islands SPA 0004122. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020o). Natura 2000 – Standard Data Form. Rockabill SPA 0004014. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2020p). Natura 2000 – Standard Data Form. The Murrough SPA 0004186. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2021a) Conservation Objectives: Rye Water Valley/Carton SAC 001398. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

NPWS (2021b). Conservation objectives for Glenasmole Valley SAC [001209]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2021c) Natura 2000 – Standard Data Form. Glenasmole Valley SAC. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

NPWS (2021d) Natura 2000 – Standard Data Form. Howth Head SAC. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

NPWS (2021e) Natura 2000 – Standard Data Form. South Dublin Bay and River Tolka Estuary SPA. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

NPWS (2021f) Natura 2000 – Standard Data Form. Malahide Estuary SPA. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2022a). Conservation objectives for Wicklow Mountains SPA [004040]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2022b). Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2022c). Conservation objectives for Dalkey Islands SPA [004172]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2022d). Conservation objectives for Ireland's Eye SPA [004117]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2022e). Conservation objectives for Lambay Island SPA [004069]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2022f). Conservation objectives for Skerries Islands SPA [004122]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS (2022g). Conservation objectives for The Murrough SPA [004186]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

NPWS Online Database (2021j). 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 [Accessed 19th November 2021]

NRA (2005a). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.

NRA (2005b). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.

NRA (2006a). Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.

NRA (2006b). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.

NRA (2008a). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.

NRA (2008b). Environmental Impact Assessment of National Road Schemes – A Practical Guide. National Roads Authority.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes.

Öckinger, E., Dannestam A. & Smith, H. G. (2009). The importance of fragmentation and habitat quality of urban grasslands for butterfly diversity. Landscape and Urban Planning 93(1):31-37.

Ó'Neill, L., Veldhuizen, T., de Jongh, A. & Rochford, J. (2009). Ranging behaviour and socio-biology of Eurasian otters (Lutra lutra) on lowland mesotrophic river systems. European Journal of Wildlife Research. 55:363-370.

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & 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.

Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D. & Wilson, C.J. (2010). Ireland Red List No. 4 – Butterflies. Department of the Environment, Heritage, and Local Government, Ireland.

Rich, C. & Longcore, T. (2005). Ecological Consequences of Artificial Night lighting. Island Press.

Roos, A., Loy, A., Savage, M., & Kranz, A (2021). Lutra Lutra Red List of Threatened Species 2021: e.T12419A124578163. Lutra lutra (Eurasian Otter) (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.

SDCC (2016). South Dublin County Development Plan 2016-2022.

SDCC (2010) South Dublin County Heritage Plan 2010-2015.

Shiel, C.B., Shiel, R.E. & Fairley, J.S. (1999). Seasonal changes in the foraging behaviour of Leisler's bats (Nyctalus leisleri) as revealed by radio-telemetry. Journal of Zoology: 249: 347-358.

Smith, G.F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council Church Lane, Kilkenny, Ireland.

Stace, C. A. (2019). New Flora of the British Isles. 4th Edition. C&M Floristics.

Svensson, L., Mullarney & K., Zetterstrom, D. (2010). Collins Bird Guide 2nd Ed. 2009 HarperCollins Publishers, London.

The Environment Agency (2010). Fifth Otter Survey of England 2009-2012. Full Technical Report. The Environment Agency, UK.

Transport Infrastructure Ireland (TII) (2015b). DN-DNG-03066 Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control.

TII (2020a). The Management of Invasive Alien Plant Species on National Roads - Technical Guidance. Transport Infrastructure Ireland Publications.

TII (2020b). The Management of Invasive Alien Plant Species on National Roads – Standard.

Trinity College Dublin (2017). Trinity Campus Pollinator Plan (CPP). Available at: https://naturalscience.tcd.ie/pollinator/conserve.php

Wright, M., Goodman, P. & Cameron, T. (2010). Exploring Behavioural Responses of Shorebirds to Impulse Noise. Wildfowl (2010) 60: 150-167.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016). Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

Directives and Legislation

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive).

Council Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

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 2017

S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).

S.I. No. 356/2015 - Flora (Protection) Order, 2015.

S.I. No. 115/2021 - Planning and Development Act 2000 (Exempted Development) (No. 2) Regulations 2021.

Wildlife Acts 1976 (as amended)