



Chapter 12
Biodiversity

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12. Biodiversity

12.1 Introduction

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

The likely significant effects of the Proposed Scheme on biodiversity during both the Construction Phase and Operational Phase (including routine maintenance) have been assessed. The potential construction phase impacts assessed include those on air, water quality, habitats, and on flora and fauna from construction activities such as utility diversions, road resurfacing, 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 process with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Scheme are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

12.2 Methodology

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

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

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

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

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

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 illustrated in Figure 12.1.1 to Figure 12.1.2 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 2018) define the Zoi for a development is the area over which ecological features may be subject to significant impacts as a result of the Proposed Scheme and associated activities (see Section 12.3.1 for more detail on the Zoi as it relates to the Proposed Scheme and the various ecological receptors).

The ecological surveys were designed based upon the characteristics of the Proposed Scheme and its likely significant impacts on the baseline environment during construction and / or operation. The study areas are described in Table 12.1, and, where relevant, are also shown on the Figure 12.5 to Figure 12.9 in Volume 3 of this EIAR.

Table 12.1: Ecological Survey Study Areas for Each Ecological Receptor

Ecological Receptor	Study Area Description
Habitats	The area within or immediately adjacent to the Proposed Scheme footprint where habitats could be directly or indirectly affected during construction/operation. The extent of the study area for habitats is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Rare and / or Protected Flora	The area within or immediately adjacent to the Proposed Scheme footprint where rare and/or protected flora could be directly or indirectly affected during construction/operation. The extent of the study area for rare and/or protected flora is illustrated in Figure 12.5 in Volume 3 of this EIAR.
Fauna species other than those listed below (includes badger, otter, other protected mammal species, amphibians, and reptiles)	The area within or immediately adjacent to the Proposed Scheme footprint where fauna species could be directly or indirectly affected during construction/operation. The extent of the study area for fauna species (other than bats and breeding birds) is illustrated in General Arrangement drawings (BCIDC-ARP-GEO_GA-1415_XX_01-DR-CR-9001) and Figure 12.7 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 12.8.1 to Figure 12.8.2 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 12.9 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) Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2017);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (hereafter referred to as the CIEEM Guidelines) (CIEEM 2018);

- National Road Authority (NRA) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority (NRA, 2005a);
- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority (NRA 2005a);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes. National Roads Authority (NRA 2006a);
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2008a);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide. National Roads Authority (2008b);
- Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (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);
- Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (Collins, J (ed.) 2016);
- The Bat Workers’ Manual (Mitchell-Jones and McLeish 1999);
- Bat Mitigation Guidelines for Ireland. 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 2021).

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);
- Dún Laoghaire-Rathdown County Development Plan 2016-2022 (DLRCC 2016); and
- Dún Laoghaire-Rathdown Biodiversity Plan 2009-2013 (DLRCC 2009).

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;
- Wildlife Acts 1976 to 2021;
- S.I. No. 356/2015 - Flora (Protection) Order, 2015 (hereafter referred to as the Flora Protection Order); and,
- Fisheries Acts 1959 to 2019

12.2.3 Data Collection and Collation

12.2.3.1 Desk Study

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

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

- Online data available on European sites and on Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the NPWS (NPWS Online Database 2021ja);
- Online data records available on National Biodiversity Data Centre Database (NBDC Online Database 2022);
- Ordnance Survey Ireland (OSI) orthophotography (from 1995 to 2012) for the Proposed Scheme study area;
- Bus Connects Drone Imagery, surveyed 2020 (NTA, 2020);
- Records of rare and / or protected species for the 10km (kilometre) grid squares O03, O13 and O23, held by the NPWS;
- Habitat and species GIS datasets provided by the NPWS, including Article 12 and Article 17 data;
- Bat records from Bat Conservation Ireland's (BCI) database;
- Records from the Botanical Society of Britain and Ireland (BSBI);
- Information contained within the Flora of County Dublin (Doogue *et al.* 1998);
- Environmental information/data for the area available from the EPA website (EPA 2020);
- Information on the status of European Union (EU) protected habitats and species in Ireland (NPWS 2019a, NPWS 2019b and NPWS 2019c);
- Information on light-bellied Brent goose inland feeding sites (Scott Cawley Ltd., 2017); and
- Information on habitats and plant species recorded at Booterstown Nature Reserve (McCorry & Ryle 2009).

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

A desk study was carried out to identify any potential suitable inland feeding and / or roosting sites for winter birds located within or directly adjacent to the Proposed Scheme. This included a review of recent aerial photography and known inland feeding sites for the Special Conservation Interest (SCI) bird species light-bellied Brent goose *Branta bernicla hrota* (Scott Cawley Ltd. 2017). The desk study 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. Aquatic surveys, suitability assessments for nesting birds, and otter surveys were undertaken at the proposed crossing points at which in-stream works, modifications to banks or significant disturbance (i.e. piling / rock breaking techniques) are proposed. Construction methodologies will not require significant works to waterbodies, as such aquatic surveys were not undertaken.

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 October 2020	Scott Cawley Ltd.
Mammal surveys (excluding bats)	June to August 2018 August 2020 October 2020 February 2021	Scott Cawley Ltd.
Bat surveys:	<u>Walked transect activity surveys</u> June to August 2018 September and October 2019 May 2020 July 2020 July 2021 August 2021 <u>Identification of potential roost features (PRFs)</u> June to August 2018 August 2020	Scott Cawley Ltd.
Wintering bird survey	February to March 2020 November 2020 to March 2021 October 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 between June and August 2018, and in August 2020 and October 2020 to capture design changes to the Proposed Scheme. All habitats located within or immediately adjacent to the Proposed Scheme footprint were surveyed and mapped to level three of the Heritage Council's A Guide to Habitats in Ireland habitat codes, after Fossitt (Fossitt 2000) and in accordance with Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.* 2011). The level of field data quality (as per Smith *et al.* 2011) was also recorded. Plant species present that were either representative of a habitat or considered to be of conservation interest (i.e., those listed on the Flora Protection Order or listed in the 'threatened' category or higher on the Ireland Red List No. 10 Vascular Plants (Wyse Jackson *et al.* 2016) and the Ireland Red List No. 8 Bryophytes (Lockhart *et al.* 2012)) were recorded, along with their relative abundances. Non-native invasive plant species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations were also recorded. The habitat's extent was mapped onto an aerial photograph, with Global Positioning System (GPS) points taken where a habitat's extent could not be clearly identified from the aerial photograph. Vascular plant nomenclature follows that of the New Flora of the British Isles Fourth Edition (Stace 2019).

12.2.3.4 Mammals (Excluding Bats)

The footprint of the Proposed Scheme was surveyed for badger *Meles meles* and otter *Lutra lutra* activity as part of the multidisciplinary walkover survey, undertaken between June and August 2018, in August 2020 and February 2021. While no works (piling or other instream works) are proposed at any watercourse crossing, the desk study identified a number of watercourses which may be subject to disturbance by virtue of proximity of the Proposed Scheme. These sites are the existing bridge crossings at Ballsbridge and the works adjacent to the Grand Canal. A corridor, approximately 150m upstream and downstream of the crossing points, was resurveyed in February 2021 to identify the presence of otter holts. With the exception of the Grand Canal crossing, the

remainder of the watercourse crossings are considered unsuitable for otter habitation and/or of such condition that food resources would not be supported. 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 hibernicus*. Nevertheless, during all surveys, attention was paid to activity signs such as searching soft muds for tracks, and to look for droppings. Potential presence of these species in suitable habitat was determined based on the habitat preferences described in Exploring Irish Mammals (Hayden & Harrington 2000).

12.2.3.5 Bats

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

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

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 lands adjacent to Nutley Lane, referred to as CBC1415BT001, Rock Road adjacent to Blackrock College, referred to as CBC1415BT002, and Rock Road adjacent to Blackrock Park, referred to as CBC1415BT003. The walked transect routes are shown on Figure 12.1.1 in Volume 3 of this EIAR.

Walked transect surveys comprised of four visits to each transect route across the three seasons of autumn, spring and summer as guided by Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2016) (see Table 12.2 for specific dates). Surveys were conducted in June to August 2018, September and October 2019, May 2020, and July 2020. Additional route sections were surveyed in 2021. Surveys commenced approximately 30 minutes after sunset to ensure that bats had emerged from their roosts. Surveys involved the surveyor walking each transect route at a slow pace using with a handheld ultrasound bat detector (Elekon Batlogger M) to record any bat species present.

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

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

12.2.3.6 Wintering Birds

A desk study was carried out to identify any potential suitable inland feeding and / or roosting sites for 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 two sites along or adjacent to the Proposed Scheme with potential for wintering birds that would be subject to direct habitat loss. These were located adjacent to Rock Road at Booterstown Nature Reserve referred to as CBC1415WB001, and Blackrock Park referred to as CBC1415WB002 (refer to Figure 12.1.2 in Volume 3 of the EIAR). Each site was surveyed over seven consecutive weeks across February and March 2020 and additionally twice a month, between the months of November 2020 and March 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.

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

12.2.3.7 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);
- The EPA Guidelines (EPA 2017);
- EPA Advice Notes (EPA 2015);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Union, 2013);
- CIEEM Guidelines (CIEEM 2018); and
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009).

12.2.4.1 Valuing the Ecological Receptors

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

Habitat areas within Special Areas of Conservation (SACs) and Special Areas of Conservation (SPAs) are considered in the context of assessing impacts on the conservation objectives and site integrity of a given

European site with regard to the Appropriate Assessment (AA) tests set out in Article 6(3) of the Habitats Directive. An AA Screening Report and Natura Impact Statements have been submitted with the application for approval as to enable the Board to carry out the requisite assessments for the purposes of Article 6(3) of the Habitats Directive. For the purposes of the appraisal of likely significant effects on biodiversity arising from the Proposed Scheme, as part of this chapter of the EIAR, all European sites are valued as internationally important.

In accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009), biodiversity features within the Zol 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 2017): Momentary Effects - effects lasting from seconds to minutes; Brief Effects - effects lasting less than a day; Temporary Effects - effects lasting less than a year; Short-term Effects - effects lasting one to seven years; Medium-term Effects - effects lasting seven to 15 years; Long-term Effects - effects lasting 15 to 60 years; Permanent Effects - effects lasting over 60 years.

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

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

12.2.4.3 Impact Significance

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

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

12.2.4.3.1 Integrity

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

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

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

12.2.4.3.2 Conservation Status

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

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

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

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

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

And the conservation status of a species is favourable when:

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

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

12.3 Baseline Environment

The Proposed Scheme has an overall length of approximately 8.3km and is comprised of two main alignments in terms of the route it follows; Blackrock to the City Centre and along Nutley Lane.

The Blackrock to City Centre section will commence on the R113 at Temple Hill, approximately 80m to the north of the R827 Stradbroke Road, travel along the N31 Frascati Road, the R118 Rock Road / Merrion Road / Pembroke Road, the R816 Pembroke Road / Baggot Street Upper / Baggot Street Lower, turn onto Fitzwilliam Street Lower and terminate at the junction of Mount Street Upper / Merrion Square South / Merrion Square East. The total length of this section of the Proposed Scheme will be approximately 7.4km. Habitats present at Temple Hill includes buildings and artificial surfaces, residential developments, stone wall and other stonework interspersed with scattered trees and parklands. As the Proposed Scheme will extend along Temple Road, the dominant habitats present include buildings and artificial surfaces and residential developments, with landscaping habitats such as amenity grasslands, treelines, hedgerows and ornamental / non-native scrubs that are incorporated into road medians and decorative features. The Proposed Scheme will cross the culverted Brewery Stream and Priory Stream at Temple Road and Frascati Road respectively, before merging with the Rock Road at Rock Hill. Amenity grassland, broadleaved woodland and scattered trees and parkland increase in abundance at adjacent sites to the Rock Road, such as Blackrock Park, Blackrock College and Booterstown Playground while treelines and hedgerows predominant as screening along roadsides. Buildings and artificial surfaces and residential developments are the dominant habitats found along the Proposed Scheme as Rock Road merges with Merrion Road at Booterstown Nature Reserve where it crosses Booterstown Stream and Elm Park Stream. Scrub, scattered trees and parkland, amenity grassland, treelines and flowerbeds and borders interspersed along roadsides at this section of the Proposed Scheme. Residential developments and buildings and artificial surfaces dominate the remainder of Proposed Scheme along Merrion Road with occasional landscaping such as amenity grassland, ornamental / non-native shrubs and flowerbeds and borders also present.

The Nutley Lane section of the Proposed Scheme will commence at the tie-in with the signalised junction on the R138 Stillorgan Road on the southern end of Nutley Lane, travel along Nutley Lane and terminate at the junction with the R118 Merrion Road. The total length of this section of the scheme will be approximately 0.90km. The Nutley Lane section of the Proposed Scheme is dominated by buildings and artificial surfaces and residential developments, with broadleaved woods, treelines, amenity grassland and scattered trees and grassland predominant at the RTÉ campus and Elm Park Golf & Sports Club adjacent to the junction of Nutley Road and Stillorgan Road. As the Proposed Scheme will continue along Merrion Road from Nutley Lane, scattered trees and parkland are interspersed between buildings and artificial surfaces at St. Vincent's University Hospital. As the Proposed Scheme will progress along Merrion Road, residential developments and buildings and artificial surfaces continue to dominate and feature mosaics of landscaping habitats including treelines, amenity grassland and scattered trees and parkland. Freshwater habitats can be found where the Proposed Scheme will cross the River Dodder at Pembroke Road and the Grand Canal at Baggot Street Lower. Scrub and amenity grassland can be found on the banks of the Grand Canal at Wilton Terrace and Herbert Place. As the Proposed Scheme will continue along Pembroke Road and Baggot Street Upper, buildings and artificial surfaces are dominant with landscaping such as treelines, amenity grassland and ornamental / non-native shrubs present at commercial buildings and along road medians. Buildings and artificial surfaces are dominant where the Proposed Scheme will terminate at Baggot Street Lower and Fitzwilliam Street Lower.

12.3.1 Zone of Influence (Zol)

The Zol, 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 Zol 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 Zol extends beyond the study area as described in Section 12.2.1 (e.g. surface water quality effects of a sufficient magnitude can extend, and affect, receptors at significant distances downstream).

The Zol of the Proposed Scheme in relation to terrestrial habitats is generally limited to the footprint of the Proposed Scheme, and the immediate environs (to take account of shading or other indirect impacts, such as air

quality). Hydrogeological / hydrological linkages (e.g. rivers or groundwater flows) between impact sources and wetland / aquatic habitats can often result in impacts occurring at significant distances.

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

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

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

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

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

Waterbody Name	Connectivity to the Proposed Scheme
Brewery Stream (Brewery Stream_010)	Culverted beneath Proposed Scheme at junction of Frascati Road and Temple Road at Brewery Stream crossing.
Priory Stream (Brewery Stream_010)	Culverted beneath Proposed Scheme at junction of Rock Hill and Rock Road at Priory Stream crossing.
Boosterstown Stream (Brewery Stream_010)	Culverted beneath Proposed Scheme at Rock Road, adjacent to Boosterstown Nature Reserve, at Boosterstown Stream crossing.
Elm Park Stream (Brewery Stream_010)	Culverted beneath Proposed Scheme at Merrion Road, adjacent to Merrion Gates petrol station at Elm Park Stream crossing.
River Dodder (Dodder_050)	Crosses the Proposed Scheme at River Dodder crossing (Pembroke Road).
Grand Canal	Crosses the Proposed Scheme at the Grand Canal crossing (McCartney Bridge).
Boosterstown Marsh and Nutley Stream	Adjacent to the Proposed Scheme
Liffey Estuary Lower	Approximately 1.8km downstream of River Dodder crossing and c. 1.6km from the Grand Canal crossing.
Dublin Bay	Approximately 7.6km downstream of River Dodder crossing. The River Dodder, Grand Canal, Brewery Stream, Priory Stream, Boosterstown Stream, Elm Park Stream all discharge into Dublin Bay.

The Zol 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 Zol 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 Zol 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 Zol (i.e. approximately 150m from Proposed Scheme boundary) for badgers and otters has been defined in accordance with the Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2005) and the Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2005b) and is considered to be of a precautionary distance. During construction-related disturbance, the screening effect provided by surrounding vegetation and buildings would likely reduce the actual distance of the Zol for badgers and otters.

The Zol 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 Zol may increase / decrease from this distance accordingly. Given the large foraging ranges for some species, the Zol of potential landscape scale impacts, such as habitat loss and severance, could extend for several kilometres from the Proposed Scheme but the most significant effects are likely to occur within 1km of important roost sites (e.g. maternity roosts). Leisler's bats have been recorded foraging up to 13km from maternity roost sites (Shiel *et al.* 1999).

The Zol 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 Zol in relation to indirect impacts to wintering birds could extend up to approximately 300m from the Proposed Scheme for general construction activities, as many species (such as waterbirds) are highly susceptible to disturbance from loud and unpredictable noise during construction. However, as many estuarine bird species use inland habitat areas at distances from the coast, the Zol 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) are not 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 Zol 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 Zol in relation to the common lizard is likely to be limited to direct habitat loss and severance within and across the Proposed Scheme boundary and disturbance / displacement effects in the immediate vicinity during construction.

12.3.2 Desk Study

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

12.3.3 Biodiversity Areas

The Dún Laoghaire-Rathdown Biodiversity Action Plan 2009-2013 highlights a number of areas considered to be of biodiversity value present within the DCC administrative boundary. These areas that are located within the zone of influence of the Proposed Scheme are provided below:

- Habitats considered to be of importance, such as hedgerows and woodlands, which support a range of species and act as important ecological links/corridors across the wider landscape;
- Booterstown Marsh is the only brackish marshland in south Dublin. The Local Authority (DLRCC 2009) note that it is the only remaining area of saltmarsh in Dún-Laoghaire-Rathdown. It supports roosting and feeding areas of waders and wildfowl and within its diverse range of flora is the 2015 Flora Protection Order (FPO) Borrer's saltmarsh grass *Puccinellia fasciculata*. The marsh is a privately owned nature reserve managed by An Taisce as a bird sanctuary, as well as the only area of remaining saltmarsh in South Dublin Bay.
- Network of parks and public green spaces, such as Blackrock Park, which support a variety of species and habitats and is considered to be a valuable biodiversity resource.

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

- Dublin City's Green Infrastructure Network. Habitats within the Proposed Scheme which are considered to contribute to the Green Infrastructure Network include semi-natural calcareous grassland, hedgerows, treelines and woodlands, which support a range of species and act as ecological links/corridors across the wider landscape. Dublin City's network of parks and public green spaces, such as Herbert Park and private gardens, support a variety of species and is considered to be a valuable biodiversity resource;
- Dublin City's network of rivers, streams and riparian zones. The Proposed Scheme will cross the River Dodder. This watercourse supports a range of riverine bird species, including kingfisher *Alcedo atthis*; a long-established otter population, which by virtue of distance and territory is linked to Qualifying Interest populations from Wicklow Mountains SAC and fish species. The Liffey Estuary is downstream of the Proposed Scheme and is noted as being highly significant regional salmonid catchment for species of Atlantic salmon *Salmo salar* and brown trout *S. trutta*. It also supports, brook lamprey *Lampetra planeri*, river lamprey *L. fluviatilis* and white-clawed crayfish *Austropotamobius pallipes*;
- The Grand Canal will be crossed by the Proposed Scheme at McCartney Bridge. It is noted as an important aspect of Dublin City's Green Infrastructure network, linking the River Shannon to Dublin Bay. It is designated as a pNHA and also supports coarse fish species, including roach *Rutilus*, pike *Esox lucius*, rudd *Scardinius erythrophthalmus*, bream *Abramis brama* and tench *Tinca tinca*. It also contains the legally protected FPO species opposite-leaved pondweed *Groenlandia densa*, as well as the endangered Red List freshwater snail species glutinous snail *Myxas glutinosa*. Otter *Lutra lutra* activity is often found where the canal crosses with streams and rivers throughout the City.

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

12.3.4 Designated Areas for Nature Conservation

12.3.4.1 European sites

The Proposed Scheme will run alongside South Dublin Bay and River Tolka Estuary SPA at Booterstown Marsh on Rock Road and at South Dublin Bay SAC at Merrion Gates.

There are eight European sites located in Dublin Bay which are downstream of the Proposed Scheme: South Dublin Bay SAC, North Dublin Bay SAC, Howth Head SAC, Rockabill to Dalkey Island SAC, Dalkey Islands SPA, Howth Head Coast SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA. European sites will be hydrologically connected to the Proposed Scheme via the Dodder_050, Grand Canal, the Liffey Estuary Lower,

the Brewery Stream_010, and Booterstown Marsh and Nutley Stream. In addition, Wicklow Mountains SAC is located upstream of the Proposed Scheme and will be hydrologically connected to the Proposed Scheme via the Dodder_050.

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

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

There are 25 no. European sites (SACs or SPAs) located within the vicinity of the Proposed Scheme, of which 18 no. are located within the Zol. Each site, their distance to the Proposed Scheme and their designations (QIs/SCIs) are listed in Table 12.5: European sites (SACs and SPAs) Located within the Zol (highlighted in light blue), and those in the Wider Area, of the Proposed Scheme Boundary. and illustrated in Figure 12.3 in Volume 3 of this EIAR. Sites within the Zol are highlighted in blue in Table 12.5.

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

Table 12.5: European sites (SACs and SPAs) Located within the Zol (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]	Proposed Scheme is immediately adjacent to the SAC at Merrion Gates	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Mudflats and sandflats not covered by seawater at low tide [1140]; • Annual vegetation of drift lines [1210]; • <i>Salicornia</i> and other annuals colonising mud and sand [1310]; and • Embryonic shifting dunes [2110]. <p><i>S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019</i></p> <p>Source: Conservation Objectives: South Dublin Bay SAC 000210. Version 1. (NPWS 2013b)</p>
North Dublin Bay SAC [000206]	Approximately 4.7km northeast of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Mudflats and sandflats not covered by seawater at low tide [1140]; • Annual vegetation of drift lines [1210]; • <i>Salicornia</i> and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]; • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]; • Embryonic shifting dunes [2110]; • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes') [2120]; • Fixed coastal dunes with herbaceous vegetation ('grey dunes') [2130]*; and • Humid dune slacks [2190]. <p>Annex II Species:</p> <ul style="list-style-type: none"> • Petalwort <i>Petalophyllum ralfsii</i> [1395]. <p><i>S.I. No. 524/2019 – European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019</i></p> <p>Source: Conservation Objectives: North Dublin Bay SAC 000206. Version 1. (NPWS 2013a)</p>

Site Name	Distance	Designation – QIs or SCIs
Rockabill to Dalkey Island SAC [003000]	Approximately 5.3km east of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Reefs [1170]. <p>Annex II Species:</p> <ul style="list-style-type: none"> • Harbour porpoise <i>Phocoena phocoena</i> [1351]. <p><i>S.I. No. 94/2019 – European Union Habitats (Rockabill To Dalkey Island Special Area Of Conservation 003000) Regulations 2019</i></p> <p>Source: Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. (NPWS 2013d)</p>
Howth Head SAC [000202]	Approximately 9.2km north-east of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and • European dry heaths [4030]. <p><i>S.I. No. 524/2021 - European Union Habitats (Howth Head Special Area of Conservation 000202) Regulations 2021</i></p> <p>Source: Conservation Objectives: Howth Head SAC 000202. Version 1. (NPWS 2016)</p>
Wicklow Mountains SAC [002122]	Approximately 9.3km west of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]; • Natural dystrophic lakes and ponds [3160]; • Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]; • European dry heaths [4030]; • Alpine and Boreal heaths [4060]; • Calaminarian grasslands of the <i>Violetalia calaminariae</i> [6130]; • Species-rich <i>Nardus</i> 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 (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110]; • Calcareous rocky slopes with chasmophytic vegetation [8210]; • Siliceous rocky slopes with chasmophytic vegetation [8220]; and • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]. <p>Annex II Species:</p> <ul style="list-style-type: none"> • Otter <i>Lutra lutra</i> [1355]. <p>Source: Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. (NPWS 2017b)</p>
Knocksink Wood SAC [000725]	Approximately 9.6km south of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]*; • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]; and • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>). <p><i>S.I. No. 93/2019 - European Union Habitats (Knocksink Wood Special Area of Conservation 000725) Regulations 2019</i></p> <p>Source: Conservation Objectives for Knocksink Wood SAC [000725]. Generic Version 1 (NPWS 2021i)</p>
Ballyman Glen SAC [000713]	Approximately 9.7km south the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]*; • Alkaline fens [7230]; <p><i>S.I. No. 92/2019 - European Union Habitats (Ballyman Glen Special Area of Conservation 000713) Regulations 2019</i></p> <p>Source: Conservation Objectives: Ballyman Glen SAC 000713. Version 1. (NPWS 2019e)</p>
Baldoyle Bay SAC [000199]	Approximately 10.1km north of	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Mudflats and sandflats not covered by seawater at low tide [1140];

Site Name	Distance	Designation – QIs or SCIs
	the Proposed Scheme	<ul style="list-style-type: none"> • <i>Salicornia</i> and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]; and • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]. <p><i>S.I. No. 472/2021 - European Union Habitats (Baldoyle Bay Special Area of Conservation 000199) Regulations 2021</i></p> <p>Source: Conservation Objectives: Baldoyle Bay SAC 000199. Version 1. (NPWS 2012b)</p>
Glenasmole Valley SAC [001209]	Approximately 11.4km south-west of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210]; • <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]; and • Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]*. <p><i>S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021</i></p> <p>Source: Conservation objectives for Glenasmole Valley SAC [001209]. Generic Version 1.0. DCHG (NPWS 2021a)</p>
Bray Head SAC [000714]	Approximately 12.2km south of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and, • European dry heaths [4030]. <p><i>S.I. No. 620/2017 - European Union Habitats (Bray Head Special Area of Conservation 000714) Regulations 2017</i></p> <p>Source: Conservation Objectives: Bray Head SAC 000714. Version 1. (NPWS 2017c)</p>
Malahide Estuary SAC [000205]	Approximately 13.5km north of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Mudflats and sandflats not covered by seawater at low tide [1140]; • <i>Salicornia</i> and other annuals colonising mud and sand [1310]; • <i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320]; • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]; • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]; • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]; and • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]*. <p><i>S.I. No. 525/2019 – European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019</i></p> <p>Source: Conservation Objectives: Malahide Estuary SAC 000205. Version 1. (NPWS 2013c)</p>
Ireland's Eye SAC [000203]	Approximately 14km northeast of the Proposed Scheme	<p>Annex I Habitats:</p> <ul style="list-style-type: none"> • Perennial vegetation of stony banks [1220]; and • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]. <p><i>S.I. No. 501/2017 – European Union Habitats (Ireland's Eye Special Area of Conservation 002193) Regulations 2017</i></p> <p>Source: Conservation Objectives: Ireland's Eye SAC 002193. Version 1. (NPWS 2017a)</p>
Lambay Island SAC [000204]	Approximately 21.7km northeast of the Proposed Scheme	<p>Annex I Habitats</p> <ul style="list-style-type: none"> • Reefs [1170]; and • Vegetated Sea cliffs of the Atlantic and Baltic coasts [1230]. <p>Annex II Species</p> <ul style="list-style-type: none"> • Grey seal <i>Halichoerus grypus</i> [1364]; and • Harbour seal <i>Phoca vitulina</i> [1365].

Site Name	Distance	Designation – QIs or SCIs
		<p>S.I. No. 294/2019 - European Union Habitats (Lambay Island Special Area Of Conservation 000204) Regulations 2019</p> <p>Source: Conservation Objectives: Lambay Island SAC 000204. Version 1. (NPWS 2013e)</p>
SPA		
South Dublin Bay and River Tolka Estuary SPA [004024]	Proposed Scheme is immediately adjacent to the SPA at Booterstown Marsh	<ul style="list-style-type: none"> • Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046]; • Oystercatcher <i>Haematopus ostralegus</i> [A130]; • Ringed Plover <i>Charadrius hiaticula</i> [A137]; • Grey Plover <i>Pluvialis squatarola</i> [A140]; • Knot <i>Calidris canutus</i> [A143]; • Sanderling <i>Calidris alba</i> [A144]; • Dunlin <i>Calidris alpina</i> [A149]; • Bar-tailed Godwit <i>Limosa lapponica</i> [A157]; • Redshank <i>Tringa totanus</i> [A162]; • Black-headed Gull <i>Chroicocephalus ridibundus</i> [A179]; • Roseate Tern <i>Sterna dougallii</i> [A192]; • Common Tern <i>Sterna hirundo</i> [A193]; • Arctic Tern <i>Sterna paradisaea</i> [A194]; and • Wetlands and Waterbirds [A999]. <p>S.I. No. 212/2010 – European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024) Regulations 2010</p> <p>Source: Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. (NPWS 2015a) and Natura 2000 – Standard Data Form (NPWS 2020a)</p>
North Bull Island SPA [004006]	Approximately 4.7km north of the Proposed Scheme	<ul style="list-style-type: none"> • Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046]; • Shelduck <i>Tadorna tadorna</i> [A048]; • Teal <i>Anas crecca</i> [A052]; • Pintail <i>Anas acuta</i> [A054]; • Shoveler <i>Anas clypeata</i> [A056]; • Oystercatcher <i>Haematopus ostralegus</i> [A130]; • Golden Plover <i>Pluvialis apricaria</i> [A140]; • Grey Plover <i>Pluvialis squatarola</i> [A141]; • Knot <i>Calidris canutus</i> [A143]; • Sanderling <i>Calidris alba</i> [A144]; • Dunlin <i>Calidris alpina</i> [A149]; • Black-tailed Godwit <i>Limosa limosa</i> [A156]; • Bar-tailed Godwit <i>Limosa lapponica</i> [A157]; • Curlew <i>Numenius arquata</i> [A160]; • Redshank <i>Tringa tetanus</i> [A162]; • Turnstone <i>Arenaria interpres</i> [A169]; • Black-headed Gull <i>Chroicocephalus ridibundus</i> [A179]; and • Wetlands and Waterbirds [A199]. <p>S.I. No. 211/2010 – European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006) Regulations 2010</p> <p>Source: Conservation Objectives: North Bull Island SPA 004006. Version 1. (NPWS 2015b) and Natura 2000 – Standard Data Form (NPWS 2020c)</p>
Dalkey Islands SPA [004172]	Approximately 5.3km south-east of the Proposed Scheme	<ul style="list-style-type: none"> • Roseate Tern <i>Sterna dougallii</i> [A192]; • Common Tern <i>Sterna hirundo</i> [A193]; and • Arctic Tern <i>Sterna paradisaea</i> [A194]. <p>S.I. No. 238/2010 – European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172) Regulations 2010</p>

Site Name	Distance	Designation – QIs or SCIs
		Source: Conservation Objectives for Dalkey Islands SPA [004172]. Generic Version 8.0. Department of Housing, Local Government and Heritage (NPWS 2021e) and Natura 2000 – Standard Data Form (NPWS 2020i)
Baldoyle Bay SPA [004016]	Approximately 10.1km north-east of the Proposed Scheme	<ul style="list-style-type: none"> Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046]; Shelduck <i>Tadorna tadorna</i> [A048]; Ringed Plover <i>Charadrius hiaticula</i> [A137]; Golden Plover <i>Pluvialis apricaria</i> [A140]; Grey Plover <i>Pluvialis squatarola</i> [A141]; Bar-tailed Godwit <i>Limosa lapponica</i> [A157]; and Wetlands and Waterbirds [A999]. <p><i>S.I. No. 275/2010 – European Communities (Conservation of Wild Birds (Baldoyle Bay Special Protection Area 004016) Regulations 2010</i></p> <p>Source: Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013f) and Natura 2000 – Standard Data Form (NPWS 2020b)</p>
Howth Head Coast SPA [004113]	Approximately 10.6km north-east of the Proposed Scheme	<ul style="list-style-type: none"> Kittiwake <i>Rissa tridactyla</i> [A188]. <p><i>S.I. No. 185/2012 – European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012</i></p> <p>Source: Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 8.0. Department of Housing, Local Government and Heritage (NPWS 2021c) and Natura 2000 – Standard Data Form (NPWS 2020f)</p>
Wicklow Mountains SPA [004040]	Approximately 9.6km south-west of the Proposed Scheme	<ul style="list-style-type: none"> Merlin <i>Falco columbarius</i> [A098]; and Peregrine <i>Falco peregrinus</i> [A103]. <p><i>S.I. No. 586/2012 – European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040) Regulations 2012</i></p> <p>Source: Conservation Objectives: Wicklow Mountains SPA 004040. Generic Version 8.0. Department of Housing, Local Government and Heritage (NPWS 2021f) and Natura 2000 – Standard Data Form (NPWS 2020j)</p>
Lambay Island SPA [004069]	Approximately 21.5km north east of Proposed Scheme	<ul style="list-style-type: none"> Fulmar <i>Fulmarus glacialis</i> [A009]; Cormorant <i>Phalacrocorax carbo</i> [A017]; Shag <i>Phalacrocorax aristotelis</i> [A018]; Greylag Goose <i>Anser anser</i> [A043]; Lesser Black-backed Gull <i>Larus fuscus</i> [A183]; Herring Gull <i>Larus argentatus</i> [A184]; Kittiwake <i>Rissa tridactyla</i> [A188]; Guillemot <i>Uria aalge</i> [A199]; Razorbill <i>Alca torda</i> [A200]; and Puffin <i>Fratercula arctica</i> [A204]. <p><i>S.I. No. 242/2010 – European Communities (Conservation of Wild Birds (Lambay Island Special Protection Area 004069)) Regulations 2010</i></p> <p>Source: Conservation objectives for Lambay Island SPA [004069]. Generic Version 8.0. Department of Housing, Local Government and Heritage (NPWS 2021d) and Natura 2000 – Standard Data Form (NPWS 2020h)</p>
Malahide Estuary SPA [004025]	Approximately 13.7km north of the Proposed Scheme	<ul style="list-style-type: none"> Great Crested Grebe <i>Podiceps cristatus</i> [A005]; Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046]; Shelduck <i>Tadorna tadorna</i> [A048]; Pintail <i>Anas acuta</i> [A054]; Goldeneye <i>Bucephala clangula</i> [A067]; Red-breasted Merganser <i>Mergus serrator</i> [A069]; Oystercatcher <i>Haematopus ostralegus</i> [A130]; Golden Plover <i>Pluvialis apricaria</i> [A140]; Grey Plover <i>Pluvialis squatarola</i> [A141];

Site Name	Distance	Designation – QIs or SCIs
		<ul style="list-style-type: none"> • Knot <i>Calidris canutus</i> [A143]; • Dunlin <i>Calidris alpina</i> [A149]; • Black-tailed Godwit <i>Limosa limosa</i> [A156]; • Bar-tailed Godwit <i>Limosa lapponica</i> [A157]; • Redshank <i>Tringa totanus</i> [A162]; and, • Wetland and Waterbirds [A999]. <p>S.I. No. 285/2011 – European Communities (Conservation of Wild Birds (Malahide Estuary Special Protection Area 004025) Regulations 2011</p> <p>Source: Conservation Objectives: Malahide Estuary SPA 004025. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013g) and Natura 2000 – Standard Data Form (NPWS 2020d)</p>
Ireland's Eye SPA [004117]	Approximately 13km north-east of the Proposed Scheme	<ul style="list-style-type: none"> • Cormorant <i>Phalacrocorax carbo</i> [A017]; • Herring Gull <i>Larus argentatus</i> [A184]; • Kittiwake <i>Rissa tridactyla</i> [A188]; • Guillemot <i>Uria aalge</i> [A199]; and • Razorbill <i>Alca torda</i> [A200]. <p>S.I. No. 240/2010 – European Communities (Conservation of Wild Birds (Ireland's Eye Special Protection Area 004117) Regulations 2010</p> <p>Source: Conservation objectives for Ireland's Eye SPA [004117]. Generic Version 8.0. Department of Housing, Local Government and Heritage (NPWS 2021b) and Natura 2000 – Standard Data Form (NPWS 2020e)</p>
Skerries Islands SPA [004122]	Approximately 27.7km north of the Proposed Scheme	<ul style="list-style-type: none"> • Cormorant <i>Phalacrocorax carbo</i> [A017]; • Shag <i>Phalacrocorax aristotelis</i> [A018]; • Brent Goose <i>Branta bernicla hrota</i> [A046]; • Purple Sandpiper <i>Calidris maritima</i> [A148]; • Turnstone <i>Arenaria interpres</i> [A169]; • Herring Gull <i>Larus argentatus</i> [A184]. <p>S.I. No. 245/2010 – European Communities (Conservation of Wild Birds (Skerries Islands Special Protection Area 004122) Regulations 2010.</p> <p>Source: Conservation Objectives: Skerries Islands SPA 004122. Generic Version 8.0. Department of Housing, Local Government and Heritage (NPWS 2021g) and Natura 2000 – Standard Data Form (NPWS 2020k)</p>
Rogerstown Estuary SPA [004015]	Approximately 18.4km north-east of the Proposed Scheme	<ul style="list-style-type: none"> • Greylag Goose <i>Anser anser</i> [A043]; • Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046]; • Shelduck <i>Tadorna tadorna</i> [A048]; • Shoveler <i>Anas clypeata</i> [A056]; • Oystercatcher <i>Haematopus ostralegus</i> [A130]; • Ringed Plover <i>Charadrius hiaticula</i> [A137]; • Grey Plover <i>Pluvialis squatarola</i> [A141]; • Knot <i>Calidris canutus</i> [A143]; • Dunlin <i>Calidris alpina</i> [A149]; • Black-tailed Godwit <i>Limosa limosa</i> [A156]; • Redshank <i>Tringa totanus</i> [A162]; and, • Wetland and Waterbirds [A999]. <p>S.I. No. 271/2010 – European Communities (Conservation of Wild Birds (Rogerstown Estuary Special Protection Area 004015) Regulations 2010</p> <p>Source: Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS, 2013h) and Natura 2000 – Standard Data Form (NPWS, 2020g)</p>
Rockabill SPA [004014]	Approximately 28.3km north east of the Proposed Scheme	<ul style="list-style-type: none"> • Purple Sandpiper <i>Calidris maritima</i> [A148]; • Roseate Tern <i>Sterna dougallii</i> [A192]; • Common Tern <i>Sterna hirundo</i> [A193]; and, • Arctic Tern <i>Sterna paradisaea</i> [A194].

Site Name	Distance	Designation – QIs or SCIs
		<p>S.I. No. 94/2012 – European Communities (Conservation of Wild Birds (Rockabill Special Protection Area 004014) Regulations 2012</p> <p>Source: Conservation Objectives: Rockabill SPA [004014]. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013i) and Natura 2000 – Standard Data Form (NPWS 2020m)</p>
The Murrough SPA [004186]	Approximately 22.7km south of the Proposed Scheme	<ul style="list-style-type: none"> • Red-throated Diver <i>Gavia stellata</i> [A001]; • Greylag Goose <i>Anser anser</i> [A043]; • Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046]; • Wigeon <i>Anas penelope</i> [A050]; • Teal <i>Anas crecca</i> [A052]; • Black-headed Gull <i>Chroicocephalus ridibundus</i> [A179]; • Herring Gull <i>Larus argentatus</i> [A184]; and, • Little Tern <i>Sterna albifrons</i> [A195]. <p>S.I. No. 298/2011 – European Communities (Conservation of Wild Birds (The Murrough Special Protection Area 004186)) Regulations 2011</p> <p>Source: Conservation Objectives: The Murrough SPA 004186. Generic Version 8.0. Department of Housing, Local Government and Heritage (NPWS, 2021h) and Natura 2000 – Standard Data Form (NPWS 2020l)</p>

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 where planning authorities must give due regard to their protection in planning policies and decisions. The Proposed Scheme lies within the administrative boundaries of Dún Laoghaire-Rathdown County Development Plan 2016-2022 (DLR 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.

Boosterstown Marsh pNHA is the closest pNHA to the Proposed Scheme. Considering the Proposed Scheme will overlap with the boundary of Boosterstown Marsh pNHA along the Rock Road, approximately 40m² of permanent land take is required. This permanent land take does not include habitats within the marsh, but of pre-existing hard surfaces of Rock Road which fall within the pNHA boundary. The Grand Canal pNHA is the next nearest pNHA to the Proposed Scheme, traversing the Proposed Scheme at McCartney Bridge. Boosterstown Marsh pNHA lies within the administrative boundaries of the Dún Laoghaire-Rathdown County Development Plan 2016-2022, whereas the Grand Canal pNHA is located within the Dublin City County Development Plan 2016-2022 boundaries.

There are six pNHAs that are located downstream of the Proposed Scheme in Dublin Bay. These pNHAs are North Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Boosterstown Marsh pNHA, Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, and South Dublin Bay pNHA. These sites will be hydrologically connected to the Proposed Scheme via the Grand Canal, River Dodder, Brewery Stream, Priory Stream, Boosterstown Stream and Elm Park Stream. These pNHAs lie within the administrative boundaries of the Dún Laoghaire-Rathdown County Development Plan 2016-2022, Dublin City County Development Plan 2016-2022 and / or Fingal County Development Plan 2017-2023 (FCC 2017).

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

There is one NHA and 36 pNHAs located in the wider area of the Proposed Scheme. These are listed in Table 12.6 and illustrated in Figure 12.4 in Volume 3 of this EIAR. Table 12.6 lists these sites, their distance from the Proposed Scheme, and the ecological features for which the sites are designated/proposed. Sixteen of these are located within the Zol of the Proposed Scheme (see Table 12.6).

These pNHAs are valued as being of National Importance.

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

Site Name	Distance	Description
NHAs		
Skerries Island NHA [001218]	Approximately 27.7km north of the Proposed Scheme	See Table 12.5 under Skerries Island SPA
pNHAs		
Boooterstown Marsh pNHA [001205]	The Proposed Scheme overlaps with the boundary of this pNHA (rough ground) by approx. 1,102m ²).	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
Grand Canal pNHA [002104]	Traverses the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed <i>Groenlandia densa</i>
South Dublin Bay pNHA [000210]	Approximately 6m east of the Proposed Scheme	See 6 under South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA
Royal Canal pNHA [002103]	Approximately 1.2km north of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed <i>Groenlandia densa</i>
North Dublin Bay pNHA [000206]	Approximately 2.4km north of the Proposed Scheme	See Table 12.5 under North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA
Dolphins, Dublin Docks pNHA [000201]	Approximately 2.5km north of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	Approximately 2.7km east of the Proposed Scheme	Good example of a coastal system with habitats ranging from sub-littoral to coastal heath. Flora is well developed and includes some scarce species. The islands are important bird sites. See also Table 12.5 under Rockabill to Dalkey Island SAC and Dalkey Islands SPA
Fitzsimon's Wood pNHA [001753]	Approximately 4.7km south of the Proposed Scheme	Birch woodland, which is very rare in County Dublin.
Loughlinstown Woods pNHA [001211]	Approximately 6km south-east of the Proposed Scheme	Demesne-type mixed woodland
Dingle Glen pNHA [001207]	Approximately 6km south of the Proposed Scheme	Variety of habitat present, including woodland
Santry Demesne pNHA [000178]	Approximately 6.6km north of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort <i>Hypericum hirsutum</i> , and woodland
Liffey Valley pNHA [000128]	Approximately 7km north west of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort <i>Hypericum hirsutum</i> , rare Red List plant species green figwort <i>Scrophularia umbrosa</i> and yellow archangel <i>Lamiastrum galeobdolon</i> and the diversity of habitat present.
Dodder Valley pNHA [000991]	Approximately 7.4km west of the Proposed Scheme	The last remaining stretch of natural riverbank vegetation on the River Dodder in the built-up Greater Dublin Area (GDA).
Ballybetagh Bog pNHA [001202]	Approximately 8.1km south of the Proposed Scheme	Marshland
Howth Head pNHA [000202]	Approximately 9.2km north-east of the Proposed Scheme	See Table 12.5 under Howth Head SAC and Howth Head Coast SPA
Knocksink Wood pNHA [000725]	Approximately 9.7km south of the Proposed Scheme	See Table 12.5 under Knocksink Wood SAC
Ballyman Glen pNHA [000713]	Approximately 9.8km south of the Proposed Scheme	See Table 12.5 under Ballyman Glen SAC

Site Name	Distance	Description
Baldoyle Bay pNHA [000199]	Approximately 10.1km [direction] of the Proposed Scheme	See Table 12.5 under Baldoyle Bay SAC and Baldoyle Bay SPA
Feltrim Hill pNHA [001208]	Approximately 11.2km north of the Proposed Scheme	Good example of knoll-reef phenomenon. Previously known to contain two rare plant species, namely spring squill <i>Scilla verna</i> and long-stalked crane's-bill <i>Geranium columbinum</i>
Sluice River Marsh pNHA [001763]	Approximately 11.3km north of the Proposed Scheme	Freshwater marsh
Powerscourt Woodland pNHA [001768]	Approximately 11.5km south of the Proposed Scheme	A mixed woodland within the two large demesnes of Powerscourt and Charleville
Glenasmole Valley pNHA [001209]	Approximately 11.4km south west of the Proposed Scheme	See Table 12.5 under Glenasmole Valley SAC
Dargle River Valley pNHA [001754]	Approximately 12km south of the Proposed Scheme	Long established wooded valley, a habitat that is becoming rare in north County Wicklow
Bray Head pNHA [000714]	Approximately 12.2km south-east of the Proposed Scheme	See Table 12.5 under Bray Head SAC,
Great Sugar Loaf pNHA [001769]	Approximately 13.1km south of the Proposed Scheme	High amenity, cultural and natural heritage significance in a local and regional context
Ireland's Eye pNHA [000203]	Approximately 13.3km north-east of the Proposed Scheme	See Table 12.5 under Ireland's Eye SAC and Ireland's Eye SPA
Malahide Estuary pNHA [000205]	Approximately 13.5km north of the Proposed Scheme	See Table 12.5 under Malahide Estuary SAC and Malahide Estuary SPA
Glencree Valley pNHA [001755]	Approximately 13.6km south of the Proposed Scheme	Deciduous woodland valley, with an upland river and boggy flushes
Lugmore Glen pNHA [001212]	Approximately 12.7km west of the Proposed Scheme	Presence of the rare Red Data Book species Yellow Archangel (<i>Lamiastrum galeobdolon</i>).
Kilmacanoge Marsh pNHA [000724]	Approximately 14.5km south of the Proposed Scheme	Fen habitat
Rye Water Valley/Carton pNHA [001398]	Approximately 16.2km west of the Proposed Scheme	Linear riverine site known to support Priority Annex I Petrifying springs with tufa formation (Cratoneurion) as well as two Annex II species snails, namely: Narrow-mouthed Whorl Snail <i>Vertigo angustior</i> and Desmoulin's Whorl Snail <i>V. moulinsiana</i> .
Portraine Shore pNHA [001215]	Approximately 17.8km north of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Rogerstown Estuary pNHA [000208]	Approximately 18.1km north of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Lambay Island pNHA [000204]	Approximately 21.8km north-east of the Proposed Scheme	See Table 12.5 under Lambay Island SAC and Lambay Island SPA
The Murrough pNHA [000730]	Approximately 20.9km south of the Proposed Scheme	See Table 12.5 under The Murrough Wetlands SAC and The Murrough SPA
Rockabill Island pNHA [000207]	Approximately 32.8km north-west of the Proposed Scheme	See Table 12.5 under Rockabill to Dalkey Island SAC and Rockabill SPA

12.3.4.3 Other Designated Sites

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

12.3.4.3.1 RAMSAR Sites

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

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

- Rogerstown Estuary 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 Dublin Bay Biosphere

Dublin Bay was initially recognised by UNESCO for its rare and internationally important habitats and species of wildlife. The North Bull Island supports a variety of plants and wildlife including an internationally significant population of light-bellied Brent geese that overwinters in the bay. UNESCO's concept of a Biosphere has evolved to include not just areas of ecological value but also the areas around them and the communities that live and work within these areas. Dublin Bay Biosphere Reserve now extends to over 300 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 (SAAO)

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

Two 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

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

12.3.5 Habitats

12.3.5.1 Overview

The results of the habitat surveys along the alignment of the Proposed Scheme are described below by habitat type (Fossitt 2000). The habitats described below relate to habitat areas within or adjacent to the Proposed Scheme, as shown on Figure 12.5 in Volume 3 of this EIAR along with the full habitat survey results. The 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);
- Exposed sand, gravel or till (ED1);
- Recolonising bare ground (ED3);
- Other artificial lakes and ponds (FL8);
- Depositing/ lowland rivers (FW2);
- Canals (FW3);
- Amenity Grassland (Improved) (GA2);
- Residential;
- (Mixed) broadleaved woodland (WD1);
- Scattered trees and parkland (WD5);
- Hedgerows (WL1);
- Treelines (WL2);
- Scrub (WS1); and,
- Ornamental/ non-native shrub (WS3).

None of these habitats corresponds to Annex I or Qualifying Interest Habitats. However, Booterstown Marsh, which partially falls within the Proposed Scheme boundary, is documented as supporting a number of coastal Annex I habitats within the marsh's wetland complex. A survey of habitats within Booterstown Marsh was not undertaken. A description of the habitats based on published historical survey data undertaken for NPWS (McCorry and Ryle, 2009) is included separately in Section 12.3.5, and the approximate distribution of these habitats was verbally confirmed to be similar in extent in 2020 survey commissioned by An Taisce (P. Foss, report author, pers. comm.).

12.3.5.2 Flower beds and borders (BC4)

This habitat includes ornamental planting associated with commercial developments, and planting at roundabouts and along roadsides in suburban areas. This habitat type was identified in nine locations across the Proposed Scheme. The largest areas of this habitat type are located at planted beds lining commercial developments adjacent to Ballsbridge Park and Landaff Terrace and planted beds at residential developments at St. Vincent's Park and Castledawson.

Ornamental species present at this habitat included garlic species *Allium* spp., pampas grass *Cortaderia selloana*, Montbretia *Crocsmia x crocosmiiflora*, horsetail species *Equisetum* spp., fuchsia species *Fuchsia magellanica*, geranium species *Geranium* spp., New Zealand broadleaf *Griselinia littoralis*, hebe species *Hebe* spp., hydrangea species *Hydrangea* spp., lavender species *Lavandula* spp., daffodils *Narcissus* spp. and rose species *Rosa* spp. Native species recorded included common valerian *Valeriana officinalis* and Scot's pine *Pinus sylvestris*.

This habitat type is also present at Merrion Village, Merrion Road, Elgin Road and at various sites adjacent to the Rock Road. This habitat type was also found in mosaics with the following habitats: amenity grassland (improved) (GA2), buildings and artificial surfaces (BL3) and ornamental/ non-native shrub (WS3).

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

12.3.5.3 Stone walls and other stonework (BL1)

Stone walls were present across the Proposed Scheme, comprising either property boundaries or roadside boundaries. The largest area of this habitat was located along at Blackrock Park, Rock Road and Temple Hill as

perimeter boundary walls, and at the River Dodder crossing and Grand Canal crossing. Additional discrete areas were located at Merlyn Park and Shrewsbury Road.

The majority of 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 ivy *Hedera helix*, ivy-leaved toadflax *Cymbalaria muralis* and red valerian *Centranthus ruber*.

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

12.3.5.4 Buildings and artificial surfaces (BL3)

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

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

This habitat type is of Local Importance (Lower Value) due to poor species composition and the nature of paved and artificial surfaces.

12.3.5.5 Exposed sand, gravel or till (ED1)

This habitat type was assigned to habitats which consisted of gravel substrate. An area of gravel was identified at Merrion Gates, Strand Road as part of a railway section containing railway ballast and rubble.

This habitat type is of Local Importance (Lower Value), due to a lack species diversity recorded.

12.3.5.6 Recolonising bare ground (ED3)

This habitat type was assigned to areas of disturbed ground and/or artificial surfaces which have been recolonised by plants, and where vegetation cover is now greater than 50%. This habitat type was identified in two locations including at Blackrock Park and Booterstown Nature Reserve.

Most of the vegetation recorded in this habitat type consisted of ruderal species. Species included yarrow *Achillea millefolium*, silverweed *Argentina anserina*, daisy *Bellis perennis*, hawksbeard *Crepis* spp., American willowherb *Epilobium ciliatum*, hairy willowherb *Epilobium parviflorum*, spurge species *Euphorbia* spp., bird's-foot trefoil *Lotus corniculatus*, ribwort plantain *Plantago lanceolata*, broad-leaved dock *Rumex obtusifolius* and red clover *Trifolium pratense*.

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

12.3.5.7 Other artificial lakes and ponds (FL8)

A small artificial pond was present at a commercial premises at the junction of Ballsbridge Park and Merrion Road. No species were recorded within the pond habitat at time of survey. A rock border and decorative stone features were observed within the pond and an artificial lining appear to be in place. Adjacent habitats included managed flower beds and borders (BC4) and ornamental / non-native shrub were present at pond edges.

Species recorded included montbretia, New Zealand broadleaf, hebe, hydrangea, lavender, daffodils and ornamental roses.

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

12.3.5.8 Depositing / lowland rivers (FW2)

This habitat type refers to the Brewery Stream, Priory Stream, Booterstown Stream, Elm Park Stream, and the River Dodder which are classified as depositing/lowland rivers. These habitats are present at multiple locations across the Proposed Scheme and are discussed individually below.

The Proposed Scheme crosses the Brewery stream at Temple Road, Blackrock (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Brewery stream is culverted under Temple Road, and channelised at the adjacent site of St. Louise's Park. The status of the Brewery stream is 'Moderate' for the period 2013-2018 and no WFD waterbodies risk factor is assigned under the Water Framework Directive.

The Proposed Scheme crosses the Priory Stream at the junction of Rock Road and Rock Hill (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Priory Stream is culverted under Rock Road and Rock Hill and channelised at adjacent sites of Blackrock Park and Frascati Park. The status of the Priory Stream is 'Moderate' for the period 2013-2018 and no WFD waterbodies risk factor is assigned under the Water Framework Directive.

The Proposed Scheme crosses the Booterstown Stream along Merrion Road at Booterstown Nature Reserve (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Booterstown Stream is culverted under Merrion Road and remains so until discharging into Dublin Bay. The status of the Booterstown Stream is 'Moderate' for the period 2013-2018 and no WFD waterbodies risk factor is assigned under the Water Framework Directive.

No riparian vegetation was identified along the Booterstown Stream banks, as it is culverted.

The Proposed Scheme crosses the Elm Park Stream at Merrion Road (illustrated in Figure 12.2 in Volume 3 of this EIAR). The Elm Park Stream is culverted under Merrion Road and channelised at Elm Park Green. The status of the Elm Park Stream is 'Moderate' status for the period 2013-2018 and no WFD waterbodies risk factor is assigned under the Water Framework Directive.

The Proposed Scheme crosses the River Dodder at Pembroke Road (illustrated in Figure 12.2 in Volume 3 of this EIAR). The River Dodder is spanned by Ball's Bridge of approximately 30m at Pembroke Road and is channelised on both banks. The riverbed appears to be comprised of fluvial clasts (pebble/boulder-sized stones transported by flowing water). The status of the River Dodder is 'Moderate' for the period 2013-2018 and is deemed At Risk of failing to meet its requirements under the Water Framework Directive.

Riparian vegetation identified along the riverbanks included willow species *Salix* spp., sycamore *Acer pseudoplatanus*, horse chestnut *Aesculus hippocastanum*, common ragwort *Jacobaea vulgaris*, common nettle *Urtica dioica*, butterfly bush *Buddleja davidii*, red valerian, broad-leaved dock *Rumex obtusifolius* and annual meadow grass *Poa annua*.

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

12.3.5.9 Canals (FW3)

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

Species recorded along the canal banks include wild angelica *Angelica sylvestris*, butterfly bush, hedge bindweed *Calystegia sepium*, red valerian, cock's-foot *Dactylis glomerata*, meadowsweet *Filipendula ulmaria*, winter heliotrope *Petasites pyrenaicus*, sycamore, bramble *Rubus fruticosus* agg., broad-leaved dock, elder *Sambucus nigra*, common dandelion and common nettle.

The instream vegetation of the Grand Canal was dominated by reed canary grass *Phalaris arundinacea*, common reed *Phragmites australis*. Other species present included flag iris *pseudacorus*.

The legally protected Flora Protection Order species, opposite-leaved pondweed *Groenlandia densa* is recorded at several areas throughout the Grand Canal. The desk study returned records for this species within 2km of the Proposed Scheme, at Grid square O13R, although no occurrence was noted at the Canal crossing point.

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

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 public parks at Blackrock Park and Booterstown Park, sport pitches at Willow Park School and Blackrock College and road verges at Merrion Road and Pembroke Road.

Grass species present included brome grass *Bromus sterilis*, fescue *Festuca* spp., Yorkshire fog *Holcus lanatus*, wall barley *Hordeum murinum*, perennial rye-grass *Lolium perenne* and annual meadow grass, while forb species present included daisy, common thistle *Cirsium vulgare*, meadowsweet *Filipendula ulmaria*, cleavers *Galium aparine*, crane's-bill *Geranium* spp., herb-Robert *G. robertianum*, ribwort plantain *Plantago lanceolata*, greater plantain *P. major*, creeping cinquefoil *Potentilla reptans*, creeping buttercup *Ranunculus repens*, broad-leaved dock, common dandelion, white clover *Trifolium repens* and common valerian.

This habitat type often occurred in mosaics with buildings and artificial surfaces (BL3), flower beds and borders (BC4), ornamental/ non-native shrub (WS3), and treelines (WL2).

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

12.3.5.11 Residential

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

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

This habitat type is of Local Importance (Lower Value) due to the poor species composition and the nature of paved and artificial surfaces.

12.3.5.12 (Mixed) broadleaved woodland (WD1)

This habitat is identified as comprising between 75-100% broad leaf trees and 0-25% conifers tree. Mixed broadleaf woodland was recorded at six locations along the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat type are at Blackrock Park, Ailesbury House, Ailesbury Road, and Herbert Park Road. Other areas of this habitat type were recorded at Elm Park Golf & Sports Club and the RTÉ campus on Nutley Lane.

Tree species recorded at these locations include maple species *Acer* spp., beech *Fagus sylvatica*, ash *Fraxinus excelsior*, holly *Ilex aquifolium*, pine species *Pinus* spp. sycamore, cherry laurel *Prunus laurocerasus*, holm oak *Quercus ilex*, elder *Sambucus nigra*, whitebeam *Sorbus aria*, yew *Taxus baccata*, and elm species *Ulmus* spp.

Occasional shrub species encountered within or alongside the woodland canopy included cotoneaster species *Cotoneaster* sp., and New Zealand broadleaf.

Where present understories and field layer species include sedge *Carex sylvatica*, winter heliotrope, cleavers, ivy, bramble and bittersweet nightshade *Solanum dulcamara*.

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

12.3.5.13 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 11 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 Elm Park Golf & Sports Club, Nutley Lane, Blackrock Park, Booterstown Park, and St. Vincent's University Hospital, Merrion Road.

Tree species identified at these locations include maple species, horse chestnut, red birch *Betula occidentalis*, birch species *Betula* spp., hornbeam *Carpinus betulus* 'fastigiata', sweet chestnut *Castanea sativa*, hawthorn *Crataegus monogyna*, cypress species *Cupressus* spp., copper beech *Fagus sylvatica* f. *purpurea*, ash, ivy, holly, Scot's pine, sycamore, flowering cherry *Prunus* 'Kanzan', holm oak, whitebeam, yew, and small-leaved lime *Tilia cordata*. The field layer was commonly comprised of cleavers, broad-leaved dock, ribwort plantain and daisy. Grasses present included annual meadow grass and perennial rye-grass. Ornamental species such as cotoneaster species, Bay laurel *Laurus nobilis*, and cherry laurel also featured occasionally, reflecting the managed or planted landscape.

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

12.3.5.14 Hedgerows (WL1)

Hedgerows were identified at numerous 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 Nutley Lane, Merrion Road, Booterstown train station, and the junction of Merrion Road and Ailesbury Road.

The species composition varied greatly within this habitat type. A range of tree and shrub species consisted of hornbeam, cotoneaster species, beech, fuchsia species, New Zealand broadleaf, ash, cherry, sycamore, butterfly bush, maple species, horse chestnut, alder *Alnus glutinosa*, palm species *Arecaceae* spp., rowan, yew, small-leaved lime, cypress species *Cupressus* × *leylandii*, cabbage palm *Cordyline* spp., cherry laurel, rose species, golden rain *Laburnum* spp., and willow species were noted across the study area.

Commonly recorded shrubs included brambles, as well as oleander *Oleander* spp. and occasionally gorse *Ulex* spp. was noted.

Grass species typically consisted of barren brome grass *Bromus sterilis*, Yorkshire fog, fescue species and wall barley, whilst there was a greater diversity of forb species. These included: parsley *Anthriscus sylvestris*, St. John's wort *Hypericum* spp., hedge bindweed *Calystegia sepium*, common knapweed *Centaurea nigra*, common thistle, horsetail species, ivy, common hogweed *Heracleum sphondylium*, meadow vetchling *Lathyrus pratensis*, winter heliotrope, ribwort plantain, creeping cinquefoil, creeping buttercup, curled dock *Rumex crispus*, common nettle, common valerian, bush vetch *Vicia sepium*, barberry species *Berberis* spp., wild teasel *Dipsacus fullonum*, cleavers, herb-Robert, wood avens *Geum urbanum* and white clover.

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

12.3.5.15 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 Temple Hill, Blackrock, Rock Road, at Booterstown Park, along Nutley Lane, and along most of Merrion Road.

Common trees species recorded include field maple *Acer campestre*, horse chestnut, silver birch *Betula pendula*, hornbeam, cypress species, beech, ash, pine species, London plane, sycamore, cherry, cherry laurel, oak species *Quercus* sp., rowan, common lime *Tilia × europaea*, small-leaved lime and elm species.

Less common tree species recorded include purple maple *Acer palmatum*, elder, whitebeam, hawthorn, yew, turkey oak *Quercus cerris*, holm oak, willow species, maple species, copper beech and birch species.

The field layer consists of a variety of species including orache *Atriplex* spp., common valerian, common poppy *Papaver rhoeas*, cleavers, ivy, bluebell species *Hyacinthoides* spp. and common dandelion.

This habitat type often occurred in mosaics with amenity grassland (GA2), and ornamental / non-native shrub (WS3).

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

12.3.5.16 Scrub (WS1)

Scrub was identified in four locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat was located at Booterstown Nature Reserve where the Proposed Scheme overlaps with a section of the pNHA along its north-western boundary. Other areas of scrub to note are located at Ballsbridge Bridge, Pembroke Road and McCartney Bridge, Baggot Street.

Tree species recorded include maple species, purple maple, palm species, spotted laurel *Aucuba japonica*, magnolia *Magnolia* spp., silver birch, birch species, butterfly bush, hornbeam, oak species, cabbage palm, holly, elder, rowan, cypress species, beech, and copper beech.

Shrub/sub canopy tree species recorded include cotoneaster species, laurel, rose species, fuchsia species, and hebe species.

Forbs species recorded include St. John's wort, montbretia, cleavers, herb-Robert, wood avens, ivy, lavender, perennial ryegrass, oleander, poppy species, geranium species, common dandelion, barberry, and common valerian.

This habitat type is of Local Importance (Lower Value) with exception to the section at Booterstown Nature Reserve located within the Booterstown Marsh pNHA (site code 001205) as it is considered as National importance.

12.3.5.17 Ornamental / non-native shrub (WS3)

Areas of ornamental / non-native shrub were generally associated with amenity and landscape planting at commercial properties and considerable variety was noted across the study area. Substantial areas of this habitat type bordered areas of building and artificial surfaces and amenity grassland habitats at Frascati Road, Blackrock, Blackrock Clinic, Rock Road, and Herbert Park, Ballsbridge.

Species identified include, maple species, purple maple, palm species, spotted laurel *Aucuba japonica*, barberry, silver birch, birch species, butterfly bush, hornbeam, cabbage palm, pampas grass, cotoneaster species, cypress species, beech, copper beech, fuchsia species,

Species recorded include cleavers, herb-Robert, wood avens, hebe species, ivy, st. john's wort, holly, laurel, lavender, perennial ryegrass, magnolia *Magnolia* spp., oleander, poppy species, geranium species, oak species, rose species, elder, rowan, common dandelion, montbretia, and common valerian.

This habitat type was recorded in mosaic with the following other habitat types; amenity grassland (GA2), treelines (WL2) and buildings and artificial surfaces (BL3).

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

12.3.5.18 Booterstown Marsh

The Proposed Scheme runs alongside Booterstown Nature Reserve, which is also designated as a pNHA, while the Marsh is also a subsite of South Dublin Bay and River Tolka Estuary SPA. The overall wetland complex of the marsh is an important bird resource including wintering SCI species associated with the South Dublin Bay and River Tolka Estuary SPA.

Overlapping with the marsh and extending northwards beyond it, the area is designated as a pNHA. To facilitate construction of the Proposed Scheme approximately 79.22m² of temporary land take (including scrub removal) will be required during the Construction Phase, which corresponds to a 2m setback. Permanent land take within the pNHA will be approximately 1023.14m² to facilitate construction of a new boundary wall, however, majority of this area (approximately 982m²) is of pre-existing hard surfaces of Rock Road that falls within the pNHA boundary, as opposed to Booterstown Marsh habitats.

Detailed habitat surveys were not undertaken in the marsh as it was outside the footprint of the Proposed Scheme. However, owing to the proximity of the Proposed Scheme to the marsh and links to known Annex I habitats present therein, the following habitat description is provided owing to the conservation importance of the site. The data used in characterizing the marsh is based on historical NPWS data adapted from McCorry & Ryle (2009). A recent survey of the marsh commissioned by An Taisce has not yet been published. However, An Taisce consented for the NTA to communicate with the reporting author, who noted that the distribution of Annex I habitats that was observed was similar in extent as the survey mapping from 2009.

12.3.5.18.1 Lower saltmarsh (CM1)

A desk study of habitats adjacent to the Proposed Scheme identified small pockets of lower salt marsh at Booterstown Nature Reserve (McCorry and Ryle 2009). This habitat is approximately 16m east of the Proposed Scheme, totalled c.120m². Based on analysis of the NPWS (2019b) data, the lower saltmarsh is buffered by approximately 15m of scrub and linear habitats, recorded in 2020 survey season, exists along the elevated landward side of the marsh. Based on a desk study of available data, parts of this lower saltmarsh complex has links to a number of Annex I habitats), (McCorry and Ryle 2009, NPWS 2019b).

McCorry and Ryle (2009) recorded saltmarsh communities with potential links to Annex I habitats around the marsh. The annual *Salicornia* and other annuals colonising mud and sand (1310) habitat was recorded at low densities on the margins of exposed mud flats and was comprised of small clumps of glasswort *Salicornia* spp., with the occasional presence of annual sea-blite *Suaeda maritima* and sea purslane *Atriplex portulacoides*. Additional plant species were recorded in low numbers at transitional zones with upper salt marsh habitat and included, creeping bent *Agrostis stolonifera* and sea beet *Beta vulgaris* subsp. *maritima*. This habitat is a Qualifying Interest habitat of the adjacent South Dublin Bay SAC.

The distribution of this habitat at Booterstown Marsh overlaps with the favourable reference range of this Annex I habitat as presented in 'The Status of EU Protected Habitats and Species in Ireland Article 17 report and is of National Ecological Importance (NPWS 2019b).

Owing to classification difference between Fossitt system and the EU Interpretation Manual (EU 2013), it is noted that the lower saltmarsh habitat also included elements of upper saltmarsh, in terms of Annexed habitats. These are discussed below.

12.3.5.18.2 Upper saltmarsh (CM2)

A desk study of habitats adjacent to the Proposed Scheme identified linear strips of upper salt marsh, often discontinuous in nature owing to the presence of brackish marsh vegetation dominated by sea club-rush *Schoenoplectus maritimus* (McCorry and Ryle 2009). The habitat is located between 10m to 16m east of the Proposed Scheme with a total area estimated at being approximately 0.8ha. A buffer of approximately 10m of scrub and linear habitats such as treelines and hedgerows were recorded in 2020 survey season between the Proposed Scheme and the upper saltmarsh habitats identified in the NPWS data (NPWS 2019b). Based on a desk study of available data, this habitat corresponds to both Annex I habitats such as Atlantic salt meadows

(*Glauco-Puccinellietalia maritimae*) (1330) or Mediterranean salt meadows (*Juncetalia maritimi*) (1410), where Mediterranean sea rush *Juncus maritimus* was recorded (McCorry and Ryle 2009, NPWS 2019b).

The Annex I Atlantic salt meadows (1330) habitat was noted as comprising 50% of the lower saltmarsh habitat with species such as sea purslane *Sesuvium portulacastrum*, sea aster *Aster tripolium*, common saltmarsh-grass *Puccinellia maritima*, glasswort, sea mayweed *Tripleurospermum maritimum*, greater sea spurrey *Spergularia media*, spear-leaved orache *Atriplex prostrata*, lax-flowered sea lavender *Limonium humile*, rock sea lavender *Limonium binervosum* and sea plantain *Plantago maritima*. Sea club-rush was also present but at low densities.

Mediterranean salt meadows (1410) was also identified in low densities, being distinguished solely during the 2009 survey on the presence of sea rush. However, this habitat was noted as being very poorly developed and there was no significant development of a distinctive vegetation type. Other species that were associated with the Mediterranean salt marsh included sea aster, greater sea-spurrey, sea arrowgrass *Triglochin maritima* and glasswort. Borrer's saltmarsh grass *Puccinellia fasciculata*, which is listed in the Flora (Protection) Order, was also recorded in low densities along the transition of the open muds and Brackish marsh e.g., to the landward side of the marsh proper.

Additional plant species were recorded at transitional zone with lower saltmarsh habitat and included creeping bent and sea beet which were recorded in low numbers. Both of these Annex I saltmarsh habitats are qualifying interest habitats for North Dublin Bay SAC, which is within the Zol of the Proposed Scheme.

These habitat types are of National Importance as they correspond with Annex I habitats Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330) and Mediterranean salt meadows (*Juncetalia maritimi*) (1410).

12.3.5.18.3 Mud sand shores (LS4)

Based on a desk top study, this habitat was identified at one location adjacent to the Proposed Scheme (McCorry and Ryle 2009). A large part of Booterstown Nature Reserve comprises soft mud and sand associated intertidal habitats prone to periodic inundation by sea water.

Few plant species were recorded by McCorry and Ryle (2009), though the peripheral mud sand shores can be associated with lower saltmarsh habitats as pioneer species form colonies. Glassworts can act as pioneer species for saltmarsh formation and was recorded at adjacent habitats.

Mud sand shore habitats at Booterstown Nature Reserve may be linked to Annex I 'mudflats and sandflats not covered by sea water at low tide (1140)' habitats.

This habitat type is of National Importance due to potential links with Annex I habitats, mudflats and sandflats not covered by sea water at low tide (1140), which is a qualifying interest habitat in the adjacent South Dublin Bay SAC.

12.3.6 Rare and Protected Plant Species

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

The desk study returned records of a total of nine species listed on the Flora (Protection) Order across the wider study area (i.e. Grid Squares O12, O13, O22 and O23) and are listed in Appendix A12.1 in Volume 4 of this EIAR. Records of Flora (Protection) Order species included numerous records of opposite-leaved pondweed *Groenlandia densa* in the Grand Canal approximately 1km west of the Proposed Scheme, as well as of great burnet *Sanguisorba officinalis* recorded at UCD, Belfield (Grid Square O183304) (NBDC Online Database 2022). Borrer's saltmarsh grass was recorded adjacent to the Proposed Scheme at Booterstown Nature Reserve (Grid

O23A) (McCorry & Ryle 2009)¹. These species are ‘red list status’ on Irelands Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al.* 2016).

One species listed as “Vulnerable” within Ireland Red List No. 10: Vascular Plants (Wyse Jackson *et al.* 2016) was returned from the desk study from within 1km of the Proposed Scheme. Historical records of wild asparagus *Asparagus prostratus* were recorded at Blackrock (Grid Square O22), adjacent to the Proposed Scheme. It was not rerecorded. Communication with ecologist P. Foss in respect of Blackrock Park note that the presence of this species was relocated at the north-east corner of the marsh, within scrub on derelict land. It is outside of the Zol of the Proposed Scheme.

One species listed as “Vulnerable” within Ireland Red List No. 8: Bryophytes (Lockhart *et al.* 2012) was returned from the desk study from within 1km of the Proposed Scheme. Records of shady beard-moss *Didymodon umbrosus* were recorded at RDS, Ballsbridge west of the Proposed Scheme.

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

12.3.7 Non-Native Invasive Plant Species

There was one non-native invasive plant species listed on the Third Schedule of the Birds and Habitats Regulations, 2011 which was identified along the Proposed Scheme; common cordgrass *Spartina anglica*. The locations of this non-native invasive plant species are summarised below in Table 12.7 and shown on Figure 12.6 in Volume 3 of the EIAR.

The desk study returned records of a total of 20 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Records across the wider study area (i.e., Grid Squares O13, O22 and O23) and are listed in Appendix A12.1 in Volume 4 of this EIAR. Records from within 1km of the Proposed Scheme include water fern *Azolla filiculoides*, curly waterweed *Lagarosiphon major*, Nuttall's waterweed *Elodea nuttallii*, Himalayan balsam *Impatiens glandulifera*, Japanese knotweed *Reynoutria japonica*, and giant hogweed *Heracleum mantegazzanum* (NBDC Online Database 2022). These species were not recorded within the footprint of the Proposed Scheme. Canadian waterweed *E. canadensis*, which was also documented from along the River Liffey and Grand Canal was delisted as a third schedule species, with the introduction of SI 355/2015.

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

Reference	Species	Description
CBC1415IAPS001	Three-cornered Garlic <i>Allium triquetrum</i>	Near viewing area located adjacent to the north-western corner of Booterstown Marsh
N/A – outside footprint of Proposed Scheme. Presence confirmed by consultation response	Common Cordgrass <i>Spartina anglica</i>	Small number of clumps on mudflats, largely along the northern boundary of the marsh, and in particular towards the north -eastern corner.

12.3.8 Mammals

12.3.8.1 Bats

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

Bat surveys were carried out across four seasons between 2018 and 2020 (as described in in Section 12.2.3.5). Three transects were surveyed within the footprint of the Proposed Scheme: Nutley Lane referred to as

¹ This FPO 2015 species was not recorded in 2020 survey and a return visit was cancelled owing to pandemic restrictions. It is a long-established species on the marsh, and although outside of the footprint of the Proposed Scheme, is assessed in this report on the basis of potential surface water/ground water impacts.

CBC1415BT001, Rock Road adjacent Castledawson Avenue referred to as CBC1415BT002, and Rock Road adjacent Blackrock Park referred to as CBC1415BT003. An additional transect located within the Blackrock Park referred to as CBC1415BT004 was surveyed in 2021. The results of these are described below and are also presented in Figure 12.8.1 and Figure 12.8.2 in Volume 3 of this EIAR.

This section is structured such that each bat species is described in turn. The results of the various surveys are presented to allow an understanding of each species' distribution across the Proposed Scheme.

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

12.3.8.1.1 Leisler's bat *Nyctalus leisleri*

Leisler's bats were recorded along the CBC1415BT001 transect in Autumn 2019 and CBC1415BT002 and CBC1415BT003 transects in the summer of 2020, and CBC1415BT004 in the summer of 2021. A total of nine recordings of Leisler's bat were identified in these locations including two recordings at CBC1415BT001 in Autumn 2019, five recordings at CBC1415BT002 in the summer of 2020, two recordings at CBC1415BT003 in the summer of 2020, and 159 recordings at CBC1415BT004 in the summer of 2021. Leisler's bat was not recorded during the spring surveys of 2018 or 2020. Leisler's bat activity was highest at the Blackrock Park with a total of 159 recordings, followed by Lexus Blackrock, Rock Road, and along the Rock Road at Blackrock College, with a total of five recordings attributed to this species occurring at these sites. The highest level of Leisler's bat activity across all seasons surveyed was recorded at Blackrock Park in the summer of 2021. The results of the bat surveys as they relate to the Leisler's bat are shown on Figure 12.8.1 in Volume 3 of this EIAR.

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 eight records of live sightings within 1km of the Proposed Scheme, these include the following records at the following locations:

- Blackrock (Grid Square O211298);
- Merrion road (Grid Square O198306);
- St. Vincent's University Hospital (Grid Square O190310);
- Ballsbridge, Pembroke Road (Grid Square O178324); and
- Ranelagh (Grid Square O1632) (NBDC Online Database2022).

12.3.8.1.2 Common pipistrelle bat *Pipistrellus pipistrellis*

Common pipistrelle bat was recorded along all of the transects surveyed between 2018 and 2021. A total of 55 recordings of common pipistrelle bat were identified on transects CBC1415BT001, CBC1415BT002 and CBC1415BT003 between 2018 and 2020. In addition, a total of 2,728 recordings were identified on transect CBC1415BT004 in 2021. Common pipistrelle bat activity was highest within Blackrock Park within transect CBC1415BT004 in summer 2021, followed by lands located adjacent to Elm Park Golf & Sports Club within transect CBC1415BT001 in autumn 2019, with 2,728 and 35 recordings attributed to this species occurring at these transects, respectively. The results of the bat surveys as they relate to the common pipistrelle bats are shown on Figure 12.8.1 in Volume 3 of this EIAR.

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 eight records of live sightings within 1km of the Proposed Scheme, these include the following records:

- Blackrock Park (Grid Square O211298);

- Pembroke Road (Grid Square O178324);
- Merrion road (Grid Square O198306);
- Lansdowne Road (Grid Square O181330),
- Haddington Road (Grid Square O171330); and,
- Baggot street (Grid Square O162321) (NBDC Online Database 2022).

12.3.8.1.3 Nathusius' pipistrelle bat *Pipistrellus nathusii*

Nathusius' pipistrelle bat was only recorded in the study area of the Proposed Scheme on six occasions at Blackrock Park along the transect CBC1415BT004 in summer 2021 during the walked transect surveys.

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

The desk study found that Nathusius' pipistrelle Bat are known to occur within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes two records at Mount Street Crescent (Grid Square O170332) and Leeson Street (Grid Square O1632) (NBDC Online Database 2022).

12.3.8.1.4 Soprano pipistrelle bat *Pipistrellus pygmaeus*

Soprano pipistrelle bat was recorded in one of the three transects surveyed between 2018 and 2020; CBC1415BT001. Additionally the species was recorded at Blackrock Park along the transect CBC1415BT004 in summer 2021. A total of eight and 81 recordings of soprano pipistrelle bat were identified at transect CBC1415BT001 and CBC1415BT004, respectively. The soprano pipistrelle bat activity was highest within the Blackrock Park, with 91 recordings occurring here in summer 2021. The results of the bat surveys as they relate to the soprano pipistrelle bats are shown on Figure 12.8.1 in Volume 3 of this EIAR.

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

The desk study found that soprano pipistrelle bat are known to occur across the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes 10 records of live sightings within 1km of the Proposed Scheme, these include the following records;

- Blackrock Park (Grid Square O211298);
- UCD (Grid Square O184304);
- Shrewsbury Road (Grid Square O183316);
- Mount Street Crescent (Grid Square O170332);
- Lansdowne Road (Grid Square O181330);
- Haddington Road (Grid Square O171330); and,
- Baggot street (Grid Square O162321) (NBDC Online Database 2022).

12.3.8.1.5 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 at Grand Canal Dock in 2013 (Grid square O171330) (NBDC Online Database 2022).

12.3.8.1.6 *Myotis* bat species

Records of *Myotis* bat species were not identified during any of the surveys between 2018 and 2021.

The desk study found that *Myotis* bat species including Daubenton's bat *Myotis daubentonii*, and Natterer's Bat *Myotis nattereri* are known to occur within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). This includes records of live sightings of Daubenton's bat at Ballsbridge (Grid Square O178324), and Lansdowne Road (Grid Square O181330) (NBDC Online Database 2022). One record for Natterer's bat at UCD, Belfield (Grid Square O184304) was also returned (NBDC Online Database 2022).

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

12.3.8.1.7 Potential Roost Features

The trees identified as having potential to support roosting bats (PRFs) are listed in Table 12.8 and shown on Figure 12.8.2 in Volume 3 of this EIAR. Each tree, or grouping of homogenous trees, was identified with regard to their potential to support roosting bats after Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2016). Trees with negligible suitability for roosting bats are not described or mapped as they are assessed as not having potential to support roosting bats.

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

Reference	Species	Description
CBC1415PRF001	Sycamore <i>Acer pseudoplatanus</i>	Cavities and knotholes
CBC1415PRF002	Lime tree <i>Tilia</i> spp.	Knotholes
CBC1415PRF003	Sycamore <i>Acer pseudoplatanus</i>	Cavities and knotholes
CBC1415PRF004	Horse chestnut <i>Aesculus hippocastanum</i>	Peeling bark

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

12.3.8.2 Badger

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

Despite this, badger are widely distributed throughout the GDA, often utilising public parks and residential gardens. The desk study returned record found within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). These records include: UCD, Belfield (Grid Square O180306); Ballsbridge (Grid Square O178320); and Clyde Road (Grid Square O173324) (NBDC Online Database 2022). As such, it has been assumed that badger may occur in vegetated areas adjacent to the Proposed Scheme.

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

12.3.8.3 Otter

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

No evidence of otter activity (e.g. sprainting posts), holts or couch sites were recorded during the early multi-disciplinary surveys carried out along the Proposed Scheme. Follow on surveys in February 2021, at accessible locations 150m up and downstream of the Ballsbridge crossing, noted mustelid prints in exposed sand. There was no evidence of otter habitation features on the downstream side of the Dodder which has been modified through the construction of flood relief measures. The vegetation on the upstream side has been cleared along one side of the watercourse during the ongoing construction of flood defences and the potential for otter holts has been reduced.

The desk study found that otter are known to occur within 1km of the Proposed Scheme and across the wider study area (see Appendix A12.1 in Volume 4 of this EIAR for further details). Records include multiple sites along the River Dodder and on Merrion Strand (NBDC Online Database 2022). The River Dodder is known to support

a local otter population. A cluster of otter activity was observed on the River Dodder between Ballsbridge and Donnybrook approximately 1km upstream of the Nutley Lane section of the Proposed Scheme, with a holt recorded at Anglesea Bridge, Donnybrook. Additional records of otter across the River Dodder included spraints and prints also being noted within approximately 1km upstream of the Proposed Scheme between Anglesea Bridge and Ballsbridge. Otter signs on Merrion Strand were recorded within 1km of the Proposed Scheme (Macklin *et al.* 2019). A holt was recorded approximately 2km upstream at Clonskeagh Road Bridge with a number of spraints recorded between 2km to 3km upstream of the Proposed Scheme at Milltown (Macklin *et al.* 2019; NPWS 2019). Three holts and several spraints were recorded approximately 6km upstream of Ballsbridge at various locations along the river between Rathfarnham and Donnybrook (Macklin *et al.* 2019).

A number of artificial holts are also known to have been constructed along sections of the River Dodder as part of earlier flood defence works undertaken by the OPW back in 2013. However their status and locations were not identified nor discussed in the Dublin City Otter survey (Macklin *et al.* 2019).

Further evidence of otter activity has been recorded approximately 1km downstream of the Proposed Scheme at Grand Canal Dock, and at Irishtown adjacent to where the River Dodder discharges into the Liffey Estuary Lower. Two incidental sightings of live otter were noted during wintering bird surveys in November 2020 and January 2021 further downstream, where the River Dodder discharges into the Liffey Estuary Lower.

In an Irish context, the conservation concern of otter is 'Least Concern' (Marnell *et al.* 2019) due to population recoveries since 2009, however otter remains 'Near Threatened' at a European and Global context (IUCN Red List) (Roos *et al.* 2015).

Wicklow Mountains SAC, which is located approximately 11.9km upstream of the Proposed Scheme, is the closest European site designated for otter. Typically, otter territories are within the range of 7.5km for females and up to 21km for males (Ó'Neill *et al.* 2009). Therefore, there is potential for otter associated with the Wicklow Mountains SAC to move downstream within the River Dodder catchment and to come within the ZoI of the Proposed Scheme. The local otter population is therefore valued as being of International Importance as it is listed on Annex II of the Habitats Directive, designated under the Dublin City Biodiversity Action Plan as it is considered to be a species of high conservation concern and has the potential to be associated with the Wicklow Mountains SAC population.

12.3.8.4 Marine Mammals

The Proposed Scheme is hydrologically connected to Dublin Bay via the Santry_020, Wad River, Tolka Estuary and North Bull Island transitional water body, and the Mayne Estuary via the Mayne_010. There were no dedicated marine mammal surveys carried out as part of the assessment.

Harbour seal, grey seal, and Harbour porpoise are known from Dublin Bay and the Mayne Estuary and these species are all protected under the Wildlife Acts and are also listed on Annex II of the habitats directive, while all cetacean species are listed on Annex IV of the Habitats Directive. Harbour porpoise is a QI species designated as part of Rockabill to Dalkey Island SAC which is located c. 5.4km east of the Proposed Scheme. Harbour seal and grey seal are also listed on Annex II of the Habitats Directive and are listed QI species designated as part of Lambay Island SAC which is located c. 22km north of the Proposed Scheme.

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

A number of protected marine mammals are known to occur within Dublin Bay, the Mayne Estuary, 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 truncatus*;
- Humpback Whale *Megaptera novaeangliae*;
- Sperm Whale *Physeter macrocephalus*;
- Striped Dolphin *Stenella coeruleoalba*;
- Risso's Dolphin *Grampus griseus*; and,
- Northern Bottle-nosed Whale *Hyperoodon ampullatus*.

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

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

12.3.8.5 Other Mammal Species

No other protected mammal species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme. The desk study returned records for the following terrestrial mammal species protected under the Wildlife Acts are known, within c. 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*;
- Hedgehog *Erinaceus europaeus*; and,
- Pygmy Shrew *Sorex minutus*

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

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

12.3.9 Birds

12.3.9.1 Breeding Birds

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

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

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

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

The desk study returned records of a total of 75 breeding bird species across the study area (i.e. Grid Squares O12, O13, O22 and O23). Records included 10 species listed under Annex I of the Birds Directive, 32 SCI species, and an additional seven Red Listed and 25 Amber Listed species. This includes 21 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme. Several bird species for which records were returned in the desk study are those typically found in coastal, estuarine and intertidal habitats, such as the Liffey Estuary and Dublin Bay. Many gull, auk, shearwater and tern species breed in steep inaccessible cliffs i.e. Howth Head, offshore islands, Dublin port. Seabirds such as terns, guillemots and kittiwakes' nest on the cliffs and crevices of Rockabill Island in Dublin Bay SPA (Birdwatch Ireland, 2020). Fulmar, shag, razorbill and gannet nest in the cliffs of Irelands Eye SPA, which also has numbers of large larus gulls, cormorant and puffin (Merne & Madden 2000). Gulls favour nesting along coasts on shingle and cliffs but may utilise inland public areas for scavenging and buildings for roof nesting (Birdwatch Ireland, 2020).

The majority of records along the Proposed Scheme comprise bird species common to suburban habitats (including residential and parkland areas), such as gull and garden bird species. Residential habitats and scattered trees and parkland, hedgerows, treelines, broadleaved woodland and amenity grassland habitats were observed in several locations across the Proposed Scheme including Blackrock Park, Booterstown Park, and Ailesbury House on Ailesbury Road. These species therefore are likely to use lands surrounding the footprint of the Proposed Scheme for breeding and foraging.

Breeding species which are associated with buildings were returned from the desk study including swallows and house martins (Birdwatch Ireland 2020). Swallows, starlings, swift and house martins occurred across the larger study area and may therefore utilise suitable buildings adjacent to the Proposed Scheme. Peregrine, kestrel and sparrowhawk occurred across the larger study area (i.e. Grid Squares O12, O13, O22 and O23). and may therefore utilise open green spaces and trees adjacent to the Proposed Scheme.

Several species of warblers and raptors which favour woodlands, agricultural lands and upland heathland areas were identified during the desk study (Appendix A12.1. in Volume 4 of this EIAR). Agricultural lands, uplands and open areas were identified at locations to the west and south of the Proposed Scheme. As such, some of these species may utilise the lands at these locations. Due to the largely urban setting of the Proposed Scheme; these habitat types are not present; or are highly fragmented within the boundary of the Proposed Scheme. As such, these species are not deemed to be present in significant numbers, however they may be present in larger parks and greenspaces in the lands surrounding the Proposed Scheme e.g., Blackrock Park, Booterstown Marsh, Booterstown Playground (to the south of Booterstown Marsh) and Herbert Park (NPWS Online Database 2021j).

Wetland and riverine bird species identified during the desk study (Appendix A12.1. in Volume 4 of this EIAR), include gulls, waders, waterfowl, swans, ducks, and herons which utilise intertidal zones, freshwater lakes, ponds, canals, and rivers. Habitats within close proximity to the Proposed Scheme include Grand Canal at McCartney Bridge; Blackrock Park, Rock Road; River Dodder at Ballsbridge and Booterstown Nature Reserve which contain populations of kingfisher, grey wagtail, mute swan, grey heron, common snipe, Eurasian teal, little egret, and tufted duck. Rivers are important nesting and foraging sites for species such as grey wagtail, kingfisher and sand martin within the Proposed Scheme. The Proposed Scheme will cross the River Dodder at Ballsbridge.

Kingfisher were not recorded during multidisciplinary surveys within the footprint of the Proposed Scheme. However, Scott Cawley Ltd. are aware of kingfisher activity, with a potential resident breeding pair along the Nutley stream. The stream, which is not mapped by the EPA, runs alongside the DART line and discharges into Dublin Bay at two areas, namely east of the Proposed Construction Compound and another tie-in with the Priors Stream at Blackrock Park. The stream is not intersected by the Proposed Scheme and its closest point to the Proposed Scheme is adjacent to the proposed Construction Compound (approximately 12m).

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

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

Common Name / Scientific Name / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Barn Swallow <i>Hirundo rustica</i> (SL)	Through all grid squares	Amber (B)	-	-
Black-headed Gull <i>Chroicocephalus ridibundus</i> (BH)	Blackrock Park Grid square O211296 and Booterstown Nature Reserve Grid square O201304	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 30m
Common coot <i>Fulica atra</i> (CO)	Blackrock Park Grid square O211296 and Booterstown Nature Reserve Grid square O201304	Amber (B/W)	-	Lough Derravaragh SPA approximately 75.2km
Common redshank <i>Tringa totanus</i> (RK)	Booterstown Nature Reserve Grid square O201304	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 886m
Common Kingfisher <i>Alcedo atthis</i> (KF)	River Dodder, Nutley Stream	Amber (B)	✓	River Boyne and Blackwater SPA approximately 50km
Common linnet <i>Carduelis cannabina</i> (L.)	Sandymount Strand Grid square O205308	Amber (B)	-	-
Common Sandpiper <i>Actitis hypoleucos</i> (CS)	Sandymount Strand Grid square O200307	Amber (B)	-	-
Common snipe <i>Gallinago gallinago</i> (SN)	Booterstown Nature Reserve Grid square O200304	Red (B/W)	-	-
Common Shelduck <i>Tadorna tadorna</i> (SU)	Booterstown Nature Reserve Grid square O201304	Amber (B/W)	-	Baldoyle Bay SPA approximately 10km
Common starling <i>Sturnus vulgaris</i> (SG)	Through all grid squares	Amber (B)	-	-
Common swift <i>Apus apus</i> (SI)	River Dodder Grid square O167303	Red (B)	-	-
Eurasian teal <i>Anas crecca</i> (T.)	Booterstown Nature Reserve Grid square O202303	Amber (B/W)	-	North Bull Island SPA approximately 5.5km
European greenfinch <i>Carduelis chloris</i> (GR)	Through all grid squares	Amber (B)	-	-
Goldcrest <i>Regulus regulus</i> (GC)	Rockfield Park, Blackrock Grid square O218290	Amber (B)	-	-
Grey heron <i>Ardea cinerea</i> (H.)	River Dodder, Herbert Park Grid square O177319	Green (B)	-	Wexford Harbour and Slobbs SPA approximately 85.2km
Great spotted woodpecker <i>Dendrocopos major</i> (GS)	Booterstown Grid square O2030	Green (B)	✓	-
Grey wagtail <i>Motacilla cinerea</i> (GL)	Dodder River Herbert Park Grid square O179317, Booterstown Nature Reserve Grid square O202303	Red (B)	-	-
House martin <i>Delichon urbicum</i> (HM)	Booterstown Nature Reserve Grid square O202303	Amber (B)	-	-
Herring gull <i>Larus argentatus</i> (HG)	Through all grid squares	Amber (B/W)	-	Ireland's Eye SPA Approximately 13km
Lesser Black-backed Gull <i>Larus fuscus</i> (LB)	Through all grid squares	Amber (B/W)	-	Lambay Island SPA approximately 12.2km
Little egret <i>Egretta garzetta</i> (ET)	Booterstown Grid square O200304	Green (B/W)	✓	-

Common Name / Scientific Name / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Mallard <i>Anas platyrhynchos</i> (MA)	Blackrock Park Grid square O211296 Booterstown nature Reserve Grid square O204302	Amber (B/W)	-	Dundalk Bay SPA approximately 58.3km
Mediterranean Gull <i>Larus melanocephalus</i> (MU)	Blackrock Grid square O212297 Sandymount Strand Grid square O207307	Amber (B)	✓	-
Mute Swan <i>Cygnus olor</i> (MS)	Blackrock Park Grid square O211296 Booterstown Nature Reserve Grid square O200304	Amber (B/W)	✓	-
Peregrine falcon <i>Falco peregrinus</i> (PE)	Sandymount Strand Grid square O205306	Green (B)	✓	Wicklow Mountains SPA approximately 9.6km
Sand martin <i>Riparia riparia</i> (SM)	Booterstown Nature Reserve Grid square O202303	Amber (B)	-	-
Tufted duck <i>Aythya fuligula</i> (TU)	Blackrock Park Grid square O211296	Amber (B/W)	-	Lough Derravaragh SPA approximately 80km

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

12.3.9.2 Wintering Birds

All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the Birds Directive, and / or as SCIs within designated European sites. A total of 17 wintering bird surveys were carried out for the Proposed Scheme at sites CBC1415WB001 and CBC1415WB002 in Blackrock Park between February and March 2020, November 2020 and March 2021, and October 2021 and March 2022. Species identified included black-headed gull, light-bellied Brent goose, little grebe and mallard. 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 wintering bird survey sites.

The surveys were undertaken along two transects, namely: CBC1415WB001 which is adjacent to Booterstown Marsh, while CBC1415WB002 was centred on the large open grassy areas around Blackrock Park and its pond.

In summary transect CBC1415WB001 captured the amenity grass area next to Booterstown Marsh (within South Dublin Bay and River Tolka Estuary SPA) and Rock Road and the current waste ground to the north of the Marsh. The small area of amenity grass is maintained with cutting by the local authority. The waste ground is not considered suitable for wintering birds. Disturbance within the site is moderate-high as this is a popular resting spot, with bench, for public use which is frequent. Light-bellied Brent geese have not been observed using this small area for feeding or resting based on no live observation or droppings within the site, however light-bellied Brent geese are known to use Booterstown Marsh as a feeding / resting spot.

Transect CBC1415WB002 is a grass-covered area in Blackrock Park, next to South Dublin Bay and River Tolka Estuary SPA. The grassland sward within the park is maintained with cutting by the local authority. Disturbance is moderate as the transect is between the path of the park and Rock Road, which is frequently used by walkers. Light-bellied Brent geese feed on the grass areas next to the transect but no evidence has been observed through live birds observations or droppings during the 2020 / 2021 survey period. Gulls are frequent within the lake, usually within its central parts.

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

Common Name / Scientific Name / BTO Code	Activity and Distribution in the Study Area (Peak count / Day)	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Black-headed gull <i>Chroicocephalus ridibundus</i> (BH)	CBC1415WB002: Two birds feeding in lake next to transect (28/02/2020); 13 birds swimming in lake next to transect (21/01/2021); 19 birds loafing in lake next to transect (26/10/2021); 13 birds swimming in lake next to transect (09/11/2021); 20 birds swimming in lake next to transect (25/11/2021); 17 birds swimming in lake next to transect (06/12/2021); 29 birds loafing on the island edge next to transect (11/01/2022); 18 birds loafing on the island edge next to transect (18/01/2022); 22 birds swimming in lake next to transect (01/02/2022); 27 birds swimming in lake next to transect (22/02/2021); 19 birds swimming in lake next to transect (08/03/2022).	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA c.<1km
Light-bellied Brent goose <i>Branta bernicla hrota</i> (BG)	CBC1415WB001: One bird feeding east of the transect within intertidal habitats of Booterstown Marsh (08/03/2022). CBC1415WB002: 18 birds feeding on grass between lake and transect (16/03/2020); six birds swimming in lake adjacent to transect (11/01/2022); nine birds feeding on grass between lake and transect (18/01/2022); five birds feeding on grass between lake and transect (01/02/2022); nine birds feeding on grass between lake and transect (22/01/2022); 16 birds swimming in lake adjacent to transect (29/03/2022).	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA c.<1km
Little grebe (LG)	CBC1415WB002: One bird swimming in lake adjacent to transect (09/11/2021).	Green (B/W)	-	Wexford Harbour and Sloba SPA approximately 85.2km
Mallard <i>Anas platyrhynchos</i> (MA)	CBC1415WB002: Seven individuals swimming in lake next to transect (25/11/2021); two birds swimming in lake next to transect (06/12/2021); six birds swimming in lake next to transect (11/01/2022);.	Amber (B/W)	-	Dundalk Bay SPA approximately 58.3km

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

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

The desk study returned records of a total of 44 wintering bird species across the study area (Grid Squares O12, O13, O22 and O23). Records included four species listed under Annex I of the Birds Directive, 36 SCI species, and an additional four Amber Listed species. This includes 21 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the footprint of the Proposed Scheme.

Downstream of the Proposed Scheme, Dublin Bay also supports Internationally Important numbers of 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 in 2013 and 2016. These included shelduck, wigeon, teal, pintail and shoveler which favoured Dollymount Strand and North Bull Island, while great crested grebe and ringed plover favoured Sandymount Strand. Red-breasted merganser, red-throated diver, little egret, grey heron, oystercatcher, grey plover, knot, sanderling, dunlin, curlew, greenshank, redshank, and turnstone were recorded across all areas of Dublin Bay. 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. However, the Proposed Scheme will intersect with South Dublin Bay and River Tolka Estuary SPA at Booterstown Nature Reserve which is used by a number of wintering bird species and further details are provided below.

A desk study of wintering bird species recorded at Booterstown Nature Reserve, which is a subsite of South Dublin Bay and River Tolka Estuary SPA, included black-tailed godwit, light-bellied Brent goose, black-headed gull, common greenshank, common redshank, herring gull, red knot, common coot, common shelduck, little egret, little grebe common snipe, Eurasian teal, and mute swan.

Dublin Bay, which is located approximately 30m east of the Proposed Scheme, 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 Dublin Bay in 2013 and 2016. These included shelduck, wigeon, teal, pintail and shoveler which favoured Dollymount Strand and North Bull Island, while great crested grebe and ringed plover favoured Sandymount Strand. Red-breasted merganser, red-throated diver, little egret, grey heron, oystercatcher, grey plover, knot, sanderling, dunlin, curlew, greenshank, redshank, and turnstone were recorded across all areas of Dublin Bay.

The wider study area of Dublin Bay, is considered of significant ornithological importance as it supports an Internationally Important population of light-bellied Brent goose, 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 five known inland wintering bird feeding sites within 300m of the Proposed Scheme. The importance of a feeding site has been categorised as follows:

- A site is considered to be of major importance if a peak count of 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; and,
- 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).

Known inland wintering bird feeding sites within approximately 300m of the Proposed Scheme and are listed below (Scott Cawley Ltd. 2017):

- Blackrock Park, Rock Road will traverse the Proposed Scheme (high importance);
- Blackrock College, Rock Road will traverse the Proposed Scheme (high importance);
- Williamstown Park, Rock Road will traverse the Proposed Scheme (high importance);
- Pembroke Cricket Club / Monkstown Rugby Club, Wilfield Road approximately 225m from Proposed Scheme (high importance); and,
- St. Andrew's Playing Pitch, adjacent to Booterstown Avenue approximately 265m from Proposed Scheme (unassigned importance).

Desk study records of wintering bird species utilising lands adjacent to the Proposed Scheme are provided in Table 12.11.

Table 12.11: 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
Bar-tailed Godwit <i>Limosa lapponica</i> (BA)	Sandymount Strand Grid square O200307	Red (W)	✓	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Black-headed Gull <i>Chroicocephalus ridibundus</i> (BH)	Boosterstown Nature reserve Grid square O203303 Sandymount Strand Grid square O207307	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Light-bellied Brent Goose <i>Branta bernicla hrota</i> (BG)	Boosterstown Nature Reserve Grid square O200311 Merrion Strand Grid square O198309, Sandymount Strand Grid square O196312.	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Common Coot <i>Fulica atra</i> (CO)	Grand Canal, Boosterstown Nature Reserve Grid square O200305, Blackrock Park Grid square O211296	Amber (B/W)	-	Lough Ennell SPA approximately 60.9km
Common Redshank <i>Tringa totanus</i> (RK)	Boosterstown Nature reserve Grid square O201303 Sandymount Strand Grid square O201307,	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Common Snipe <i>Gallinago gallinago</i> (SN)	Boosterstown Nature Reserve Grid square O200304	Red (B/W)	-	-
Dunlin <i>Calidris alpina</i> (DN)	Boosterstown Nature Reserve Grid square O202303 Sandymount Strand Grid square O200307	Red (B/W)	✓	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Eurasian Curlew <i>Numenius arquata</i> (CU)	Sandymount Strand Grid square O207307	Red (B/W)	✓	-
Eurasian Oystercatcher <i>Haematopus ostralegus</i> (OC)	Blackrock Grid square O212297 Sandymount Strand Grid square O200307	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Eurasian Teal <i>Anas crecca</i> (T.)	Boosterstown Nature Reserve Grid square O203302 Sandymount Strand Grid square O199308	Amber (B/W)	-	North Bull Island SPA approximately 4.8km
Eurasian Wigeon <i>Anas Penelope</i> (WN)	Across all grids Merrion Strand	Amber (B/W)	-	The Murrough SPA approximately 22km
Great Crested Grebe <i>Podiceps cristatus</i> (GG)	Sandymount Strand Grid square O206304	Amber (B/W)	-	Malahide Estuary SPA approximately 13.6km
Grey Plover <i>Pluvialis squatarola</i> (GV)	Sandymount Strand Grid square O200309	Red (W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Herring Gull <i>Larus argentatus</i> (HG)	Boosterstown Nature Reserve Grid square O201304 Sandymount Strand Grid square O200307.	Amber (B/W)	-	Ireland's Eye SPA approximately 15.8km
Lesser Black-backed Gull <i>Larus fuscus</i> (LB)	Sandymount Strand Grid square O207307	Amber (B/W)	-	Lambay Island SPA approximately 17.5km
Little Egret <i>Egretta garzetta</i> (ET)	Boosterstown Nature Reserve Grid square O202303 Sandymount Strand Grid square O199307	Green (B/W)	✓	-
Mediterranean Gull <i>Larus melanocephalus</i> (MU)	Blackrock Grid square O212297 Sandymount Strand Grid square O207307.	Amber (B/W)	✓	-
Mew Gull <i>Larus canus</i> (CM)	Sandymount Strand Grid square O205307	Amber (B/W)	-	Dundalk Bay SPA approximately 58.2km
Mute Swan <i>Cygnus olor</i> (MS)	Boosterstown Nature Reserve Grid square O201304 Blackrock Park Grid square O211296	Amber (B/W)	-	-
Northern Gannet <i>Morus bassanus</i> (GX)	Sandymount Strand Grid square O206305	Amber (B/W)	-	Ireland's Eye SPA approximately 13km

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
Red-breasted Merganser <i>Mergus serrator</i> (RM)	Sandymount Strand Grid square O203309	Green (B/W)	✓	Malahide Estuary SPA approximately 13.6km
Red Knot <i>Calidris canutus</i> (KN)	Boosterstown Nature Reserve Grid square O201304 Sandymount Strand Grid square O200308	Red (W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Ringed Plover <i>Charadrius hiaticula</i> (RP)	Sandymount Strand O212297	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA intersects with Proposed Scheme
Ruddy Turnstone <i>Arenaria interpres</i> (TT)	Sandymount Strand Grid square O207307	Amber (W)	-	North Bull Island SPA approximately 4.8km
Sanderling <i>Calidris alba</i> (SS)	Sandymount Grid square O200307	Green (W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Common Shelduck <i>Tadorna tadorna</i> (SU)	Boosterstown Nature Reserve Grid square O201304	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA is adjacent to the Proposed Scheme
Tufted Duck <i>Aythya fuligula</i> (TU)	Blackrock Grid square O211296,	Amber (B/W)	-	Lough Ennell SPA approximately 60.9km

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

12.3.10 Reptiles

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

The desktop 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 Importance (Higher Value).

12.3.11 Amphibians

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

Suitable amphibian habitat (i.e., vegetated riverbanks, surface water / drainage features with stagnant, relatively unpolluted water) was identified within the footprint of the Proposed Scheme. This includes scattered areas of vegetated riverbank along the River Dodder, Boosterstown Stream, Elm Park Stream and Priory Stream.

The desktop study returned records for common frog and smooth newt within 1km of the Proposed Scheme. The common frog was recorded at Wanderers Football Club, Merrion Road, the River Dodder and Pembroke Road. A record of smooth newt at St. Michaels College, Nutley Avenue is also noted (NPWS 2019).

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

The desk study returned records for common frog within 1km of the Proposed Scheme at Marino in 2003 (NBDC Online Database 2022). This includes records of common frog across the length of the Proposed Scheme and records of smooth newt at Portmarnock and Howth (NPWS 2019d).

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

12.3.12 Fish

Fish species are protected under the Fisheries Acts and by fishing by-laws. Atlantic salmon, river lamprey and the brook lamprey are listed on Annex II of the EU Habitats Directive. Fish surveys were not carried out as part of the field surveys as there will be no in-stream works.

The Proposed Scheme lies within the Dodder_SC_010 sub catchment. The River Dodder catchment is located in the Eastern River Basin District and covers an area of approximately 113km². The River Dodder flows in a north easterly direction through south Co. Dublin, discharging to the River Liffey at Grand Canal Dock in Dublin city (Matson *et al.* 2019). The WFD sub-catchment Dodder_SC_010 was assigned an Ecological fish status of 'Good' in 2018 in the upper reaches and deemed 'Not at Risk' of failing to meet the WFD objectives. At Dodder Valley Park the River Dodder [Dodder_40] was assigned an ecological fish status of 'Poor' and deemed to be 'At Risk' of failing to meet its WFD objectives (EPA 2018). The River Dodder catchment was surveyed by Inland Fisheries Ireland (IFI) in 2011. Monitoring locations within close proximity to the Proposed Scheme included Beaver Row and Mount Carmel Hospital are approximately 2km and 4.5km upstream of the Proposed Scheme. The River Dodder was assigned an Ecological Fish Status of Moderate to High (Kelly *et al.* 2012) at these locations. Surveys of the River Dodder in 2011 recorded Atlantic salmon *Salmo salar*, brown trout *S. trutta*, European eel *Anguilla anguilla*, stone loach *Barbatula barbatula*, three-spined stickleback *Gasterosteus aculeatus* and minnow *Phoxinus phoxinus*. Later surveys, which were carried out in September 2018 at nine sites along the course of the River Dodder, recorded five fish species with brown trout being the most abundant, other species comprised of stone loach, three-spined stickleback, minnow and European eel (Matson *et al.* 2019).

The Elm Park Stream, Booterstown Stream, Priory Stream, and Brewery Stream returned no records of fish species. The Ecological Fish Status of these streams is unknown, although it is considered negligible given the localised culverting and the condition, habitat management and lack of suitable instream habitat to support species the fish prey on.

12.3.12.1 Salmonid Species

The River Dodder is reported to contain stocks of brown trout in low numbers. Brown trout are valued as being of Local Importance (Higher Value) (Matson *et al.* 2018). Indeed, it is considered exceptional among most urban rivers in the area, having resident salmon and sea trout populations, as such the river is regarded as a very important fishery (IFI Consultation 2020).

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

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

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

12.3.12.2 Lamprey Species

The desk study returned records for lamprey species in the River Dodder and River Liffey (in the case of river Lamprey *Lampetra fluviatilis* only) (Kelly *et al.* 2012; IFI 2010). Inland Fisheries Ireland surveys carried out during 2017 found Lamprey upstream of the Proposed Scheme in low numbers (Matson *et al.* 2018). The River Dodder is reported to contain juvenile lamprey, with suitable habitat located approximately 15km upstream of the Proposed Scheme at Lower Reservoir (Matson *et al.* 2019).

Lamprey populations are valued as being of National Importance.

12.3.12.3 European Eel

The desk study returned records for European eel in the River Dodder and on the Grand Canal.

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 & Gollock 2014). The Liffey Estuary serves as the natural linkage for European eel migrating between freshwater and marine environments (Central and Regional Fisheries Board 2008).

The desk study returned records for European eel in the Grand Canal. European eels were recorded along the Grand Canal by IFI during the eel monitoring programme conducted in 2011 (O’Leary *et al.* 2011).

A re-stocking programme based in Shannon Estuary was initiated to address declining numbers, currently their passage is assisted upstream and into other connected water bodies using the “trap and transport” method which involves catching the eels and moving them past obstacles (O’Connor 2014).

European eel populations are valued as being of National Importance (IFI 2010).

12.3.12.4 All Other Fish Species

Results of water sampling undertaken at several locations along the River Dodder during 2018 surveys included minnowstone loach and three-spined stickleback (Matson *et al.* 2019).

The Grand Canal is known as a major angling destination and species present include common bream, tench, common rudd, common perch *Perca fluviatilis* and pike. It also has a population of non-native invasive roach, a species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations (Waterways Ireland 2021).

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

12.3.13 Invertebrates

12.3.13.1 White-clawed Crayfish

White-clawed crayfish *Austropotamobius pallipes* are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive. 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 closest reported location of white-clawed crayfish populations are in Poulaphouca reservoir (Wicklow County Council 2009; NBDC Online Database 2022).

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

12.3.13.2 Freshwater Molluscs

Surveys for freshwater molluscs was not carried out as part of this assessment by virtue of the Proposed Scheme and lack of instream works. The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned records for freshwater molluscs approximately 1km downstream and upstream of the Proposed Scheme, with a live record of glutinous snail *Myxas glutinosa* at the Grand Canal Grid, south of McCartney Bridge. The orb pea mussel *Pisidium pseudosphaerium* was also recorded in the same location. Glutinous snail and orb pea mussel are listed as ‘Endangered’ on Ireland Red List No. 2: Non-Marine Molluscs (Byrne *et al.* 2009).

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

12.3.13.3 Marsh Fritillary Butterfly

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

The desk study (see Appendix A12.1 in Volume 4 of this EIAR) did not return records for marsh fritillary within the footprint of the Proposed Scheme. Desk study records in the wider area were largely historical (pre-1980s). Recent records for marsh fritillary were identified approximately 5.5km north east of the Proposed Scheme at North Bull Island in 2019 (NBDC Online Database 2022). Marsh fritillary are restricted to habitats containing a low, open sward with abundant devil's-bit scabious *Succisa pratensis* including sand dunes, calcareous grassland, fens, raised and blanket bogs, upland heaths and grasslands. Neither devil's-bit scabious nor these habitats were recorded within the footprint of the Proposed Scheme.

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

12.3.13.4 Other Invertebrates

The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned records for several invertebrates red listed on the Ireland Red List No. 4: Butterflies (Regan et al. 2010), Ireland Red List No. 6: Damselflies and Dragonflies (Odonata) (Nelson et al. 2011), Ireland Red) and Regional Red List of Irish Bees 2006 (Fitzpatrick et al. 2006; NBDC Online Database 2022). 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 *Tropaeolum 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) and amenity grasslands (GA2); Temple Lane Park, Blackrock Park, Booterstown Playground, Blackrock College, St. Vincent's University Hospital, Elm Park Golf & Sports Club, and adjacent to Merrion Road at the junction of Simmons Court Road. These habitats were identified along the route of the Proposed Scheme in fragmented pockets of small and medium size. Species diversity was low in terms of foodplants in these habitats. Butterfly communities that are known to survive in highly fragmented landscapes are mobile species that can feed off a range of plants (Öckinger et al. 2010).

Damselflies and Dragonflies are typically found at slow moving or stagnant water bodies such as wetlands, river mires and flood lands, however they have adapted to artificial habitats such as ponds and canals (Fox & Cham 1994). These species are carnivorous predators throughout their life cycles and are used as bio-indicator species for water quality as they have low tolerances for pollution, with juveniles spending the entirety of their life in aquatic systems (Nelson et al. 2011). Suitable habitats along the Proposed Scheme, which are isolated and fragmented, include; other artificial lakes and ponds (FL8) and canals (FW3) in Blackrock Park, Grand Canal at Baggot Street Lower and Ballsbridge Park. The preferred foodplants for bees are native species with white, blue or yellow flowers (Fitzpatrick et al. 2006). Additional fragmented sites where suitable floral species were recorded along the Proposed Scheme include ornamental flower beds and borders (BC4) within residential gardens, parkland with scattered trees (WD5), and amenity grasslands (GA2); in parks adjacent to the Proposed Scheme along Rock Road, Nutley Lane and adjacent to Merrion Gates on Merrion Road.

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

Loss of natural and semi-natural habitats has been a key driver in pollinators who require a balanced diet from a range of plant species throughout their active foraging season which lasts from early spring until late autumn (TCD 2017). Isolated and fragmented sites which are adjacent to the route of the Proposed Scheme include Blackrock Village (Anon. 2020) and Blackrock College. These sites are recorded as urban pollinator areas with designated areas set aside where grass cutting has ceased and is actively being managed for wildflowers (NBDC 2018). These other invertebrate species favour species rich semi-natural grasslands and meadows, upland

heathland and sand dunes. Habitats within close proximity to the Proposed Scheme which correspond to species requirements include areas of ornamental planting along roadsides, parkland, other artificial lakes and ponds, canals, and gardens. Such habitats are fragmented and highly disturbed and are therefore deemed unsuitable for significant populations of red-listed invertebrates (Biesmeijer *et al.* 2006; Öckinger *et al.* 2010). As such, other invertebrates are not considered further in the assessment.

12.3.14 Summary Ecological Valuation and Identification of KERs

Table 12.12: summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance. KERs are highlighted in blue in Table 12.12. Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of assessing the impacts on what are determined to be important ecological or biodiversity features, as per the CIEEM Guidelines (CIEEM 2018) and the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009).

All designated areas for nature conservation that lie within the Zol 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 Zol of the Proposed Scheme are not considered to be at risk of impact and are therefore not considered to be KERs.

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

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

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

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

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

Table 12.12: 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
Wicklow Mountains SAC [002122]	International Importance	Yes
Lambay Island SAC [000204]	International Importance	Yes
South Dublin Bay and River Tolka Estuary SPA [004024]	International Importance	Yes

Ecological Receptor	Ecological Valuation	KER?
Baldoyle Bay SPA [004016]	International Importance	Yes
North Bull Island SPA [004006]	International Importance	Yes
Malahide Estuary SPA [004025]	International Importance	Yes
Ireland's Eye SPA [004117]	International Importance	Yes
Howth Head Coast SPA [004113]	International Importance	Yes
Rogerstown Estuary SPA [004015]	International Importance	Yes
Lambay Island SPA [004069]	International Importance	Yes
Dalkey Islands SPA [004172]	International Importance	Yes
Skerries Islands SPA [004122]	International Importance	Yes
The Murrough SPA [004186]	International Importance	Yes
Rockabill SPA [004014]	International Importance	Yes
All other SAC or SPA sites	International Importance	No – beyond Zol
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
Boosterstown Marsh pNHA [001205]	National Importance	Yes
Baldoyle Bay pNHA [000199]	National Importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	National Importance	Yes
Howth Head pNHA [000202]	National Importance	Yes
Ireland's Eye pNHA [000203]	National Importance	Yes
Malahide Estuary pNHA [000205]	National Importance	Yes
Portraine Shore pNHA [001215]	National Importance	Yes
Rogerstown Estuary pNHA [000208]	National Importance	Yes
Lambay Island pNHA [000204]	National Importance	Yes
The Murrough pNHA [000730]	National Importance	Yes
Rockabill Island pNHA [000207]	National Importance	Yes
Skerries Island NHA [001218]	National Importance	Yes
All other NHA or pNHA sites	National Importance	No – beyond Zol
Habitats		
Flower beds and borders (BC4)	Local Importance (Lower Value)	No
Stone walls and other stonework (BL1)	Local Importance (Lower Value)	No
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	No
Exposed sand, gravel or till (ED1)	Local Importance (Lower Value)	No
Recolonising bare ground (ED3)	Local Importance (Lower Value)	No
Other artificial lakes and ponds (FL8)	Local Importance (Lower Value)	No
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Yes
Canals (FW3)	National Importance	Yes
Amenity grassland (improved) (GA2)	Local Importance (Lower Value)	No
Residential	Local Importance (Lower Value)	No
(Mixed) broadleaved woodland (WD1);	Local Importance (Higher Value)	Yes

Ecological Receptor	Ecological Valuation	KER?
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
Lower salt marsh (CM1) (corresponding to Annex I habitat <i>Salicornia</i> and other annuals colonising mud and sand (1310))	National Importance	Yes
Upper salt marsh (CM2) (corresponding to Annex I habitats Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (1330) Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (1410))	National Importance	Yes
Mud sand shores (LS4) (corresponding to Annex I habitat mudflats and sandflats not covered by sea water at low tide (1140))	National Importance	Yes
Flora Species		
Flora Species listed on the Flora Protection Order 2015	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		
Bats	Local Importance (Higher Value)	Yes
Badger	Local Importance (Higher Value)	Yes
Otter	International Importance	Yes
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Yes
Marine mammals (all other marine mammals)	County Importance	Yes
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Yes
SCI / Annex I bird species	International Importance	Yes
Kingfisher (non-SCI population)	International Importance	Yes
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Yes
Reptiles	Local Importance (Higher Value)	Yes
Amphibians	Local Importance (Higher Value)	Yes
Atlantic salmon	International Importance	Yes
European eel / Lamprey	National Importance	Yes
All other fish species	Local Importance (Higher Value)	Yes
Invertebrates (Freshwater molluscs)	Local Importance (Higher Value)	Yes
Non-native invasive animal species	N/A	N/A

12.4 Potential Impacts

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

12.4.1 Characteristics of the Proposed Scheme

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

12.4.1.1 Construction Phase

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

- Site preparation and clearance;
- Removal of existing boundaries, pavement, lighting columns, bus stops, and signage;
- Protection and / or diversion of buried services;
- Reconnection of existing and new drainage infrastructure into the existing surface water drainage infrastructure;
- Road widening, pavement reconstruction, and kerb improvements;
- Temporary and permanent land take at a number of key areas including;
 - Lands adjacent to Booterstown Marsh pNHA.
 - Blackrock Park – overlooking the pond.
 - Blackrock College road frontage and main gates realignment.
 - Elm Park Golf & Sports Club - road frontage.
- 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.

12.4.1.1.1 Drainage Infrastructure

The drainage system for the Proposed Scheme will discharge to three surface water receptors: Brewery Stream_010, Dublin Bay and Ringsend WwTP, which then discharges to Liffey Estuary Lower, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. For the Proposed Scheme, there will be a net increase of 3,797m² in the impermeable area ultimately discharging to Dublin Bay. The drainage design principles ensure that all runoff from increases in impermeable areas will be attenuated and there will be no net increase in the surface water flow discharged to these receptors.

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

12.4.1.1.2 Construction Compound

The Construction Compound will be located in Booterstown Car Park, within Blackrock Park, along the R118, opposite Willow Terrace. The Construction Compound will be used to store materials, plant and equipment, to manage the activities from, and to provide welfare facilities for construction personnel and limited car parking.

The Construction Compound will be in place for the duration of the Construction Phase of the Proposed Scheme, estimated as approximately 24 months.

12.4.1.1.3 Estimated Project Duration

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

12.4.1.2 Operational Phase

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

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

12.4.2 'Do Nothing' Scenario

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

The Baseline Environment (see Section 12.3) describes the existing land use surrounding the Proposed Scheme. The Greater Dublin Area is highly urbanised with existing trends resulting in added pressure to water resources and habitat losses to ongoing development. As the full extent of the Proposed Scheme passes through lands zoned under the Dún Laoghaire-Rathdown County Development Plan 2016-2022 (DLR 2016) and Dublin City County Development Plan 2016-2022 (DCC 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 water bodies and habitat fragmentation. It is also likely that traffic numbers will continue to remain high on a road network with variable drainage control or pollution control measures, which may have effects on biodiversity receptors in the receiving environment. However, any effects on biodiversity are likely to be moderated by the environmental protective policies in the Dún Laoghaire-Rathdown County Development Plan 2016-2022 (DLR 2016) and Dublin City County Development Plan 2016-2022 and overarching pollution control objective in the River Basin Management Plan (RBMP) (DHPLG, 2018).

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

12.4.3 Construction Phase

12.4.3.1 Designated Areas for Nature Conservation

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

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

12.4.3.1.1 European sites

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

The nature and scale of the Proposed Scheme, the identified potential impacts and their relationship to European sites were considered in order to determine which European sites were located within the Zol 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 Zol (further information can also be found in Section 6 and Section 7 of the NIS).

The Zol 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 Zol 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 Zol based on the extent of the impact

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

- South Dublin Bay SAC [000210];
- North Dublin Bay SAC [000206];
- Rockabill to Dalkey Island SAC [003000];
- Howth Head SAC [000202];
- Lambay Island SAC [000204];
- Wicklow Mountains SAC [002122];
- South Dublin Bay and River Tolka Estuary SPA [004024];
- North Bull Island SPA [004006];
- Dalkey Island SPA [004172];
- Baldoyle Bay SPA [004016];
- Howth Head Coast SPA [004113];
- Rockabill SPA [004114];
- Ireland's Eye SPA [004117];
- Skerries Islands SPA [004122];
- Lambay Island SPA [004069];
- Malahide Estuary SPA [004025];
- Rogerstown Estuary SPA [004015]; and
- The Murrough SPA [004186].

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

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

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

12.4.3.1.1.1 Habitat Loss and Fragmentation

The Proposed Scheme runs immediately alongside two single European sites, namely South Dublin Bay SAC at the Merrion Gates and South Dublin Bay and River Tolka Estuary SPA at Booterstown Marsh. The Proposed Scheme boundary overlaps the SAC and SPA boundaries by 2.7m² and 4.3m², respectively, where habitats within these areas do not currently correspond to QI habitats, and / or habitats on which QI / SCI species of nearby habitats rely on for foraging, resting / roosting and / or commuting on. Where the SAC boundary overlaps within the application boundary areas, the area comprises of pre-existing hardstanding surfaces, which are of low ecological value and are not listed on Annex I of the Directive. With regard to the South Dublin Bay and River Tolka Estuary SPA, the area of overlap, c. 4.3m², does not contain any wetland or saltmarsh habitat for which the site is designated nor does the area of overlap represent important wetland habitat for wintering bird species, a finding that was confirmed during wintering bird surveys. The pre-existing hardstanding areas impacted, will be replaced by new road surface, i.e. equivalent habitat to what is being lost.

Therefore, although there is a small overlap with the boundaries of the South Dublin Bay SAC and the South Dublin Bay and River Tolka Estuary SPA, the Proposed Scheme boundary does not overlap with any Annex I habitats listed as a Qualifying Interest of the SAC, or habitats considered to support the SCI species of the SPAs, or have an impact on the conservation objectives of these, or any other, European sites.

The nearest European sites with a hydrological connection to the Proposed Scheme includes South Dublin Bay and River Tolka Estuary SPA and the overlapping South Dublin SAC, although the discharges are via a number of culverted streams; there is potential (albeit limited) for direct habitat loss and fragmentation to occur within the SPA territory at Booterstown Marsh. Habitat loss (SPA Annex I wetland complex or Annex I saltmarsh habitats) could also occur indirectly as a consequence of habitat degradation arising from a reduction in water quality and/or a change to the hydrological regime, as described in the section below.

It is also proposed to remove some screening vegetation alongside known *ex situ* feeding sites at Blackrock Park and Blackrock College, both of which are adjacent to the SPA. The full extent and nature of the vegetation removal may have an impact on both the extent of available feeding territory as well as screening vegetation.

Special Conservation Interest (SCI) species for which SPAs in the vicinity of the Proposed Scheme have been designated are known to utilise *ex situ* feeding sites in the Dublin area (i.e. Malahide Estuary SPA, Baldoyle Bay SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA and Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA, and potentially The Murrough SPA). The Proposed Scheme will not result in the loss of sites suitable to support breeding gull and wintering bird species.

A number of potential inland feeding sites within the footprint of the Proposed Scheme were surveyed to inform this assessment, these were located at lands adjacent to Booterstown Marsh referred to as CBC1415WB001, and at Blackrock Park referred to as CBC1415WB002. Of these, Blackrock Park was found to support SCI species. The Proposed Scheme will result in the permanent loss of sites suitable to support breeding gull and wintering bird species at Blackrock Park (referred to as CBC1415WB002).

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

With the exception of otter, Annex I habitats and Annex II species for which European sites are designated for within the Zol of the Proposed Scheme will not result in any direct loss or fragmentation of habitat by virtue of the location of the Proposed Scheme and its construction. In terms of otter, while the Proposed Scheme does cross the Dodder River and the Grand Canal, it does so at existing transport bridges and as such will not be subject to any instream works nor alteration to the territory currently occupied by otter.

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

The Proposed Scheme is hydrologically connected to Dublin Bay and the Dodder_050, Brewery Stream_010, Grand Canal, and Booterstown Marsh and Nutley Stream as well as a network of interconnecting and established surface or combined sewer/surface water pipes. The potential release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during the Construction Phase 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 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 including the following European sites: 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 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 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 Estuary SPA and Dalkey Islands SPA are undermined.

The Proposed scheme will be hydrologically connected to the River Dodder, via the drainage network as well as crossing it directly at Ballsbridge. The source of the River Dodder is in the Wicklow Mountains SAC which is located approximately 11.9km south (upstream). Otter territories are within the range of 7.5km for females and 21km for males (Ó'Neill et al. 2009). Therefore, there is potential for otter associated with the Wicklow Mountains SAC to move downstream and to come within the Zol of the Proposed Scheme. The remaining QIs for the SAC, namely Oligotrophic water containing very few minerals of sandy plains (Littorelletalia); Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoteo-Nanojuncetea; Natural dystrophic lakes and ponds; Northern Atlantic wet heaths with Erica tetralix; European dry heaths; Alpine and Boreal heaths; Calaminarina grasslands of the Violetalia calaminariae; Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*; Blanket Bogs (*if active bog); Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani); Calcareous rocky slopes with chasmophytic vegetation; and Old sessile oak Woods with Ilex and Blechnum in the British Isles do not occur within the Zol of the Proposed Scheme. These habitats are located upstream of the Proposed Scheme and will not be subject to any hydrological impacts as a result of the Proposed Scheme. A reduction in water quality as a result of a possible accidental pollution event (either alone or in combination with other pressures on water quality) could however result in the degradation of the local aquatic environment, which could in turn negatively affect the otter population through direct contact with pollutants or a decline in fish prey. In a 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 SCI bird species and QI mammal species that commute, forage and loaf in the Liffey Estuary Lower and areas of Dublin Bay, i.e. birds associated with Skerries Islands SPA, Rockabill SPA and Lambay Island SPA, Ireland's Eye SPA, North Dublin Bay SPA, South Dublin Bay and River Tolka Estuary SPA, Malahide Estuary SPA, Rogerstown SPA, Dalkey Islands SPA, Murrough SPA and marine mammals associated with Rockabill to Dalkey Island SAC and Lambay Island SAC. This reduction in water quality could result in the degradation of sensitive habitats present within downstream European sites, which in turn could negatively affect the SCI bird species that rely upon these habitats as foraging and / or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI and QI populations.

12.4.3.1.1.3 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 Zol of the Proposed Scheme is not considered to extend to any groundwater dependent terrestrial ecosystems linked to European sites, however they may extend into Booterstown Marsh wetland habitat, which is a constituent element of South Dublin Bay and River Tolka Estuary SPA. This Zol follows the professional judgement of the design team hydrogeology specialists.

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

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

A single area of three-cornered garlic *Allium triquetrum*, a species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations, was recorded within the Proposed Scheme, alongside South Dublin Bay and River Tolka Estuary SPA (and overlapping Booterstown Marsh pNHA). A second non-native species common cordgrass (*Spartina anglica*) is known to be locally present on exposed muds within the saline parts of Booterstown Marsh. This coastal species often associated with saltmarsh habitats is outside the footprint of the Proposed Scheme. In the absence of mitigation, there is potential for this 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). These in turn may result in the degradation of the existing habitats and therefore undermine the conservation objectives of these European sites.

It is not considered possible that the listed non-native invasive species could spread to European sites that are located a considerable distance downstream of the Proposed Scheme at a number of outfall locations. In terms of the extent and nature of the three-cornered garlic, it is a terrestrial species of shady banks and managed verges and is unlikely to become established in SPA wetland areas nor in coastal SAC habitats. It could potentially spread within the edges of the adjacent SPA albeit along non-wetland boundary vegetation.

Common cordgrass lies outside of but adjacent to the Proposed Scheme. It will not be directly impacted by the Proposed Scheme by virtue of its location. Indirect impacts could arise in the case where water draining off the Proposed Scheme during construction and of such a magnitude that it resulted in seed dispersal into other areas of bare saline mudflats or into Annex I coastal habitats.

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 (NO_x, NO₂), 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 Zol 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 compound 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 SAC and South Dublin Bay and River Tolka Estuary SPA 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 immediate footprint of the Proposed Scheme, but there is one SPA, namely South Dublin Bay and River Tolka Estuary SPA immediately adjacent to and within the disturbance Zol of the Proposed Scheme – Booterstown Marsh which is a constituent part of the SPA. There are a number of QI species known to occur within the vicinity of the Proposed Scheme. Refer to Section 12.4.3.4 for more details with regards to potential construction impacts on QI mammals.

There are a number of SPAs located in relatively close proximity to the Proposed Scheme which are designated for SCI species that are known to forage and / or roost at inland sites, such as amenity grassland playing pitches (i.e. Malahide Estuary SPA, Baldoyle Bay SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA, and the Murrough SPA). These species include light-bellied Brent goose, curlew, oystercatcher, black-tailed godwit, black-headed gull, herring gull and lesser black-backed gull. Suitable inland foraging / roosting sites, which these bird species utilise, are located within the potential Zol of the Proposed Scheme.

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

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

- Booterstown Marsh pNHA [001205];
- Grand Canal pNHA [002104];
- North Dublin Bay pNHA [000206];
- South Dublin Bay pNHA [000210];
- Dolphins, Dublin Docks pNHA [000201];
- Dalkey Coastal Zone and Killiney Hill pNHA [001206];
- Howth Head pNHA [000202];
- Baldoyle Bay pNHA [000199];
- Ireland's Eye pNHA [000203];
- Malahide Estuary pNHA [000205];
- Portrane Shore pNHA [001215];
- Rogerstown Estuary pNHA [000208];
- Lambay Island pNHA [000204];
- The Murrough pNHA [000730];
- Rockabill Island pNHA [000207]; and;
- Skerries Island NHA [001218].

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

The potential effects on European sites arising from the Proposed Scheme, described above in Section 12.4.3.1.1, may also negatively affect the pNHA and NHA sites located within the boundaries of these European sites. These pNHA 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. With the exception of Booterstown Marsh pNHA and the Grand Canal pNHA, where biodiversity receptors in these pNHAs or NHAs do not form part of the QIs / SCIs in the Natura Impact Statement (NIS) assessment, they are considered under the other individual impact assessment headings for each KER below.

12.4.3.1.1.8 Habitat Loss – Booterstown Marsh pNHA

The Proposed Scheme will overlap with the Booterstown Marsh pNHA at Rock Road where the existing retaining wall will be set back by approximately 2m. There will be permanent habitat loss of approximately 1,020m² within the pNHA and temporary land take of approximately 80m² associated with the construction working area. The majority of the permanent landtake does not include habitats within the marsh, but of pre-existing hard surfaces of Rock Road which fall within the pNHA boundary.

Although the Proposed Scheme partially overlaps with the existing boundary of the pNHA, the area of overlap does not contain any wetland or saltmarsh habitat for which the site is designated. The area of overlap comprises of scrub and grassland habitats only, and therefore there will be no impact on the integrity of the pNHA wetland or saltmarsh habitats. The habitats lost will be replaced by amenity grassland. As such, habitat loss is not deemed to be significant at any geographical scale and will not impact the wetland or saltmarsh habitats for which the pNHA is designated for.

12.4.3.1.1.9 Habitat Degradation – Air Quality

The Proposed Scheme will traverse the Grand Canal pNHA at McCartney Bridge, will overlap with Booterstown Marsh pNHA, and will lie within approximately 6m of South Dublin Bay pNHA.

Dust Emissions

Dust emissions associated with Construction Phase could, in extreme circumstances, affect adjoining habitats, potentially burying sensitive habitats or plant species. Best practice construction methodologies and mitigation measures have been designed to minimise construction generated dust and to contain it within the proposed development boundary. Mitigation measures in respect of construction dust are provided in Chapter 7 (Air Quality).

Vehicle Derived Emissions

During the Construction Phase of the Proposed Scheme, emissions from car exhausts, and the deposition of particulate matter and heavy metals produced by engine, brake and tyre wear of construction vehicles, can contribute to increased deposition of pollutants such as oxides of nitrogen (NO_x, NO₂) and particulate matter (PM) in the vicinity of a road carriageway. This can affect the ecosystems and vegetation present, influencing plant growth rates and species composition, diversity, and abundance.

The current advice for assessing of air quality impacts from roads and their interaction / effects on ecology are set out in the TII guidance document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (National Roads Authority 2011) and three UK reports: *The Ecological Effects of Diffuse Air Pollution from Road Transport* (Bignal *et al.* 2004), *The Ecological Effects of Air Pollution from Road Transport: An Updated Review* (Natural England 2016), and *Advice on Ecological Assessment of Air Quality Impacts* (CIEEM 2021). Further guidance can also be found in the IAQM document “*A Guide To The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites*” (IAQM 2020) and in the DMRB guidance LA105 Air Quality (UKHA 2019), both of which describe NO_x emissions as the most likely source of significant impacts from road traffic. Pollutants such as PM, CO₂, CO, SO₂, ammonia and volatile organic

compounds are not considered in this guidance and have been scoped out of detailed assessment. Refer to Chapter 7 (Air Quality) for full methodology.

An assessment of the impact of the Proposed Scheme has been undertaken using the approach outlined in the IAQM guidance document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM 2020). Vehicle-derived air emissions were modelled during the Construction Phase along the McCartney Bridge crossing in addition to several crossing points outside of the Proposed Scheme. However, some of these vehicle-derived air emissions may be part of the extended road network as a result of traffic redistribution effects (Grand Canal pNHA), and Booterstown Marsh pNHA (refer to Chapter 7 (Air Quality) for details). The worst-case predicted annual average NO_x concentrations at various distances from the proposed road edge exceed the 30µg/m³ limit value. In all cases where exceedances occur, the baseline environment is already in excess of this value. During the construction year of the Proposed Scheme, annual mean NO_x concentrations are predicted to decrease at Booterstown Marsh pNHA and the McCartney Bridge crossing at the Grand Canal pNHA, and experience a slight, temporary increase at Leeson Bridge due to traffic redistribution effects.

The contribution of the Construction Phase of the Proposed Scheme to the NO₂ dry deposition rate was modelled at Booterstown Marsh pNHA and the Grand Canal pNHA. Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Grand Canal pNHA, including Canals (FW3), Dry Meadow / Grassy Verges (GS2), Reed and Large Sedge Swamps (FS1) and Tall-herb Swamps (FS2), and wetland habitats associated with North Dublin Bay pNHA. The majority of sites are below the lower critical load of inland and surface water habitats of 5-10 Kg(N)/ha/yr (National Road Authority 2011) and decrease in levels during the Construction Phase. There are two modelled locations where the lower critical load of 5 Kg(N)/ha/yr is exceeded (Grand Canal pNHA at Leeson Bridge east and west). NO₂ dry deposition rates are modelled to be in excess of this value without the construction of the Proposed Scheme, the construction of the Proposed Scheme is not considered to increase this value significantly and will be temporary, and therefore, harmful effects on vegetation within North Dublin Bay pNHA and the Royal Canal pNHA from NO₂ are not likely, nor will there be any reduction in habitat area of the pNHA habitats.

12.4.3.2 Habitats

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

12.4.3.2.1 Habitat Loss and Fragmentation

The construction of the Proposed Scheme will result in habitat loss across its length, totalling approximately 1.5ha, excluding man-made habitats i.e. buildings and artificial surfaces (BL3).

The *ex situ* habitat types included within the lower saltmarsh (CM1) and upper saltmarsh (CM2) are considered to be of International Importance, given their Annex I status under the Habitats Directive. They include; *Salicornia* and other annuals colonising mud and sand [1130], Atlantic salt meadows [1330] and Mediterranean salt meadows [1410]). These habitats are known to be present within Booterstown Marsh pNHA, the boundary of which is alongside the Proposed Scheme at Rock Road. The marsh overlaps with the South Dublin Bay and River Tolka Estuary SPA as well as the Booterstown Marsh pNHA (although this national designation further extends northwards towards derelict scrubland). Furthermore, the wetland complex encompassing Booterstown Marsh is a supporting feature for the SPA. As none of these habitats, nor the wetland complex overlaps with the Proposed Scheme, there will be no direct impact nor permanent loss of these habitat types as a result of the Proposed Scheme.

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; Brewery Stream, Booterstown Stream, Priory Stream, Elm Park Stream and River Dodder. All of these watercourses are crossed by the Proposed Scheme. The River Dodder is considered the most

ecologically significant watercourse by virtue of its conditions, aquatic assemblages and the presence of QI otter and non-designated SCI kingfisher. However, there will be no permanent loss of this habitat type as a result of the Proposed Scheme. Therefore, there is no potential for significant effects at any geographic scale.

The Proposed Scheme crosses the Grand Canal (Habitat Canal FW3) at McCartney Bridge. This Canal Habitat (FW3) is ranked as being of National Importance. However, there will be no permanent loss of this habitat type.

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 be directly lost as a result of the construction of the Proposed Scheme provided in Table 12.13. The permanent loss of such habitat types which are considered to be of Local Importance (Higher Value) has the potential to affect the conservation status of each of these habitat types and, therefore, result in a significant negative effect at the local geographic scale.

The remaining areas within the footprint of the Proposed Scheme comprise of habitats considered to be of a Local Importance (Lower Value). These include, improved amenity grasslands (GA2), planted flowers beds (BC4) and ornamental/non-native shrub (WS3), areas of disturbed ground (ED1 and ED3) and scrub (WS1), stonewalls (BL1), hard standing (BL3), and other artificial lakes and ponds (FL8). 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 12.13.

The various KER habitat types affected and corresponding total areas which overlap with the Proposed Scheme boundary are summarised in Table 12.13. These calculations include all KER habitat areas within the Proposed Scheme boundary, as the possibility of areas within the Proposed Scheme boundary but outside of the footprint of the Proposed Scheme itself being affected by construction activities cannot be ruled out. KERs highlighted in blue will be subject to direct habitat loss as a result of the Proposed Scheme.

Habitat loss may also lead to habitat fragmentation, i.e. creating new divisions of existing habitat blocks and / or contributing to an existing trend of fragmenting semi-natural habitat blocks; however, considering the habitat types to be lost, their extents and the surrounding habitats beyond the Proposed Scheme boundary, this potential impact will not result in a significant effect at any local geographic scale. The mitigation measures that have been designed to avoid or reduce the effects of direct impacts to habitats are in Section 12.5.1.

Table 12.13: Extent of KER habitat types within the Proposed Scheme

Habitat Type	Extent of permanent habitat loss	Extent of temporary habitat loss
International Importance		
Lower saltmarsh (CM1) (corresponding to Annex I <i>Salicornia</i> and other annuals colonising mud and sand [1130], Atlantic saltmeadows [1330] and Mediterranean saltmeadows [1410])	c. 0ha	c. 0ha
Upper saltmarsh (CM2) (corresponding to Annex I <i>Salicornia</i> and other annuals colonising mud and sand [1130], Atlantic saltmeadows [1330] and Mediterranean saltmeadows [1410])	c. 0ha	c. 0ha
National Importance		
Canals (FW3)	c. 0ha	c. 0ha
Local Importance (Higher Value)		
Mixed broadleaved woodland (WD1)	c. 0.07ha	c. 0.05ha
Scattered trees and parkland (WD5)	c. 0.1ha	c. 0.21ha
Hedgerows (WL1)	c. 1040m	c. 60m
Treelines (WL2)	c. 4157 m / 329 trees	c. 242m
Other artificial lakes and ponds (FL8)	c. 0ha	c. 0ha
Depositing/ lowland rivers (FW2)	c. 0ha	c. 0ha
Local Importance (Lower Value)		
Flower beds and borders (BC4)	c. 0.02ha	c. 001ha

Habitat Type	Extent of permanent habitat loss	Extent of temporary habitat loss
Recolonising bare ground (ED3)	c. 0.004ha	c. 0.003ha
Amenity grassland (GA2)	c.0.23ha	c.0.14ha
Scrub (WS1)	c. 0.02ha	c.0.04ha
Residential	c. 0.12ha	c. 0.08ha
Ornamental / non-native shrub (WS3)	c.0.16ha	c. 0.1ha

12.4.3.2.2 Habitat Degradation – Surface Water Quality

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

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

Construction works in close proximity to the Dodder_050, the Grand Canal pNHA, Brewery Stream_010, Booterstown Marsh or existing surface water drainage infrastructure hydrologically connected to the watercourses, could possibly result in generated silt / sediment being released into these surface water features and in a worst case scenario, potentially being transferred downstream including, potentially, into downstream transitional and coastal water bodies. Cement based products used in the Construction Phase of the Proposed Scheme (e.g. concrete and / or bentonite which are highly corrosive and alkaline materials), if released into the surface water network may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality at a local geographical scale and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, transitional and coastal habitats downstream, in the Liffey Estuary Lower, and Dublin Bay, could also be affected.

Habitat degradation as a consequence of construction effects on surface water quality has the potential to affect the conservation status of the Grand Canal pNHA and Annex I habitats contained in European sites in and around Dublin Bay 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 Zol of the Proposed Scheme.

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

12.4.3.2.3 Habitat Degradation – Hydrological Regime

During the Construction Phase, the potential for temporary disruption to local drainage systems and hydrological regimes have been assessed in relation to the Proposed Scheme. This is not predicted to result in a likely significant negative effect on any aquatic habitats or species through effects on the hydrological regime (for more detail refer to Chapter 13 (Water)).

12.4.3.2.4 Habitat Degradation – Groundwater

Any effects on the existing hydrogeological baseline supporting wetland habitats, particularly Booterstown Marsh has the potential to negatively affect habitat extent and distribution, and vegetation structure and composition. The potential effects upon the existing hydrogeological regime are not necessarily limited to habitats within the

Proposed Scheme boundary but can be far-reaching, with significant negative long-term effects. As discussed in Chapter 14 (Land, Soils, Geology & Hydrogeology), the Proposed Scheme may involve the excavation of potentially contaminated ground, result in damage to the aquifer, or change the existing groundwater regime.

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

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

As detailed in the Construction Environmental Management Plan (CEMP) for the Proposed Scheme (Appendix A5.1 in Volume 4 of the EIAR), specific controls / mitigation measures, 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 Chapter 7 (Air Quality), the Proposed Scheme has the potential to generate dust during construction works which could affect vegetation in habitat areas adjacent to the Proposed Scheme.

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

As discussed above in Section 12.4.3.1.1.9, air quality modelling of NO_x concentrations, and deposition rates, were modelled for the Construction Phase of the Proposed Scheme at distances up to 200m from the proposed road development (refer to Chapter 7 (Air Quality) for details). The results from the Air Quality modelling deem the 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 (and / or vector material such as soil that is contaminated with these non-native species) is controlled under regulation 49 of the Birds and Natural Habitats Regulations and refers to plant or animal species listed on the Third Schedule of those regulations (see also Section 12.3.7).

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

The effects of introducing such non-native invasive plant species to highly sensitive and ecologically important habitat areas (e.g. designated area for nature conservation or areas of Annex I habitat) have the potential to result in a likely significant negative effect, at geographic scales ranging from local to international. One area of non-native invasive plant species listed on the Third Schedule of the Birds and Natural Habitats Regulations was identified along the Proposed Scheme. The only species that was recorded was three-cornered garlic. The desktop study revealed records for the following additional species in close proximity to the Proposed Scheme; Himalayan balsam, Japanese knotweed, giant hogweed, curly waterweed, Nuttall's waterweed (and its associated species which has been removed from the list of third schedule species Canadian waterweed), and water fern.

The ex situ presence of Common Cordgrass *Spartina anglica* has been confirmed from within the marsh (P. Foss, pers. comm.). It is predicted that the distribution of this species will not be interfered with by the Proposed Scheme, except where indirectly whereby an exceptional runoff of surface water/contaminated or otherwise could result in the spread of seed (if in flower). Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1).

12.4.3.3 Rare and Protected Plant Species

12.4.3.3.1 Habitat Loss

No protected plant species listed on the Flora (Protection) Order 2015 were recorded within or in close proximity to the Proposed Scheme, although Borrer's saltmarsh grass is known to occur in Booterstown Marsh pNHA, which lies adjacent to the Proposed Scheme along Rock Road. Its presence was not confirmed in early 2020 (P. Foss pers. comm.), although its presence is long established.

The desktop study also revealed records for opposite-leaved pondweed in close proximity to the Proposed Scheme along the Grand Canal. A record for great burnet exists within UCD which is also located in close proximity, but not intersected by the Proposed Scheme. A historical record for wild asparagus is also known from the wider area within Blackrock. Finally, a record for shady beard-moss exists from the RDS in Ballsbridge, also located in close proximity to the Proposed Scheme. None of these species were re-recorded during field surveys.

There is no potential for direct impacts on any of these species to occur as a consequence of the Proposed Scheme.

12.4.3.3.2 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora (Protection) Order 2015 were recorded within the Proposed Scheme during field surveys. However, the desk study returned records of opposite-leaved pondweed from the Grand Canal and Borrer's saltmarsh grass at Booterstown Marsh, as well as other species further offline from the Proposed Scheme.

Opposite-leaved pondweed may lie dormant in sediments for many years until conditions become suitable for regrowth. The construction of the Proposed Scheme, in the absence of mitigation, has the potential to result in impacts on the surface water quality of the Grand Canal, through contamination with construction related run-off or accidental spillages (i.e., runoff of sediment/ accidental spillages of harmful substances such as hydrocarbons/ cementitious materials etc). Impacts on the quality of surface water within the canal could affect the possible establishment of populations of opposite-leaved pondweed present in the vicinity of the Proposed Scheme.

A similar scenario exists in respect of Borrer's saltmarsh grass at Booterstown Marsh, for which indirect impacts arising from the release of contaminated surface water draining into the wetland complex in which this Flora (Protection) Order species occurs.

In the absence of mitigation, habitat degradation of the Grand Canal or Booterstown Marsh as a consequence of construction stage impacts on surface water, and the potential knock-on impacts this could have on the protected species opposite-leaved pondweed and Borrer's saltmarsh grass, is likely to be significant at the national level.

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. Four trees with Potential Roosting Features (PRFs) were identified within the footprint of the Proposed Scheme; a single horse chestnut tree along Pembroke Road, a lime and sycamore tree along Rock Road and a single horse chestnut along Rock Road. However, the Proposed Scheme will not result in any direct impacts to these trees. The Proposed Scheme

will not result in the loss of trees with PRFs. Therefore, there is no potential for impacts on bat roosts as a result of the construction of the Proposed Scheme.

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

Bats rely on suitable semi-natural habitats which support the insect prey upon which they feed. The Proposed Scheme will result in the loss of such habitats used for feeding by all bat species recorded in the study area. Suitable habitat for foraging and / or commuting bats within the footprint of the Proposed Scheme includes hedgerows and treelines, mixed broadleaved woodland, canal, rivers, areas of parkland, and open grassland. The area of the habitats which will be lost as a result of the Proposed Scheme is provided in Table 12.13 and shown in the Landscape General Arrangement drawings (BCIDC-ARP-ENV_LA-1415_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 presence and relative abundance of other similar habitats in the wider locality, which will not be impacted by the Proposed Scheme. The Proposed Scheme will not result in any loss along the water courses.

In assessing the impacts of habitat loss as a result of fragmentation of foraging / commuting habitat on bat populations, consideration was given to a species Core Sustenance Zone (CSZ). A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the '*resilience and conservation status*' of the colony using the roost. Bat Conservation Trust Guidance (Bat Conservation Trust 2016) states that: "*With reference to planning and development the core sustenance zone is: The area surrounding the roost within which development work can be assumed to impact the commuting and foraging habitat of bats using the roost, in the absence of information on local foraging behaviour. This will highlight the need for species-specific survey techniques where necessary; and; The area within which mitigation measures should ensure no net reduction in the quality and availability of foraging habitat for the colony, in addition to mitigation measures shown to be necessary following ecological survey work.*"

Notwithstanding the fact that there is evidence of bats foraging and commuting within the study area of the Proposed Scheme, along all four transects, particularly along Nutley Lane (CBC1415BT001) and Blackrock Park (CBC1415BT004), and that 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 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.

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. Permanent removal of suitable habitat for foraging and / or commuting bats within the footprint of the Proposed Scheme is calculated as 5,197m of vegetation, including 329 trees. Habitat removal is within a highly disturbed urban environment with low numbers of species records, and, as such is not deemed to provide significant contributions to CSZs of roosts outside of the footprint of the Proposed Scheme. The effect of habitat fragmentation and barrier effect associated with the construction of the Proposed Scheme is therefore considered to be significant at the local level only.

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

One Construction Compound is required for the Proposed Scheme which will be located at Booterstown car park on Rock Road. Security lighting will be installed in this compound for the duration of construction (i.e. 24 months), thereby temporarily increasing the level of artificial lighting in this area. Artificial lighting within suitable habitat may result in avoidance behaviour by bats, and could prevent bats from accessing foraging areas or roosts and / or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Given the suburban setting of this proposed Construction Compound, 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. In the event additional lighting at the Construction Compound is required, it will be cowled and positioned to reduce over spill. Considering the Construction Compound will be in place for approximately 24 months, any potential impact will be short-term, and therefore the effect of the additional lighting is considered to be significant at a local level only.

The existing lighting at Booterstown Marsh, Grand Canal and River Dodder is sufficient to accommodate the construction works to be undertaken at these areas and therefore no additional high level lighting will be required. However in the unlikely event additional lighting is required by the watercourses or elsewhere, it will be cowled and positioned to reduce over spill onto previously dark areas. The effect of the additional lighting is therefore considered to be significant at a local level only and temporary.

12.4.3.4.2 Badger

Multi-disciplinary surveys 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 Zol of the Proposed Scheme before construction works commence, it is a possibility, and therefore this scenario has been taken into account in the mitigation strategy (refer to Section 12.5.1).

12.4.3.4.2.1 Loss of Foraging Habitat and Breeding / Rest Sites

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

Construction will result in the permanent loss of minor and disturbed sections of suitable foraging / commuting habitat for badgers (e.g. amenity grassland, scattered trees and parkland, scrub, mixed broadleaved woodland and treelines / hedgerows). In addition, the provision of a Construction Compound at the Booterstown car park on Rock Road, for the duration of the Construction Phase will result in the temporary loss of buildings and artificial surfaces and amenity grassland, which could be used by commuting / foraging badgers. As the majority of this site is already composed of hard standing (buildings and artificial surfaces), it is not considered to be an important area for commuting / foraging badgers, and therefore its use as a Construction Compound will not have any significant effect on the local badger population. Permanent habitat removal is proposed at lands located largely adjacent to pre-existing roads / paths and is limited to approximately 2m linear sections of amenity grassland (or 4m in the case of sections of Blackrock Park overlooking the pond), existing hard surfaces, scattered trees and parkland and roadside treelines / hedgerows, within a highly disturbed urban environment. These areas of habitat removal are not likely to provide significant foraging habitat for the local badger population. Therefore, the Proposed Scheme is unlikely to affect the conservation status of the local badger population and will not result in a likely significant negative effect, at any geographic scale.

12.4.3.4.2.2 Disturbance / Displacement

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

Given badgers are nocturnal in habit, their displacement from foraging areas (outside of areas where foraging habitat will be lost as a result of the Proposed Scheme) is extremely unlikely to affect the local badger population and will not result in a likely significant negative effect, at any geographic scale. In addition, badgers residing within the wider study area are likely to be habituated to disturbance within the urban environment and therefore would be less sensitive to very localised, temporary increases in disturbance. Disturbance and displacement effects on badger may also be the result of increased artificial lighting during construction. Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore 2005). Although the majority of the Proposed Scheme corridor is already lit artificially, the proposal may result in the introduction of additional artificial lighting to previously unlit or poorly lit areas.

It is likely the proposed Construction Compound at Booterstown car park on Rock Road requires security lighting for the duration of construction. Area adjacent to the Construction Compound comprises of suitable foraging habitat for badger (e.g. amenity grassland). If high-intensity, non-directional security lighting (e.g., floodlighting) is installed in the proposed compound, 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 Zol 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).

12.4.3.4.3.1 Loss of Breeding / Resting Sites

Given no otter breeding or resting places, holt or couch sites, were identified within the boundary of the Proposed Scheme, during the field surveys, there will not be any loss of holt or couch sites as a result of construction works. No instream / bankside works are proposed along any watercourse intersected by the Proposed Scheme, with the exception of upgrade to the ramp on the Grand Canal tow path. Considering the works along the Grand Canal are localised and short-term, 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

With the potential exception of a mustelid print in sediments a short distance upstream of the Dodder crossing at Ballsbridge, evidence of otter activity 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 occur along the River Dodder and along the Grand Canal (Macklin *et al.* 2019). Observations of otter have also been made on Merrion Strand, Grand Canal Dock, Irishtown and along the Grand Canal.

The provision of the Construction Compound along the Rock Road for the duration of the Construction Phase is not expected to result in the loss of any habitat used by otter that might potentially venture along the Nutley Stream, owing to the fact that the location of the Construction Compound is separated from the watercourse by approximately 12m of open ground including a heavily trafficked pedestrian path. The Proposed Scheme is not expected to result in any loss / fragmentation to habitats used by otter nor of any severance of their commuting territory in the absence of works to watercourses or associated riparian vegetation in the vicinity of the Proposed Scheme. Otter are known to routinely avoid using highly modified habitat within culverts and beneath bridges, unless clear line of sight through the structure is available. Any habitat loss arising from the Proposed Scheme would not constitute a significant decline in the extent of available otter habitat and will not affect the local otter population's ability to maintain itself, even in the short-term.

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

12.4.3.4.3.3 Habitat Severance / Barrier Effect

Proposed works in the vicinity of surface water features (e.g., works in the vicinity of the River Dodder between Anglesea Road and Ballsbridge Terrace or works in close proximity to the Grand Canal) could result in a barrier effect to local otters, if present, at least temporarily by virtue of proximal increase in disturbance in construction-related activities atop the bridge deck.

However, given that otter are generally nocturnal in habit, 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, even over the short-term, and is not likely to affect the species conservation status and result in a significant negative effect, at any geographic scale.

12.4.3.4.3.4 Habitat and Food Source Degradation – Water Quality

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

Habitat degradation as a result of effects on surface water quality during construction 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).

12.4.3.4.3.5 Disturbance / Displacement

The results of the desk study did not confirm the presence of otter holts within 1km of the Proposed Scheme. However, it is reasonable to assume, based on documented data (Macklin *et al.* 2019) 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, given the distance between them and the Proposed Scheme. 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 carriageway and pavement planning, resurfacing / reconstruction as required, readjustment of kerbs and restructuring of existing road layouts including repainting. Noise and vibrations associated with these works will have the potential to create disturbance and displacement within the vicinity of the works. Noise and disturbance levels associated with these works are quantified 80dB at 10m from the Proposed Scheme boundary and return to background levels at 250m.

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). Given otter are generally nocturnal in habit and can (in many circumstances) tolerate high levels of human presence and disturbance, displacement of otter from their habitat is extremely unlikely to affect the local otter population. Therefore, disturbance during construction is not likely to have a significant effect on the species' conservation status and will not result in a likely significant negative effect, 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 Proposed Scheme may result in the introduction of artificial lighting to previously unlit areas, however, construction works in the vicinity of known otter locations (e.g. watercourses such as the River Dodder or Grand Canal) are not considered to require additional lighting. The existing lighting at Booterstown Marsh, Grand Canal and River Dodder is sufficient to accommodate the construction works to be undertaken at these areas and therefore no additional high level lighting will be required. However in the unlikely event additional lighting is required, it will be cowed and positioned to reduce over spill onto watercourses used by otter. The effect of the additional lighting is therefore considered to be significant at a local level and temporary.

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

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

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

12.4.3.4.5 Other Mammals

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

12.4.3.4.5.1 Habitat Loss

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

12.4.3.4.5.2 Mortality Risk

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

12.4.3.4.5.3 Disturbance / Displacement

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

Given the relevant mammal species are nocturnal in habit, displacement of mammal species from foraging areas (outside of areas where foraging habitat will be lost as a result of the Proposed Scheme) is extremely unlikely to affect the local mammal population and will not result in a likely significant negative effect, at any geographic scale.

12.4.3.5 Birds

12.4.3.5.1 Breeding Birds

The assessment carried out in the NIS for the Proposed Scheme (which is a standalone document provided within the planning application to enable the Board, as competent authority, to carry out an 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, and in particular South Dublin Bay and Rive Tolka Estuary SPA which in places occurs along the Proposed Scheme. 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 12.13 for all KER habitat types. These areas include hedgerows and treelines, of mixed broadleaved woodland and scattered trees and parkland habitats. In addition, there are areas of scrub, ornamental / non-native shrub and amenity grassland within the footprint of the Proposed Scheme, which are not KERs in their own right due to their limited botanical value, however, may provide nesting and / or foraging habitat for birds. These areas will be removed during construction of the Proposed Scheme resulting in an additional loss of breeding bird nesting and / or foraging habitat. In summary, the habitats that may be lost comprise:

- Treeline habitat located along Merrion Road;
- Treeline habitat inside Blackrock College;
- Mixed broadleaved woodland at Blackrock Park;
- Scrub and hedgerow habitats along roadside edge of derelict land at northern boundary of Booterstown Marsh;
- Scattered trees and parkland habitat outside Telford Nursing Home;
- Scattered trees and parkland, treeline and small areas of mixed broadleaved woodland habitats along Nutley Lane;
- Treeline habitat at the corner of Ailesbury Road;
- Scattered trees and parkland habitat outside the RDS in Ballsbridge; and;
- Scattered trees and parkland habitat at the corner of Temple Park Avenue and the N31.

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

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

- Parks and greenspaces with hedgerow, treeline and / or scrub boundaries such as the Rockfield Park, Carysfort Park, St. John of Gods, Kilmacud Crokes playing pitches, Blackrock College playing pitches, Oatlands College playing pitches, Willow Park School playing pitches, St. Andrew's College playing pitches, Coláiste Eoin / Íosagáin playing pitches, grounds of Radisson Blue St. Helen's, UCD campus, Elm Park Golf & Sports Club, Herbert Park, Milltown Park, Ringsend Park, Sean Moore Park;
- Wildfowl and Waterbird habitat within the Lower Liffey Estuary and wider Dublin Bay area such as Booterstown Marsh which is directly adjacent to the Proposed Scheme and Sandymount Strand, distally located; and,

- Sections of the Grand Canal both upstream and downstream of the Proposed Scheme, along with riparian habitat along the banks of the River Dodder.

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

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

12.4.3.5.1.2 Mortality Risk

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

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

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

12.4.3.5.1.3 Disturbance / Displacement

The noise, vibration, increased human presence and the visual deterrent of construction traffic, associated with site clearance and construction will disturb breeding bird species and is likely to displace breeding birds from habitat areas adjacent to the footprint of the Proposed Scheme. Construction activities will largely involve carriageway and pavement resurfacing / reconstruction as required, readjustment of kerbs and new road layouts with no piling / blasting methodologies proposed. There is an existing relatively high level of human disturbance within the immediate environment of the Proposed Scheme (e.g., Rock Road, Merrion Road, and inner-city areas such as Baggot 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 Zol, but will be ongoing from periods of up to 24 months and multiple breeding seasons across the entirety of the Construction Phase. However, phasing of the construction works in scheme section will reduce the temporary nature of this impact to approximately two to nine month disturbances in each section of the Proposed Scheme.

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

12.4.3.5.1.4 Habitat Degradation – Surface Water Quality

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

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

12.4.3.5.2 Wintering Birds

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

12.4.3.5.2.1 Habitat Loss

The Proposed Scheme will result in the temporary loss of 0.07ha of GA2 habitat suitable to support breeding gull and wintering bird species at Blackrock Park (referred to as CBC1415WB002).

The loss of suitable GA2 habitat is not deemed to have a significant impact on the wintering bird population at any geographical scale due to the following reasons:

- The absence or low frequency of occurrence of these SCI bird species recorded on lands located within the footprint of the Proposed Scheme, 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;
- Land take in the proposed works area is temporary in nature and will be returned to GA2 habitat during the Operational Phase of the Proposed Scheme.

12.4.3.5.2.2 Disturbance / Displacement

A temporary increase in noise, vibration and / or human activity levels during the construction 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.

The Proposed Scheme will require the removal of a number of mature trees along the boundary of Blackrock College, which currently provides screening to the playing pitches present within the College campus which are used by foraging wintering birds. While the tree boundary is not considered suitable for wintering birds, whose preference for inland feeding sites is typically larger open green fields as suggested in field survey around Dublin (Scott Cawley Ltd. 2017), the permanent removal of these trees will increase the visual and noise disturbance to foraging winter birds which use these pitches. Likewise, the construction of the Proposed Scheme will require the removal of an area of mixed broadleaved woodland along the boundary of Blackrock Park. This vegetation currently provides visual screening to foraging birds using Blackrock Park, shielding them from traffic on the Rock Road. In addition, general construction activities in close proximity to Booterstown Marsh may affect the use of this wetland habitat by waders and gulls and other waterfowl which are known to use the marsh in the winter season. Finally, the provision of a Construction Compound at the Booterstown car park on Rock Road, will result in a temporary increase in noise and visual disturbance to wintering birds foraging in Williamstown Park, during construction. However, the site of the temporary compound is no longer considered suitable for wintering birds given that it is a Construction Compound at present, and that much of the grass has been removed for hard surfacing.

Assessment 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 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 proposed 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. Low, or no, effects would be expected for those noise levels. Any landscape features, vegetation cover or buildings between the construction site and identified wintering bird sites would contribute to further reducing the ambient noise at any given distance. Therefore, 300m is considered to be a precautionary buffer in defining the Zol of disturbance effects.

The potential for construction to disturb wintering birds at night, will be minimal to negligible. 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, disturbance levels will likely return to baseline conditions and as a result these lands will become available again as foraging and / or roosting habitat for these wintering bird species.

The majority of wintering birds identified in the desk study are typically found in coastal, estuarine and intertidal habitats including the Liffey Estuary and Dublin Bay, and therefore will not be impacted directly during Construction Phase. However, Booterstown Marsh, which is a constituent feature of South Dublin Bay and River Tolka Estuary SPA is immediately adjacent to a section of the Proposed Scheme. 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. There are large areas of suitable foraging and / or roosting habitat available for these wintering bird species both adjacent to, and in the wider locality of the Proposed Scheme (i.e. beyond the 300m study area, from approximately 300m from these existing sites located within the footprint of the Proposed Scheme). 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:

- Blackrock / Blackrock Park (high importance);
- Blackrock / Williamstown Park (high importance) (this section includes the area of the Construction Compound)
- Blackrock/ Blackrock College (high importance);
- St. Andrew's Playing Pitch (unknown importance); and;
- Pembroke CC/ Monkstown RC (high importance).

There are large areas of suitable foraging habitat available for wintering bird species within the wider locality of the Proposed Scheme. The following three known inland wintering bird feeding sites are known to occur within 300m - 1km of the Proposed Scheme (i.e., beyond the Zol), and it is likely that birds displaced from the sites listed above, would be displaced to the following known sites:

- Shelbourne Park Dog Track (high importance);
- Sandymount YMCA Sports Ground (unknown importance); and;
- Railway Union Football Sandymount (unknown importance).

Wintering birds which are disturbed during the Construction Phase 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 level, except potentially for Booterstown Marsh by virtue of its proximity to the Proposed Scheme.

12.4.3.5.2.3 Habitat Degradation – Surface Water Quality

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

Habitat degradation as a result of effects on surface water quality during construction has the potential to result in a 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 4 of this EIAR).

12.4.3.6 **Reptiles**

There were no reptile species recorded during the multi-disciplinary surveys and no suitable habitat confirmed within the footprint of the Proposed Scheme. The desk study did 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 due to the presence of suitable habitat.

12.4.3.6.1 Disturbance and Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of, common lizard. Given 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. The desk study returned records for common frog and smooth newt within 1km of the Proposed Scheme, and therefore it cannot be ruled out that these species occur in the vicinity of the Proposed Scheme.

12.4.3.7.1 Disturbance / Mortality Risk

Site clearance and / or construction works in areas within, or adjacent to, suitable amphibian habitat, have the potential to result in disturbance to, and the direct mortality of amphibians. Given the relatively small area of potentially suitable habitat for amphibians in the study area and its immediate locality, the number of individuals that would potentially be at risk is considered to be low. Therefore, potential impacts arising from increased disturbance or mortality risk are not likely to affect the local populations of any amphibian species in the long-term nor their conservation status and as such there is no potential for a likely significant negative effect, above the local 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 the 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 the Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on amphibians either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats).

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

12.4.3.8 Fish

12.4.3.8.1 Habitat Loss / Severance and Barrier Effect

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

12.4.3.8.2 Habitat Degradation – Surface Water Quality

As discussed in Section 12.4.3.2.2, the Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on European eel and other fish species either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats). Habitat degradation as a result of effects on surface water 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 international geographic scale, as described below.

Records returned from the desk study as presented in Section 12.3.12, revealed that the River Dodder and Lower Liffey Estuary are known to support populations of Atlantic salmon and the River Dodder is known to also support brown trout. Furthermore, the River Liffey is recognised as a highly significant regional salmonid catchment for species of Atlantic salmon. 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 Dodder or River Liffey during construction, has the potential to result in a likely significant effect at the County level on salmonid species.

River lamprey are known to occur in the River Dodder and River Liffey, as outlined in the desk study. Suitable lamprey habitat occurs in upstream sections of the River Dodder, approximately 15km 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 level on lamprey species, given the habitat value present and their protection under the Habitats Directive.

The results of the desk study revealed that European eel is known to occur in the River Dodder. 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 European eel in Irish waters.

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

12.4.3.9 Invertebrates – Freshwater Molluscs

12.4.3.9.1 Habitat Loss / Mortality Risk

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

12.4.3.9.2 Habitat Degradation – Surface Water Quality

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

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

Table 12:14: Summary of Potential Construction Phase Impacts (Pre-Mitigation)

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

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Dalkey 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
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Grand Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Rockabill SPA Rockabill Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Habitats (outside of designated areas for nature conservation)			
Lower salt marsh (CM1) (corresponding to Annex I habitat <i>Salicornia</i> and other annuals colonising mud and sand (1310))	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale
Upper salt marsh (CM2) (corresponding to Annex I habitats Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330) Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (1410))	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Mud sand shores (LS4) (corresponding to Annex I habitat mudflats and sandflats not covered by sea water at low tide (1140))	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Canals (CW2)	National Importance	See Grand Canal pNHA above	See Grand Canal pNHA above
Depositing/lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; air quality; 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

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Rare / Protected Plant Species			
Opposite-leaved Pondweed	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Borrer's Saltmarsh Grass	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Flora Species on Irelands Red Lists (Vulnerable or of higher concern concern)	Local Importance (Higher Value)	Habitat Degradation (air quality)	Likely significant effect at the local geographic scale
Non-native invasive plant species	N/A	Spread at expense of other Habitats, Habitat Degradation (hydrology)	Likely significant effect at the local to International scale geographic scale
Fauna Species			
Bats	Local Importance (Higher Value)	Habitat Loss / Fragmentation ; Disturbance / Displacement	Likely significant effect at the local geographic scale
Badger	Local Importance (Higher Value)	Disturbance / Displacement	Likely significant effect at the local geographic scale
Otter	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Disturbance / Displacement	Likely significant effect at the local geographic scale
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals (all other marine mammals)	County Importance	Habitat Degradation (hydrology)	Likely significant effect at the local 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
Kingfisher (non-SCI population)	International Importance	Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Reptiles	Local Importance (Higher Value)	N/A	N/A
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
European eel / Lamprey / Atlantic Salmon	National Importance – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to international geographic scale
All other fish	Local importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Invertebrates – Freshwater molluscs	Local importance (Higher Value)	Habitat Degradation (hydrology); Mortality risk	Likely significant effect at the local geographic scale

12.4.4 Operational Phase

12.4.4.1 Designated Areas for Nature Conservation

12.4.4.1.1 European sites

12.4.4.1.1.1 Habitat Loss and Fragmentation

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

Refer to Section 12.4.3.5 with regards to potential operational impacts on wintering bird species, which encompass all relevant SCI bird species.

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

The Proposed Scheme is hydrologically connected to Dublin Bay via a number of watercourses and existing pipes which drain directly to Dublin Bay. The release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and the accidental spillage and / or leaks of containments 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, i.e. Dublin Bay, within which European sites are located: North Dublin Bay SAC, South Dublin Bay SAC, Howth Head SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay, River Tolka Estuary SPA and Dalkey Islands SPA, Baldoyle Bay SAC and Baldoyle Bay SPA. This reduction in water quality (either alone or in combination with other pressures on water quality) could result in the degradation of sensitive habitats present within these European sites, which in turn would negatively affect the SCI bird species that rely upon these habitats as foraging and / or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI bird species. These potential impacts could occur to such a degree that the conservation objectives of the North Dublin Bay SAC, South Dublin Bay SAC, Howth Head SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay, River Tolka Estuary SPA and Dalkey Islands SPA, Baldoyle Bay SAC, Baldoyle Bay SPA and The Murrough may be undermined.

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

12.4.4.1.1.3 Habitat Degradation as a result of Air Quality Impacts

A reduction in air quality within the immediate vicinity of the road, involving emissions from car exhausts, and the deposition of particulate matter and heavy metals produced by engine, brake and tyre wear during the Operational Phase, can contribute to increased deposition of pollutants such as oxides of nitrogen (NOx, NO's), volatile organic compounds (VOCs), particulate matter (PM), heavy metals (HM) and ammonia (NH4) in the vicinity of a

road carriageway. This can affect the ecosystems and vegetation present, influencing plant growth rates and species composition, diversity, and abundance.

The unmitigated Zol for air quality effects arising from the Proposed Scheme has the potential to extend up to 200m the Proposed Scheme boundary during the Operational Phase. The Proposed Scheme is located immediately adjacent to South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC. As such, 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 Operational Phase of the Proposed Scheme, is fully discussed in the NIS.

12.4.4.1.1.4 Habitat Degradation as a result of hydrogeological impacts

Groundwater levels in groundwater dependant 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 is highly variable depending on the nature of the proposed works at specific locations and the receiving environment ground conditions. The unmitigated hydrogeological Zol of the Proposed Scheme is not considered to extend to any groundwater dependent terrestrial ecosystems linked to European sites. However it may extend into Booterstown Marsh wetland habitat, which is a constituent element of South Dublin Bay and River Tolka Estuary SPA. This Zol follows the professional judgement of the hydrogeology specialists.

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

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

There is a single area where a three-cornered garlic a species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations, present within the footprint the Proposed Scheme. In the absence of mitigation, there is potential for this species to spread or be introduced during routine maintenance / management works, to terrestrial habitat areas in European sites downstream in Dublin Bay (specifically the proximal South Dublin Bay and River Tolka Estuary SPA). This in turn may result in the degradation of the existing supporting wetland complex and therefore undermine the conservation objectives of this European site.

It is not considered likely that non-native invasive species could spread to other European sites which are located a significant distance from the outfall locations of the watercourses intersected by the Proposed Scheme, by virtue of the habitat conditions in which the species normally occurs and subject to the full implementation of the non-native Invasive Species Management Plan (ISMP) refer to Appendix A5.1- Construction Environmental Management Plan in Volume 4 of the EIAR. In addition, the maintenance of the Proposed Scheme does not have the potential to result in habitat degradation of the QI / SCI species of any European site as the result of operation impacts and there is no potential for in combination effects to occur in that regard.

12.4.4.1.1.6 Disturbance and Displacement Impacts

A single European site, South Dublin Bay and River Tolka Estuary SPA, is in close proximity to and is within the Zol of the Proposed Scheme and could result in potential impacts to SCI bird populations during operation. Furthermore, 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 operational impacts on QI mammals and fish, respectively.

The potential for impacts on SCI bird populations for which SPAs are designated has been provided in the NIS. Refer to Section 12.4.3.5.2 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 in Section 12.4.3.1.1, may also negatively affect the NHA and pNHA sites, which are located within the boundaries of European sites and designated for similar reasons. 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. With the exception of Air Quality impacts to Grand Canal pNHA and Booterstown Marsh pNHA that are discussed below, where biodiversity receptors in these NHA and pNHAs do not form part of the QIs / SCIs in the NIS assessment, they are considered under the other individual impact assessment headings for each KER below. Potential impacts arising from the Proposed Scheme on these NHA and pNHA sites would result in a likely negligible to minor negative effect at a national geographic scale.

12.4.4.1.2.1 Habitat Degradation – Air Quality

Air quality modelling of NO_x concentrations, and deposition rates were modelled for the Operational Phase of the Proposed Scheme at distances up to 200m from the Proposed Scheme or where significant changes to AADT flows occur. The assessment methodology for air quality impacts from roads and their interaction / effects on ecology are discussed in Section 12.4.3.1.1.5 and also within Chapter 7 (Air Quality).

Vehicle-derived air emissions were modelled during the Operation Phase of the Proposed Scheme at Booterstown Marsh and the Grand Canal pNHA proposed crossing points (refer to Section 7.4.3.2.4 of Chapter 7 (Air Quality) for details). The worst-case predicted annual average NO_x concentrations at various distances from the Proposed Scheme exceed the 30µg/m³ limit value. In all cases where exceedances occur, the baseline environment is already in excess of this value. In the case of Rock Road (Booterstown Marsh pNHA), the modelled future baseline environment is already in excess of this value and emissions reduce below this critical level at 190m from Rock Road, the pNHA experiences an overall reduction in Operational Phase emissions as a result of the Proposed Scheme. At the McCartney Bridge crossing point at the Grand Canal pNHA, emissions are modelled reduce during the Operational Phase of the Proposed Scheme. Increases in NO_x are modelled at Huband Bridge, Leeson Bridge, McKenny's Bridge, Mespil Road and Percy Place as a result of traffic redistribution effects.

The contribution of the Operation Phase of the Proposed Scheme to the NO₂ dry deposition rate was modelled at Booterstown Marsh and the Grand Canal pNHA. Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Booterstown Marsh pNHA, including Lower Saltmarsh (CM1), Upper Saltmarsh (CM2), and Mud and Sand Shores (LS4). Dry deposition rates will be below the lower critical load of inland and surface water habitats of 5-10 Kg(N)/ha/yr (National Road Authority, 2011) and reduce during the Operational Phase of the Proposed Scheme. Therefore, significant effects on vegetation within Booterstown Marsh pNHA from NO₂ are not considered likely, nor will there be any reduction in habitat area of the pNHA habitats.

In the case of the Grand Canal pNHA, nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Grand Canal pNHA, including Canals (FW3), Dry Meadow / Grassy Verges (GS2), Reed and Large Sedge Swamps (FS1) and Tall-herb Swamps (FS2). The majority of sites are below the lower critical load of inland and surface water habitats of 5-10 Kg(N)/ha/yr (National Road Authority, 2011). There are four modelled locations where the lower critical load of 5 Kg(N)/ha/yr is exceeded (Huband Bridge, Leeson Bridge, McKenny's Bridge, Mespil Road and Percy Place). NO₂ dry deposition rates are modelled to be in excess of this value without the construction of the Proposed Scheme. The Operation Phase of the Proposed Scheme is modelled to increase this value by a maximum of 9.6kgN/ha/yr at these crossing points. Given the existing baseline urban environment, the additional air quality effects associated with the Proposed Scheme is not considered to greatly increase the level of impact than already exists on the pNHA.

While harmful air quality effects on the Grand Canal pNHA as a result of the Proposed Scheme are considered to be unlikely, in a worst case scenario, this could result in a likely significant negative effect at a local geographic scale. The prediction is based on conservative assumptions regarding background pollutant concentrations and

the improvement in vehicle emission rates. 2019 background pollutant concentrations have been used to represent the 2028 baseline, although those concentrations are likely to be lower by the opening year than in 2019. To ensure a robust assessment, older fleet projections were used in the absence of a future fleet that incorporates the effects of 2021 Climate Action Plan measures – a larger proportion of electric vehicles is planned by the opening year than has been modelled. In reality, total concentrations (and magnitude of change) are likely to be lower than those reported here. (refer to Section 7.4.5 of Chapter 7 (Air Quality) for further details).

12.4.4.2 Habitats

12.4.4.2.1 Habitat Degradation- Surface Water Quality

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. The drainage system for the Proposed Scheme will discharge to three surface water receptors: Brewery Stream_010, Dublin Bay and Ringsend WwTP, which ultimately discharges to Liffey Estuary Lower, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. For the Proposed Scheme, there will be a net increase of 3,797m² in the impermeable area ultimately discharging to Dublin Bay. This increase in impermeable area will be being managed for the Proposed Scheme through a combination of bioretention areas, filtration drains and oversized pipes. Where no new paved areas are proposed, the existing drainage network will be retained and utilised (see Chapter 4 (Proposed Scheme Description) for more detail on drainage design).

The inclusion of Sustainable drainage systems (SuDs) will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 13 (Water). The Proposed Scheme will not exacerbate the existing surface water quality conditions in the Dodder_050, Brewery Stream_010, or larger waterbodies such as Liffey Estuary Lower, South Dublin Bay and wetlands in Booterstown Marsh. It will, in fact, result in a beneficial, albeit imperceptible, impact on the local surface water quality due to the implementation of SuDs, where appropriate.

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

Mitigation measures to maintain SuDS are provided in Section 12.5.2.

12.4.4.2.2 Habitat Degradation – Hydrological Regime

Changes in the flow regime due to increased surface water runoff or discharges, in new locations, could result in changes to sedimentation processes and the structure of riverbanks. None of these are predicted to have any long-term effects that would give rise to a 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 – Non-Native Invasive Plant Species

One non-native invasive plant species, three-cornered garlic, listed on the Third Schedule of the (Birds and Natural Habitats) Regulations), was identified within the Proposed Scheme during the field surveys (see Table 12.8). 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 presence of another Third schedule non-native species outside of the Proposed Scheme footprint, is common cordgrass. This species occurs on mudflats in Booterstown Marsh and is widely distributed across a number of European sites in Dublin Bay (McCorry and Ryle 2009). In terms of operational impacts, poorly maintained drainage network and / or contaminated runoff entering Booterstown Marsh could result in the further spread of this species.

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

Mitigation measures have been designed to avoid this potential impact (see Section 12.5).

12.4.4.2.4 Habitat Degradation – Air Quality

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

12.4.4.3 Rare and Protected Plant Species

12.4.4.3.1 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora (Protection) Order 2015 were recorded within the Proposed Scheme during field surveys undertaken. However, the desk study returned records of opposite-leaved pondweed within the Grand Canal, great burnet at UCD and shady beard-moss at RDS. Another species for which limited publicly available extant data exists is Borrer's saltmarsh grass. Opposite-leaved pondweed may lie dormant in sediments for many years until conditions become suitable for regrowth. Surface water runoff containing harmful compounds from the Proposed Scheme could affect the water quality of the Grand Canal and affect populations of opposite-leaved pondweed which are present in the vicinity of the Proposed Scheme. With regards great burnet and shady beard-moss, as these species do not lie within the footprint of the Proposed Scheme, and are not aquatic in nature, there is no potential for the operation of the Proposed Scheme to result in direct or indirect impacts on populations of these species.

As discussed in Section 12.4.4.2.4, without the design mitigation incorporated into the design of the Proposed Scheme, the Operational Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on rare and protected plant species either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their supporting habitats).

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

Mitigation measures to maintain SuDs are provided in Section 12.5.2.

12.4.4.4 Mammals

12.4.4.4.1 Bats

12.4.4.4.1.1 Indirect Disturbance of Light Patterns Due to Operational Lighting

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 could 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 / peri-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. The lighting approach 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 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.

Mitigation to avoid light spill are detailed in Section 12.5.1.4.2.3.

12.4.4.4.1.2 Disturbance / Displacement – Increased Human Activity

The provision of the proposed cycle and pedestrian facilities is likely to result in increased human presence along the Proposed Scheme. However, populations of bats associated with the Proposed Scheme are likely to be habituated to a certain degree of human disturbance. Therefore, it is considered that there may be temporary significant effect on bats at a local scale, until such a time that they have habituated to the increased levels of human disturbance.

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.

12.4.4.4.2.1 Habitat Severance / Barrier Effect

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

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

12.4.4.4.2.2 Mortality Risk

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

12.4.4.4.2.3 Light Spill

Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore 2005). It should be noted that the majority of the Proposed Scheme corridor is already lit artificially.

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

Therefore, lighting associated with the Proposed Scheme is not predicted to 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, although unconfirmed mustelid prints were recorded in the River Dodder in close proximity of the road bridge at Ballsbridge in February 2021. However, based on the results of the desktop study, otter are known to occur within the wider vicinity, particularly along the River Dodder, and Grand Canal as well as Merrion Strand and the Liffey Estuary Lower. Therefore, potential impacts on this species cannot be excluded.

12.4.4.4.3.1 Habitat Severance / Barrier Effect

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

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

12.4.4.4.3.2 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. 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.

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 Degradation – Surface Water Quality

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

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of otter and result in a 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.

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 and Prey Abundance

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

Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the conservation status of marine mammals and result in a 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 marine mammals across the wider environment, as demonstrated in the results of the desk study.

12.4.4.4.5 Other Mammals

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

12.4.4.4.5.1 Habitat Severance / Barrier Effect

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

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on mammals is not considered to be significant at any geographic scale. The existing infrastructure itself already acts as a barrier to 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 the Proposed Scheme however, it should be noted that the majority of the Proposed Scheme corridor is already lit artificially, and so mammals in the area would be habituated to some degree of artificial lighting. 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. Increased noise levels, as well as causing disturbance to birds in the locality, may also affect the breeding success of local bird populations as bird calls would become drowned out by traffic noise.

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

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

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

12.4.4.5.1.2 Habitat Degradation – Surface Water

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

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

12.4.4.5.2 Wintering Birds

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

12.4.4.5.2.1 Disturbance / Displacement

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

Although there is still likely to be some level of displacement effect, a perceptible effect would be expected to be limited to inland feeding site habitats immediately adjacent to the Proposed Scheme, owing to the duration for screening landscape planting to become fully re-established. However, a number of known wintering bird sites are located adjacent to the Proposed Scheme, including Blackrock College, Blackrock Park, Williamstown Park and Booterstown Marsh pNHA which is contained within the boundary of South Dublin Bay and River Tolka Estuary SPA. Blackrock College, Blackrock Park and Williamstown Park are all known to be used by foraging wintering birds such as light-bellied Brent goose. Booterstown Marsh is used by waders and gulls and is a designated Nature Reserve. 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. Proposals include the removal of the boundary treeline at Blackrock College and an area of mixed broadleaved woodland on the boundary of Blackrock Park. These areas of vegetation currently provide visual screening to foraging winter birds utilising these sites, thereby reducing the visual disturbance of traffic on the adjacent Rock Road. The removal of such screening vegetation would result in a permanent increase in visual disturbance to foraging winter bird species here. This vegetation currently provides visual screening from traffic on Rock Road to birds using the marsh. It is likely that an increase in visual disturbance will occur at least temporarily until the replacement vegetation here becomes established.

Any displacement of birds from habitat areas during the operation of the Proposed Scheme could be expected to be temporary, residual effect until such time that landscaping planting re-establishes. However, it is not predicted to affect the conservation status of wintering bird species by virtue of the widespread availability of a number of other suitable forage sites nearby and across the wider Dublin Bay. Thus the operational impact should not result in a likely significant negative effect, at any geographic scale.

12.4.4.5.2.2 Habitat Degradation – Surface Water

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

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

12.4.4.6 **Reptiles**

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

12.4.4.6.1 Habitat Severance/ Barrier Effect

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

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

12.4.4.6.2 Mortality Risk

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

12.4.4.7 Amphibians

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

12.4.4.7.1 Habitat Severance / Barrier Effect

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

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

12.4.4.7.2 Mortality Risk

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

12.4.4.7.3 Habitat Degradation – Surface Water

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

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

12.4.4.8 Fish

12.4.4.8.1 Habitat Degradation – Surface Water

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

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

12.4.4.9 Invertebrates – Freshwater Molluscs

12.4.4.9.1 Habitat Degradation – Surface Water

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

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

Table 12.15: Summary of Potential Operational Phase Impacts (Pre-mitigation)

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Designated Areas for Nature Conservation			
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Howth Head SAC Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rockabill to Dalkey Island SAC Dalkey Coastal Zone and Killiney Hill pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SAC Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
South Dublin Bay and River Tolka Estuary SPA Dolphins, Dublin Docks pNHA South Dublin Bay pNHA North Dublin Bay pNHA Booterstown Marsh	International Importance National Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Dalkey 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
Skerries Islands SPA Skerries Islands NHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Murrrough SPA The Murrrough pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
The Grand Canal pNHA	National Importance	Habitat Degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale
Rockabill SPA Rockabill Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Habitats (outside of designated areas for nature conservation)			
Lower salt marsh (CM1) (corresponding to Annex I habitat <i>Salicornia</i> and other annuals colonising mud and sand (1310))	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Upper salt marsh (CM2) (corresponding to Annex I habitats Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330) Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (1410))	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Mud sand shores (LS4) (corresponding to Annex I habitat mudflats and sandflats not covered by sea water at low tide (1140))	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Canals (CW2)	National Importance	See Grand Canal pNHA above	See Grand Canal pNHA above
Depositing/lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1);	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale
Rare / Protected Plants			

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Opposite-leaved pondweed	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Borrer's saltmarsh grass	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Flora Species on Irelands Red Lists (Vulnerable or of higher concern concern)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Non-native invasive plant species	N/A	Spread at expense of other Habitats, Habitat Degradation	Likely significant effect at the local to International scale geographic scale
Fauna Species			
Bats	Local Importance (Higher Value)	Disturbance / displacement (until habituated)	Likely significant effect at the local geographic scale (until habituated)
Badger	Local Importance (Higher Value)	Habitat Severance / barrier effect	Likely significant effect at the local geographic scale
Otter	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	N/A	N/A
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals (all other marine mammals)	County Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
SCI bird species	International Importance	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Kingfisher (non-SCI population)	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Reptiles	Local Importance (Higher Value)	N/A	N/A
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
European eel / Lamprey / Atlantic Salmon	National Importance – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to international geographic scale
All other fish	Local importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Invertebrates – Freshwater molluscs	Local importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale

12.5 Mitigation and Monitoring Measures

12.5.1 Construction Phase

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

12.5.1.1 Designated Areas for Natura 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 Zol are presented in the Natura Impacts Statement (NIS). Following a consideration and assessment of the Proposed Scheme on the identified relevant European sites, the following mitigation measures were developed to address potential impacts that were identified:

- Measures to prevent habitat loss during construction;
- Measures to protect surface water and groundwater quality during construction;
- Measures to prevent the spread of invasive species to downstream European sites;
- Measures to prevent disturbance/displacement of wintering SCI birds and otter; and,
- Measures to prevent air quality impacts to QI/SCI species habitat during construction

12.5.1.1.2 National sites

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on NHA and pNHAs within the Zol are as per those for European sites as the boundaries coincide with the SACs and SPAs. Therefore, the mitigation measures outlined above in Section 12.5.1.1.1, and as detailed in the NIS, will prevent the Proposed Scheme resulting in a significant negative effect on these NHA and pNHAs at the national geographic scale.

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on the Grand Canal pNHA includes mitigation measures to address potential habitat degradation as a result of surface water quality effects and the spread of non-native invasive species (see Section 12.4.3.2), effects on rare and protected plant species (see Section 12.4.3.3), and negative effects on the protected fauna species associated with the sites such as mammals, riparian birds, and fish species (see Sections 12.4.3.4, 12.4.3.5 and 12.4.3.8).

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), (i.e. mixed broadleaved woodland, scattered trees and parkland, tree line 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 in Volume 3 of this EIAR. These areas will be protected for the duration of construction works and fenced off at an appropriate distance

To mitigate loss of habitat, proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor listed below and displayed on the Landscaping General Arrangement drawings in Volume 3 of this EIAR:

- 349 street trees planted;
- 558m of proposed hedgerow;
- 1,241m² of proposed species rich grassland;

- 4,990m² of proposed ornamental planting;
- 176m² of proposed native planting; and,
- 2,928m² 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) and Environmental Incident Response Plan (EIRP) have 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.

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.

Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality at the Construction Compound, Booterstown Marsh and Canal tow path at Wilton Terrace are set out below.

Materials will be stored at the Construction Compound in accordance with the mitigation measures proposed, however the proximity of Booterstown Marsh which connects directly to Dublin Bay, means additional measures are required, as follows:

- The slit drain in the centre of the car park will be sealed for the duration of the construction programme (it is assumed the construction compound will be retained for the full length of the construction programme);
- The appointed contractor will ensure that appropriate spill control equipment is available (e.g., a suitably sized floating boom), to control any spillages to the watercourses should a spillage occur;
- The existing gravel-like surface will be retained to reduce the likelihood of silty water runoff. Geotextile membranes will be installed in high-risk areas;
- Existing grassed areas which provide a buffer to the pond outlet (and Dublin Bay) will be retained;
- Silt fencing will be installed along the boundary to the pond outlet (as a last defence against any overland runoff of silty water or spillages of chemicals or hydrocarbons);
- Fuel storage will be located on the western boundary of the construction compound – nearest the road and as far as possible from the slit drain and pond outlet. There is an existing wall here which will prevent any spillages reaching surface water drains in the road. All fuel will be stored in accordance with the SWMP;
- Storage of other materials will be located on the western boundary of the construction compound – nearest the road and as far as possible from the pond outlet;
- All potentially contaminating materials will be stored in covered areas;
- Wheel wash areas will be closed-cycle. There will be no discharge of wheel wash water to surface water drains. Off-site disposal of contaminated and silty water and sludge will be required;
- Wastewater from cabins will be contained. Where discharge to the local sewer is required consent from the local authority will be obtained (a temporary permit); and
- The appointed contractor will undertake a risk assessment due to the proximity of the existing surface water drainage system to the Construction Compound.

The potential for significant impacts associated with the movement of an existing boundary wall in land to the north of Booterstown Marsh have been identified. These will be avoided and minimised through the following measures:

- If dewatering of the footings of the wall is required, water will be settled in a siltbuster tank (or similar) before being discharged as clean, uncontaminated surface water to local surface water systems;
- Surface water drains will be clearly identified and marked as such;
- Surface water drains in the road will be protected through the use of a silt curtain (or similar) to prevent silty water runoff from entering during construction. This will be placed as close to the works as is practicable and at the very least no further than alongside the footpath edge;
- No refuelling will take place at this location – the construction compound is close by and so all refuelling of plant and machinery will take place there; and
- The generic mitigation measures outlined in the SWMP for the management of vehicles and plant will be implemented by the appointed contractor.

There is potential for significant impacts associated with the upgrading of the ramp on the Grand Canal tow path. These will be avoided and minimised through the following measures:

- Retaining wall:
 - The concrete for the foundations will be poured in dry weather only;
 - Silt fences will be used along the top of the bank to reduce the likelihood of silty water runoff and cement washings reaching the canal; and
 - Any water collected behind the silt fences will be settled using a siltbuster tank (or similar) and then discharged to the foul sewer (with the permission for Dublin City Council).
- Oil filled cable:
 - Ground Investigations will be carried out in this location to determine whether there is contamination present. If any is detected, excavated materials will be removed to a licensed waste facility by a licensed contractor and will not be used in any landscaping or backfilling activities; and
 - A construction method statement detailing the measures taken to avoid the cable will be prepared by the appointed contractor in advance of construction works at the location.

12.5.1.2.3 Habitat Degradation – Groundwater

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

- The construction management of the site will be implemented by the appointed contractor will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams et al., 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination; and
- Measures to be implemented by the appointed contractor to minimise the risk of spills and contamination of soils and waters include:
 - Employing only competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;
 - Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g. by a roll-over bund, raised kerb, ramps or stepped access;
 - The location of any fuel storage facilities will be considered in the design of the Construction Compound. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded;
 - Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire Construction Phase;
 - Potential pollutants to be adequately secured against vandalism;

- Provision of proper containment of potential pollutants according to codes of best practice;
 - Thorough control during the entire Construction Phase to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and
- Spill kits will be provided and be kept close to the storage area. Staff to be trained on how to use spill kits correctly.

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

12.5.1.2.4 Habitat Degradation – Air Quality

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

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

12.5.1.2.5 Habitat Degradation – Non-Native Invasive Plant Species

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

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

- Where a pre-construction invasive species re-survey identifies newly established non-native invasive species within the footprint of the Proposed Scheme, the final non-native invasive species management plan produced will provide a detailed description of the infestations (e.g., approximate area of the respective colonies (m²), 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 National Roads Authority (2010) Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads, and other species-specific guidance documents including those listed in the draft ISMP, as necessary;
- The NTA will ensure that all control measures specified in the Proposed Scheme non-native ISMP shall be implemented by a suitably qualified and licenced specialist prior to the construction of the Proposed Scheme to control the spread of newly established non-native invasive species within the footprint of the Proposed Scheme. Furthermore, the appointed contractor will adhere to control measures specified within the ISMP throughout the Construction Phase of the Proposed Scheme;

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

12.5.1.3 Rare and Protected Plant Species

12.5.1.3.1 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).

12.5.1.4 Mammals

12.5.1.4.1 Bats

12.5.1.4.1.1 Protection of Bats during Vegetation Clearance

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

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

It is an offence to kill a bat or to damage or destroy the breeding or resting place of any bat species, and it is not necessary that the action should be deliberate for an offence to occur. This puts an onus of due diligence on anyone proposing to carry out works that might result in such damage or destruction. Under Section 54 of S.I. 477 of 2011, 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 four trees with potential roost features (PRFs) were identified within the footprint of the Proposed Scheme during the multidisciplinary surveys (see Figure 12.8.2 in Volume 3 of this EIAR). The following mitigation measures will be implemented by the appointed contractor:

- Retained trees with PRFs will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches, or root system of the tree which could disturb roosting bats. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist;
- Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it;
- The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) or concrete washout areas will not be undertaken within 10m of any retained trees, hedgerows and treelines;
- A qualified arborist engaged by the appointed contractor will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Scheme footprint but whose RPA is impacted by the works;
- Where works are required within the RPA, the mitigation measures as set out in the method statement within the Arboricultural Impact Assessment (refer to Appendix A17.1 in Volume 4 of this EIAR) will be implemented; and

- There will be no additional lighting within 5m of the PRF during the Construction Phase of the Proposed Scheme to avoid disturbance to roosting bats.

12.5.1.4.1.2 Habitat Loss & Fragmentation

Where possible, habitats of importance to bats such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted by the Proposed Scheme will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1415_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 which will provide suitable habitat for the bat species recorded within the study area (refer to the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1415_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

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 Disturbance of Flight Patterns / Foraging Routes as a result of Lighting Impacts

The appointed contractor in liaison with the suitably qualified licensed ecologist(s) will ensure that lighting at the construction 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 Badger

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

12.5.1.4.2.1 Disturbance / Displacement

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

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

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

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

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

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

12.5.1.4.2.3 Lighting

Refer to Section 12.5.1.4.2.3 for lighting mitigation measures.

12.5.1.4.3 Otter

Otter are listed on Annex II and Annex IV of the Habitats Directive and are strictly protected under the Birds and Habitats Regulations. Otter, and their breeding and resting places, are also protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure an Otter or to wilfully interfere with or destroy their breeding or resting places (holts/couches). Otter are known to occur on the River Liffey, in the vicinity of the Proposed Scheme, as well as the Grand Canal basin and upstream along the River Dodder.

12.5.1.4.3.1 Loss of Breeding / Resting Sites

Although there were no signs of otter recorded during field surveys, otter could potentially establish new holt or couch sites within the Zol of the Proposed Scheme. 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 2008c).

12.5.1.4.3.2 Measures to Prevent Injury / Mortality Impacts

The appointed contractor will engage a suitably qualified and/or licensed ecologist(s) to oversee and advise works at watercourse crossings.

- Where a new or reactivated holt is encountered, within 150 metres (up and downstream) of the watercourse crossing, the qualified ecologist(s) will consult with the NPWS in conjunction with the NTA and appointed contractor;
- The qualified ecologist will review method statements; oversee works; provide advice to the appointed contractor(s), deliver toolbox talks and temporarily halt works, if, and as, necessary, having conferred with the NTA;
- To protect otters from indirect harm during construction, where practicable open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor;

- Excavations will also be covered at night, where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow mammals to safely exit should they fall in; and
- Fencing requirements as per the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2008) will be erected around the Construction Compound and other working areas which are in close proximity to significant watercourses and have suitable roaming territory for otter.

12.5.1.4.3.3 Measures to Prevent Disturbance / Displacement

Where night time works are required the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s). and implement measures to mitigate the impact of such works (especially works carried adjacent to watercourses with known otter activity).

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).

12.5.1.4.3.4 Lighting

Refer to Section 12.5.1.4.3.4 for lighting mitigation measures.

12.5.1.4.4 Marine Mammals

12.5.1.4.4.1 Habitat and Food Source Degradation – Water Quality

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

No additional mitigation is required.

12.5.1.4.5 Other Mammals 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).

No additional mitigation is required.

12.5.1.5 Birds

12.5.1.5.1 Breeding Birds

12.5.1.5.1.1 Habitat Loss & Fragmentation

Where possible, habitats of importance to breeding birds such as scattered trees and parkland, 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 (BCIDC-ARP-ENV_LA-1415_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

Planting of treeline, hedgerow and grassland habitats within the Proposed Scheme footprint will be carried out by the appointed contractor, as detailed in the landscape drawings (Refer to the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1415_XX_00-DR-LL-9001) in Volume 3 of this EIAR for locations.

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

12.5.1.5.1.2 Mortality Risk

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

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

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

12.5.1.5.1.3 Disturbance / Displacement

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

In respect of the Construction Compound and potential impacts on local breeding birds, the compound shall be screened off as detailed in Section 12.5.1.5.2 for wintering birds. 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 Degradation – Water Quality

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

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

12.5.1.5.2 Wintering Birds

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

Where practicable, the removal of screening vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) from Booterstown Marsh, Blackrock College and Blackrock Park will be undertaken outside of the breeding bird season (01 March to the 31 August) and before the arrival of the wintering birds. Therefore clearance works at Booterstown Marsh, Blackrock College and Blackrock Park will commence in September and be concluded before the start of October.

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

12.5.1.5.2.2 Measures to Prevent Disturbance and Displacement Impacts during Construction

The following mitigation measures will be put in place at the 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 design of the lighting will ensure that light-spill will not occur in the direction of Dublin Bay. The use of lighting where required shall be such that it is not excessively tall thus providing an obstacle to low-flying birds potentially moving between feeding sites. Furthermore, and where security lighting is not required, lighting should not be continuously on when compound is closed. Sensor-operated lighting timers as necessary should be installed.
- 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.

12.5.1.5.2.3 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).

12.5.1.5.2.4 Measures to Prevent Air Quality Impacts to QI / SCI Species Habitat during Construction

Mitigation measures to prevent air quality impacts to QI / SCI species habitat are described in Section 12.4.4.2.4.

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. No mitigation therefore required.

12.5.1.7 Amphibians

12.5.1.7.1 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.

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 Zol 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 Zol of the Proposed Scheme. If used, the type and design of traps shall be approved by the NPWS. This is a standard and proven method of catching and translocating smooth newt;
- If the size or depth of the habitat feature is such that it cannot be determined by a visual survey whether all amphibians have been captured, the suitably qualified ecologist engaged by the appointed contractor will advise on the appropriate course of action to confirm that no amphibian species remain. If drainage of the habitat feature is deemed to be the appropriate course of action, any mechanical pumps used will have a screen fitted, and be sited, such that no amphibian species can be sucked into the pump mechanism; and
- Any capture and translocation works shall be undertaken immediately in advance of site clearance / construction works commencing.

12.5.1.7.2 Habitat Degradation- Water Quality

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

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

12.5.1.8 Fish

Habitat Degradation – Surface Water Quality

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

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

12.5.1.9 Invertebrates – Freshwater Molluscs

12.5.1.9.1 Habitat Degradation – Surface Water Quality

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

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

12.5.2 Operational Phase

12.5.2.1 Designated Areas for Nature Conservation

12.5.2.1.1 European Sites

The mitigation measures that are specifically required to ensure that the Proposed Scheme will not adversely affect the integrity of the European sites within the Zol 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 non-native invasive species to downstream European sites.

12.5.2.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Scheme on pNHAs within the Zol are as set out for European sites as the boundaries of the pNHAs follow those of the SACs and SPAs. Therefore, the mitigation measures outlined in Section 12.5, and as detailed in the NIS (which accompanies the application for approval), will prevent the Proposed Scheme resulting in a significant negative effect on these pNHAs.

12.5.2.1.2.1 Habitat Loss / Fragmentation

To mitigate loss of habitat, the proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor. This planting is listed below and displayed on the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1415_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

- 349 street trees planted;
- 558m of proposed hedgerow;
- 1,241m² of proposed species rich grassland;
- 4,990m² of proposed ornamental planting;
- 176m² of proposed native planting; and,
- 2,928m² of proposed amenity grassland planting.

Reinstatement works in relation to Booterstown Marsh pNHA will be carried out by the appointed contractor as per the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1415_XX_00-DR-LL-9001).

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

12.5.2.1.2.2 Habitat Degradation – Surface Water Quality

The proposed SuDs drainage system, as shown in Proposed Surface Water Drainage Works drawings (BCIDC-ARP-DNG_RD-1415_XX_00-DR-CD-9001 in Volume 3 of this EIAR), will be installed by the appointed contractor during the Construction Phase.

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

These standard drainage design controls have been proven through widespread use in developments across the country. The proposed SuDs drainage system incorporated into the design of the site are common drainage systems that are used in most development types. They are proposed and designed in accordance with the Greater Dublin Strategic Drainage Study (GSDSDS, 2005).

Once the Proposed Scheme is in operation, the Local Authorities will be required to implement a maintenance and inspection regime for SuDs which will be subject to their management procedures. No additional mitigation is required.

12.5.2.1.2.3 Habitat Degradation – Non-Native Invasive Plant Species

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

12.5.2.2 Habitats

12.5.2.2.1 Habitat Degradation – Surface Water Quality

Refer to Section 12.5.2.1.2.2.

12.5.2.2.2 Habitat Degradation – Groundwater

Given there are no significant effects on habitats owing to impacts from groundwater changes, no mitigation is required.

12.5.2.2.3 Habitat Degradation- Non-Native Invasive Plant Species

Refer to Section 12.5.2.1.2.3

12.5.2.3 Rare and Protected Flora Species

12.5.2.3.1 Habitat Degradation- Surface Water Quality

Refer to Section 12.5.2.1.2.2.

12.5.2.4 Mammals

12.5.2.4.1 Bats

12.5.2.4.1.1 Habitat Loss and Loss of Breeding / Resting Sites

The operation of the Proposed Scheme is not predicted to result in any significant effects to bats in the vicinity of the Proposed Scheme, particularly given that the bulk of the corridor is characterised by streetscape planting which offer limited roosting potential. There are a number of areas characterised by mixed age / mature planting adjacent to the Proposed Scheme and these areas are directly avoided by retaining them and their connectivity to the wider landscape such as along the Liffey Valley corridor.

Planting of treeline, hedgerow and grassland habitats within the Proposed Scheme footprint will be carried out by the appointed contractor during the Construction Phase, will provide suitable habitat for the bat species recorded within the study area. Refer to the Landscape General Arrangement drawings (BCIDC-ARP-ENV_LA-1415_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

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

12.5.2.4.1.2 Indirect Disturbance of Flight Patterns Due to Operational Lighting

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

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

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

12.5.2.4.2 Badgers

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

12.5.2.4.3 Otter

12.5.2.4.3.1 Habitat Degradation - Surface Water

Refer to Section 12.5.2.1.2.2.

12.5.2.4.4 Marine Mammals

12.5.2.4.4.1 Habitat Degradation - Surface Water

Refer to Section 12.5.2.1.2.2.

12.5.2.4.5 Other Mammals Species

No significant effects on other mammal species are predicted during the Operational Phase of the Proposed Schemes, therefore, no mitigation is required.

12.5.2.5 Birds

12.5.2.5.1 Breeding Birds

12.5.2.5.1.1 Habitat Loss and Loss of Breeding / Resting Sites

As previously mentioned, planting of treeline, hedgerow and scrub habitats within / alongside the Proposed Scheme boundary as detailed in the landscape drawings will provide suitable habitat for the breeding bird species recorded within the study area.

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.

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

12.5.2.5.1.2 Habitat Degradation - Surface Water

Refer to Section 12.5.2.1.2.2.

12.5.2.5.2 Wintering Birds

12.5.2.5.2.1 Measures to Reduce Impacts to SCI birds due to Vegetation Loss

As part of the landscape plan and following on from completion of works in particularly sensitive areas, namely Booterstown Marsh, Rock Road fronting Blackrock College (Construction Compound having been fully screened off as described above, to minimise impacts) and Rock Road fronting Blackrock Park; the re-establishment of vegetation in a timely manner will be critical.

Planting of treeline, hedgerow and grassland habitats within the Proposed Scheme footprint will be carried out by the appointed contractor. Re-establishment of vegetation, including re-grassing, at these areas is to be done outside of the wintering bird season, but as soon as practicable after completion of a section of works.

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

12.5.2.5.2.2 Habitat Degradation - Surface Water

Refer to Section 12.5.2.1.2.2.

12.5.2.6 Reptiles

No significant effects on reptile species are predicted during the Operational Phase of the Proposed Scheme. Therefore, no mitigation is required.

12.5.2.7 Amphibians

12.5.2.7.1 Habitat Degradation- Surface Water

Refer to Section 12.5.2.1.2.2.

12.5.2.8 Fish

12.5.2.8.1 Habitat Degradation - Surface Water

Refer to Section 12.5.2.1.2.2.

12.5.2.9 Invertebrates – Freshwater Molluscs

12.5.2.9.1 Habitat Degradation - Surface Water

Refer to Section 12.5.2.1.2.2.

12.6 Residual Impacts

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

12.6.1 Construction Phase

Following the implementation of the mitigation measures outlined in Section 12.5, the Proposed Scheme will not result in any significant residual effects above the local scale on the KERs identified (see Table 12.16) on its own, or cumulatively together with other proposed developments during the Construction Phase.

Table 12.16: Summary of Construction Phase Significant Residual Impacts

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

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
North Dublin Bay pNHA Booterstown Marsh pNHA				
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; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	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; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Habitats (outside of designated areas for nature conservation)				
Lower salt marsh (CM1)	International Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale	No significant residual effect
Upper salt marsh (CM2)	International Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Canals (CW2)	National Importance	See Grand Canal pNHA above	See Grand Canal pNHA above	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
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1);	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	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	Likely significant 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
Rare / Protected Plant Species				
Opposite-leaved pondweed	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Borrer's saltmarsh grass	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Non-native invasive plant species	N/A	Spread at expense of other Habitats, Habitat Degradation (hydrology)	Likely significant effect at the local to international scale geographic scale	No significant residual effect
Fauna Species				
Bats	Local Importance (Higher Value)	Habitat Loss / Fragmentation; Disturbance / Displacement	Likely significant effect at the local geographic scale	No significant residual effect
Badger	Local Importance (Higher Value)	Disturbance / Displacement	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Otter	International Importance	Habitat Degradation (hydrology); Disturbance / Displacement	Likely significant effect at the local geographic scale (Habitat Degradation (hydrology)); Likely significant effect at the local geographic scale (Disturbance / Displacement)	No significant residual effect
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine Mammals	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
SCI bird species	International Importance	See SPAs above	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale (Habitat Loss; Mortality risk; Disturbance / Displacement); Likely significant effect at the local geographic scale (Habitat Degradation (hydrology))	Likely significant effect at the local geographic scale (Habitat Loss; Mortality risk; Disturbance / Displacement); No significant residual effect (Habitat Degradation (hydrology))
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 (Habitat Loss; Mortality risk; Disturbance / Displacement); Likely significant effect at the local geographic scale (Habitat Degradation (hydrology))	Likely significant effect at the local geographic scale (Habitat Loss; Mortality risk; Disturbance / Displacement); No significant residual effect (Habitat Degradation (hydrology))
Kingfisher (non-SCI population)	National Importance	Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale (Disturbance / Displacement); Likely significant effect at the local geographic scale (Habitat Degradation (hydrology))	No significant residual effect
Amphibians	Local Importance (Higher Value)	Habitat Degradation (mortality risk; hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
European Eel / Lamprey / Atlantic Salmon	National Importance – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to international geographic scale	No significant residual effect
All other fish	Local importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Invertebrates - Freshwater molluscs	Local importance (Higher Value)	Habitat Degradation (hydrology); Mortality risk	Likely significant effect at the local geographic scale	No significant residual effect

12.6.2 Operational Phase

Following the implementation of the mitigation measures outlined in Section 12.5, the Proposed Scheme will not result in any significant residual effects above the local geographic scale during the Operational Phase – refer to Table 12.17 below.

Table 12.17: Summary of Operational Phase Significant Residual Impacts

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Designated Areas for Nature Conservation				
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; air quality; 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 Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; air quality, 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; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
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 geographic scale	No significant residual effect
The Grand Canal pNHA	National Importance	Habitat Degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	Likely significant effect at the local geographic scale for air quality; No significant residual effect arising for other potential impacts
Habitats (outside of designated areas for nature conservation)				
Lower salt marsh (CM1)	International Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale	No significant residual effect
Upper salt marsh (CM2)	International Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international geographic scale	No significant residual effect
Canals (CW2)	National Importance	See Grand Canal pNHA above	See Grand Canal pNHA above	No significant residual effect
Depositing/lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1);	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Treelines (WL2)	Local Importance (Higher Value)	Habitat loss	Likely significant effect at the local geographic scale	No significant residual effect
Rare / Protected Plant Species				
Opposite-leaved pondweed	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Borrer's saltmarsh grass	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Non-native invasive plant species	N/A	Spread at expense of other Habitats, Habitat Degradation (hydrology)	Likely significant effect at the local to International scale geographic scale	No significant residual effect
Fauna Species				
Bats	Local Importance (Higher Value)	Habitat Loss / Fragmentation ; Disturbance / Displacement	Likely significant effect at the local geographic scale	No significant residual effect
Badger	Local Importance (Higher Value)	Disturbance / Displacement	Likely significant effect at the local geographic scale	No significant residual effect
Otter	County Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Disturbance / Displacement	Likely significant effect at the local geographic scale	No significant residual effect
Marine Mammals	International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
SCI bird species	International Importance	See SPAs above	See SPAs above	No significant residual effect
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
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
Kingfisher (non-SCI population)	National Importance	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
European Eel / Lamprey / Atlantic Salmon	National Importance – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to international geographic scale	No significant residual effect
All other fish	Local importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Invertebrates - Freshwater molluscs	Local importance (Higher Value)	Habitat Degradation (hydrology); Mortality risk	Likely significant effect at the local geographic scale	No significant residual effect
Local Biodiversity Areas				

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Areas not discussed under designated sites, Flora and Fauna	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect

While unlikely, in a worst-case scenario, a potential air quality effect at the Grand Canal pNHA, namely Leeson Bridge, could occur as result of the operation of the Proposed Scheme. However, it is expected that by 2043 the existing background pollution concentrations will reduce to negligible levels, due to a significant reduction in emissions between 2028 and 2043 from advancement in engine technology and the addition of a higher percentage of electric vehicles to the fleet. Therefore localised impacts by the Grand Canal, namely at Leeson Bridge, are therefore considered to be significant at a local scale only.

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