Chapter 12
Biodiversity

Contents

12. Biodiversity

12.1 Introduction

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

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

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

The design of the Proposed Scheme has evolved through comprehensive design iteration 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 (hereafter referred to as "the Habitats Directive").

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

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

12.2.1 Ecological Survey Study Area

The Proposed Scheme extents are illustrated in the General Arrangement Drawings (BCIDA-ACM-GEO_GA-0006_XX_00-DR-CR-9001) in Volume 3 of his EIAR. Ecological surveys were carried out for each of the biodiversity receptors listed in Table 12.1, within a specific study area (as described in Table 12.1), and focused on assessing potential impacts within the Zone of Influence (ZoI) of the Proposed Scheme. The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (hereafter referred to as the CIEEM Guidelines) (CIEEM 2018) define the ZoI for a development is the area over which ecological features may be subject to significant impacts as a result of the Proposed Scheme and associated activities (see Section 12.3.1 for more detail on the ZoI as it relates to the Proposed Scheme and the various ecological receptors).

The ecological surveys were designed based upon the characteristics of the Proposed Scheme and its likely significant impacts on the baseline environment during construction and / or operation. The study areas are described in Table 12.1.

Table 12.1: Ecological Survey Study Areas for Each Ecological Receptor

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

12.2.2 Relevant Guidelines, Policy and Legislation

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

- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (hereafter referred to as the CIEEM Guidelines) (CIEEM 2018);

- National Road Authority (NRA) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority (NRA, 2005a);
- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority (NRA 2005b);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes. National Roads Authority (NRA 2006a);
- Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA, 2006b);
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2008a);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide. National Roads Authority (2008b);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009);
- The Management of Invasive Alien Plant Species on National Roads - Technical Guidance (TII 2020a);
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII 2020b);
- Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (Collins, J (ed.) 2016);
- The Bat Workers' Manual (Mitchell-Jones and McLeish 1999);
- Bat Mitigation Guidelines for Ireland. 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).

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

Policy and Planning Documents:

- Department of Culture, Heritage and the Gaeltacht (DCHG) National Biodiversity Plan 2017 - 2021 (DCHG 2017);
- Dublin City Council (DCC) Dublin City Development Plan 2016 - 2022 (DCC 2016);
- Dublin City Biodiversity Action Plan 2015 - 2020 (DCC 2015);
- South Dublin County Council (SDCC) South Dublin County Development Plan (2022-2028) (SDCC 2022);
- South Dublin County Heritage Plan 2010-2015 (SDCC 2010); and,
- Connecting with Nature Biodiversity Acton Plan for South Dublin County 2020-2026 (Draft) (SDCC 2020 Draft)

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. 235/2022- Flora (Protection) Order, 2022 (hereafter referred to as the Flora Protection Order); and
- Fisheries Acts 1959 to 2019.

12.2.3 Data Collection and Collation

12.2.3.1 Desk Study

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

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

- Online data available on European sites and on Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the NPWS (NPWS Online Database 2022- January);
- 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 2022);
- Information on the status of European Union (EU) protected habitats and species in Ireland (NPWS 2019a, NPWS 2019b and NPWS 2019c); and
- Information on light-bellied Brent goose inland feeding sites (Scott Cawley Ltd., 2017).

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

A desk study was carried out to identify any potential suitable inland feeding and / or roosting sites for 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 in which significant suitable

foraging and/or roosting habitat which would be directly lost as a consequence of the Proposed Scheme, for further wintering bird surveys.

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

12.2.3.2 Ecological Surveys

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

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

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

12.2.3.3 Habitat Survey

Habitat surveys were carried out by Scott Cawley Ltd., between June and August 2018, and in August 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 October 2020. The Hermitage Golf Club was surveyed for signs of mammals in June 2022. The presence / absence of these species was surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings as well as by direct observation. In addition, the study area was surveyed for the presence of badger sett and otter holts. Where present, any evidence of use was recorded.

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, 2020 and 2022 to inform the EIAR. The bat surveys were carried out under the following licence, issued by the NPWS:

- DER / BAT 2019-02 (amended) – Derogation licence to disturb bat roosts throughout the State.
- DER / BAT 2020-67 (amended) – Derogation licence to disturb bat roosts throughout the State.
- DER / BAT 2021-01 (amended) – Derogation licence to disturb bat roosts throughout the State.
- DER / BAT 2022-02 (amended) – Derogation licence to disturb bat roosts throughout the State.

12.2.3.5.1 Bats - Walked Transect Surveys

Walked bat activity transect surveys were conducted along preselected transect routes at two locations along the Proposed Scheme. Transect routes were located at lands adjacent to Palmerstown Drive, referred to as CBC0006BT001, and adjacent to the Irish War Memorial Park and Gardens, referred to as CBC0006BT002. 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, July 2020 and August 2021. Surveys commenced approximately 30 minutes after sunset to ensure that bats had emerged from their roosts. Surveys involved the surveyor walking each transect route at a slow pace using 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).

Three additional transects, located within the grounds of Hermitage Golf Club, were surveyed in June 2022; CBC0006BT004 ran from east to west behind the wide strip of vegetation which fronts onto the N4 (i.e. the fairway of the 16th hole), while CBC0006BT005 ran along the fairway of the 15th and 17th holes in the south-western portion of the Golf Club, and CBC0006BT006 was located along the Golf Club's western boundary. These additional walked transect routes are also shown on Figure 12.1.1 in Volume 3 of this EIAR.

Transect surveys at the Hermitage Golf Club were conducted on one occasion, on the 23rd June 2022. A second survey was scheduled, however, permission to access the grounds to carry out this survey was not granted.

Considering the data collected in June 2022 (within the optimal survey period for bats), the previous data collected in 2021 and overall habitat suitability of the Golf Club to support populations of bats, the absence of a second survey later in the 2022 season is not considered a significant limitation for the purposes of this assessment.

The assessment presented here has also considered the overall habitat suitability of the Hermitage Golf Club lands for use by bats..

12.2.3.5.2 Bats - Building Inspection within The Hermitage Golf Club

One unoccupied building, located along the western boundary of the Hermitage Golf Club, was examined externally for its potential to support roosting bats, during a multidisciplinary survey of the Golf Club lands on 23rd June 2022. Potential access/ egress points were recorded, where present, and a general assessment of the buildings suitability for roosting bats was undertaken. This building is not contained within the temporary or permanent land take boundary of the Proposed Scheme.

12.2.3.5.3 Bats - Tree Surveys

Trees located within the footprint of the Proposed Scheme were assessed for their potential to support roosting bats (i.e. Potential Roost Features (PRFs)) as part of the multidisciplinary walkover survey carried out between June and August 2018 and August 2020. Trees within the Hermitage Golf Club were assessed during a multidisciplinary survey of the lands on the 23rd June 2022.

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 one site along or adjacent to the Proposed Scheme with potential for wintering birds that would be subject to direct habitat loss. This was located at Liffey Gael GAA playing pitches adjacent to R148 / Con Colbert Road, referred to as CBC0006WB001 (refer to Figure 12.1.2 in Volume 3 of the EIAR). This 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, surveyed again twice a Month between October 2021 and March 2022 and an additional 3 visits between March 2022 and April 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 2022);
- 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 ZoI of the Proposed Scheme which are '*both of sufficient value to be material in decision making and likely to be affected significantly'* are deemed to be KERs. These are the biodiversity receptors which may be subject to likely significant impacts from the Proposed Scheme, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of Local Importance (Higher Value) or greater.

12.2.4.2 Characterising and Describing the Impacts

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

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

Parameter	Categories
Type of impact	Positive / Neutral / Negative

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

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

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

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

12.2.4.3 Impact Significance

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

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

12.2.4.3.1 Integrity

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

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

An impact on the integrity of an ecological site or ecosystem is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites' habitats and / or species; 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 9.6km, from the Lucan Road/ N4 Junction 3 to St John's Road West/ Victoria Quay, to the south of the Frank Sherwin bridge, where it will join the prevailing traffic management regime along the City Centre Quays.

Habitats present at Lucan Road include tilled land, dry meadows and grassy verges, treelines, residential estates, and building and artificial surfaces associated with land use adjacent to the N4. As the Proposed Scheme extends eastward towards the Liffey Valley Shopping Centre, buildings and artificial surfaces dominate to the south of the N4, with amenity grassland, hedgerows and treelines abundant to the north. Residential estates, buildings and artificial surfaces dominate the landscape to the east from the M50 motorway to Palmerstown, with treelines, amenity grassland and deciduous woodlands found adjacent to Chapelizod Bypass or interspersed between hard standings. As the Proposed Scheme approaches the R148 Chapelizod Bypass / Lucan Road at Chapelizod, habitats comprise deciduous woodlands, treelines and hedgerows that border the Chapelizod Bypass from Palmerstown to the Con Colbert Road. The remainder of the Proposed Scheme from Con Colbert Road to Victoria Quay is dominated by urban habitats such as commercial, residential buildings and artificial surfaces. Amongst this urban landscape, city landscaping features, treelines, amenity grassland and scattered trees and parkland can be found at the Irish National War Memorial Gardens and the Royal Hospital Kilmainham. Freshwater habitats are present adjacent to sections of the Proposed Scheme, such as the River Liffey, and the River Camac culvert on St John's Road West adjacent to Heuston station.

12.3.1 Zone of Influence (ZoI)

The ZoI, or distance over which a likely significant effect may occur, will differ across the KERs, depending on the predicted impacts and the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken has established the habitats and species present along the alignment of the Proposed Scheme. The ZoI is then informed and defined by the sensitivities of each of the ecological receptors

present, in conjunction with the nature and potential impacts associated with the Proposed Scheme. In some instances, the ZoI extends beyond the study area as described in Section 12.2.1 (e.g., surface water quality effects of a sufficient magnitude can extend, and affect, receptors at significant distances downstream).

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

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

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

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

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

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

Waterbody Name	Connectivity to the Proposed Scheme
Annfield River (Liffey_180)	The Annfield River runs perpendicular to the Proposed Scheme at the Lucan Road/ N4.
River Camac (Camac_040)	Crossed by the Proposed Scheme at R148 St. John's Road West just before it converges with the Liffey Estuary Upper. Culverted beneath Heuston Station.
River Liffey (Liffey_170, Liffey_180 and Liffey_190)	The surface water drainage in the most western extent of the Proposed Scheme drains to the Liffey_170 in Griffeen Valley Park. Both the Liffey_180 and Liffey_190 run almost parallel to the Proposed Scheme. There are no proposed crossings of these sections of the River Liffey. The Annfield River discharges into the River Liffey.
Liffey Estuary Upper	Located at the eastern extent of the Proposed Scheme. The River Liffey and River Camac both discharges into the Liffey Estuary Upper.
Grand Canal	Located approximately 735m m to the south of the Proposed Scheme.
Liffey Estuary Lower	Located approximately 2.7km downstream of Proposed Scheme. The Grand Canal and Liffey Estuary Upper discharge into the Liffey Estuary Lower.
Dublin Bay	Located approximately 8km downstream of Proposed Scheme. The Liffey Estuary Lower discharges into Dublin Bay.

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

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

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

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

Current understanding of construction related noise disturbance to wintering waterbirds is based on the research presented in Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance 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 ZoI in relation to amphibian species is likely to be limited to direct habitat loss and severance within the Proposed Scheme boundary and / or indirect impacts to water quality in wetland habitats hydrologically connected to the Proposed Scheme.

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

12.3.2 Desk Study

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

12.3.3 Biodiversity Areas

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

- Habitats considered to be of importance, such as hedgerows and woodlands, which support a range of species and act as important ecological links/corridors across the wider landscape;
- Liffey Valley is important as an interconnecting biodiversity corridor with adjacent pNHA's such as Rye River/Carton pNHA. Relevant objectives contained in the South Dublin County Development Plan 2022-2028 include to protect and enhance the outstanding natural character and amenity of the area (SDCC 2022). Tree preservation orders have also been identified for areas adjacent to Lucan Road. Liffey Valley was designated by a Special Amenity Area Order (SAAO) by the then Minister for the Environment in 1990. It traverses the county boundaries of both SDCC and Fingal County Council (FCC). The valley has tremendous ecological significance in the form of a wide variety of habitats which support diverse plant and animal species including salmon, kingfisher and otter and flora including hairy St. John's-wort *Hypericum hirsutum*, and rare Red List plant species green figwort *Scrophularia umbrosa* and yellow archangel *Lamiastrum galeobdolon*. The objective of the order is to protect these outstanding landscapes, nature and amenities. The River Liffey is an important feature in this river catchment for terrestrial and aquatic species as well as greenspaces; and
- Network of parks and public green spaces which support a variety of species and habitats and are 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 the Irish National War Memorial 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 terminate at the Liffey Estuary Upper. 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;* and
- The Grand Canal is contained within the ZoI of the Proposed Scheme. 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 not overlap with any European site. The nearest European site to the Proposed Scheme is the Rye Water Valley/Carton SAC, which is located approximately 4.3km west and upstream. The nearest European site with a direct hydrological connection to the Proposed Scheme is South Dublin Bay and River Tolka Estuary SPA, which is located approximately 4.4km downstream of the proposed crossing point on the River Camac. This is followed by South Dublin Bay SAC, which is located approximately 5.4km downstream of the proposed crossing point on the River Camac.

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 River Annfield (Liffey_180), River Camac (Camac_040), Grand Canal and River Liffey (Liffey_180 and Lffey_190).

There are thirteen 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, Wicklow Mountains 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 28 no. European sites (SACs or SPAs) located within the vicinity of the Proposed Scheme, of which 16 no. are located within the ZoI. Each site, their distance to the Proposed Scheme and their designations (QIs/SCIs) are listed in Table 12.5, and illustrated in Figure 12.3 in Volume 3 of this EIAR. Sites within the ZoI are highlighted in blue in Table 12.5.

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

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

Site Name	Distance	Designation – QIs or SCIs
SAC		
South Dublin Bay SAC [000210]	Approximately 5.3km east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • Annual vegetation of drift lines [1210]; • *Salicornia* and other annuals colonising mud and sand [1310]; and • Embryonic shifting dunes [2110]. *S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019* Source: Conservation Objectives: South Dublin Bay SAC 000210. Version 1. (NPWS 2013b)
North Dublin Bay SAC [000206]	Approximately 7.4km east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • Annual vegetation of drift lines [1210]; • *Salicornia* and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]; • Mediterranean salt meadows (Juncetalia maritimi*)* [1410];

Site Name	Distance	Designation – QIs or SCIs
		• Embryonic shifting dunes [2110]; • Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') [2120]; • Fixed coastal dunes with herbaceous vegetation ('grey dunes') [2130]*; and • Humid dune slacks [2190]. Annex II Species: • Petalwort *Petalophyllum ralfsii* [1395]. *S.I. No. 524/2019 – European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019* Source: Conservation Objectives: North Dublin Bay SAC 000206. Version 1. (NPWS 2013a)
Rockabill to Dalkey Island SAC [003000]	Approximately 13.4km south-east of the Proposed Scheme	Annex I Habitats: • Reefs [1170]. Annex II Species: • Harbour porpoise *Phocoena phocoena* [1351]. *S.I. No. 94/2019 – European Union Habitats (Rockabill To Dalkey Island Special Area Of Conservation 003000) Regulations 2019* Source: Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. (NPWS 2013d)
Howth Head SAC [000202]	Approximately 13.1km north-east of the Proposed Scheme	Annex I Habitats: • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and • European dry heaths [4030]. *S.I. No. 524/2021 - European Union Habitats (Howth Head Special Area of Conservation 000202) Regulations 2021* Source: Conservation Objectives: Howth Head SAC 000202. Version 1. (NPWS 2016)
Wicklow Mountains SAC [002122]	Approximately 11.6km south of the Proposed Scheme	Annex I Habitats: • Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]; • Natural dystrophic lakes and ponds [3160]; • Northern Atlantic wet heaths with *Erica tetralix* [4010]; • European dry heaths [4030]; • Alpine and Boreal heaths [4060]; • Calaminarian grasslands of the Violetalia calaminariae [6130]; • Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]*; • Blanket bogs (* if active bog) [7130]; • Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110]; • Calcareous rocky slopes with chasmophytic vegetation [8210]; • Siliceous rocky slopes with chasmophytic vegetation [8220]; and • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]. Annex II Species: • Otter *Lutra lutra* [1355]. Source: Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. (NPWS 2017b)
Baldoyle Bay SAC [000199]	Approximately 11.9km north-east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (Glauco - Puccinellietalia maritimae) [1330]; and • Mediterranean salt meadows *(Juncetalia maritimi)* [1410].

Site Name	Distance	Designation – QIs or SCIs
		S.I. No. 472/2021 - European Union Habitats (Baldoyle Bay Special Area of Conservation 000199) Regulations 2021 Source: Conservation Objectives: Baldoyle Bay SAC 000199. Version 1. (NPWS 2012b)
Glenasmole Valley SAC [001209]	Approximately 9.7km south of the Proposed Scheme	Annex I Habitats: • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]; • *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]; and • Petrifying springs with tufa formation (Cratoneurion) [7220]*. *S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021* Source: Conservation objectives for Glenasmole Valley SAC [001209]. Generic Version 1.0. DCHG (NPWS 2021a)
Malahide Estuary SAC [000205]	Approximately 14.1km north-east of the Proposed Scheme	Annex I Habitats: • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • *Spartina* swards (Spartinion maritimae) [1320]; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]; • Mediterranean salt meadows (Juncetalia maritimi) [1410]; • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]; and • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]*. *S.I. No. 91/2019 – European Union Habitats (Malahide Estuary Special Area of Conservation 000205) Regulations 2019* Source: Conservation Objectives: Malahide Estuary SAC 000205. Version 1. (NPWS 2013c)
Ireland's Eye SAC [000203]	Approximately 16.1km north-east of the Proposed Scheme	Annex I Habitats: • Perennial vegetation of stony banks [1220]; and • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]. *S.I. No. 501/2017 – European Union Habitats (Ireland's Eye Special Area of Conservation 002193) Regulations 2017* Source: Conservation Objectives: Ireland's Eye SAC 002193. Version 1. (NPWS 2017a)
Lambay Island SAC [000204]	Approximately 23.1km north-east of the Proposed Scheme	Annex I Habitats • Reefs [1170]; and • Vegetated Sea cliffs of the Atlantic and Baltic coasts [1230]. Annex II Species • Grey seal *Halichoerus grypus* [1364]; and • Harbour seal *Phoca vitulina* [1365]. *S.I. No. 294/2019 - European Union Habitats (Lambay Island Special Area Of Conservation 000204) Regulations 2019* Source: Conservation Objectives: Lambay Island SAC 000204. Version 1. (NPWS 2013e)
Rogerstown Estuary SAC [000208]	Approximately 18km north-east of the Proposed Scheme	Annex I Habitats: • Estuaries [1130]; • Mudflats and sandflats not covered by seawater at low tide [1140]; • *Salicornia* and other annuals colonising mud and sand [1310]; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]; • Mediterranean salt meadows (Juncetalia maritimi) [1410];

Site Name	Distance	Designation – QIs or SCIs
		• Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]; and, • Fixed coastal dunes with herbaceous vegetation (grey dunes)* [2130]. *S.I. No. 286/2018 European Union Habitats (Rogerstown Estuary Special Area of Conservation 000208) Regulations 2018* Source: Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013e)
Rye Water Valley/Carton SAC [001398]	Approximately 4.2km west of the Proposed Scheme	Annex I Habitats: • Petrifying springs with tufa formation (Cratoneurion) [7220]*. Annex II Species: • *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014]; and • *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016]. *S.I. No.494/2018 – European Union Habitats (Rye Water Valley/ Carton Special Area of Conservation 001398) Regulations 2018* Source: Conservation Objectives for Rye Water Valley/Carton SAC [001398]. Version 1.0. Department of Housing, Local Government and Heritage (NPWS 2021b)
Knocksink Wood SAC [000725]	Approximately 15.8km south-east of the Proposed Scheme	Annex I Habitats: • Petrifying Springs with Tufa formation (Cratonuerion)* [7220] • Old Sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* [91E0] *S.I. No. 93/2019- European Union Habitats (Knocksink Wood Special Area of Conservation 000725) Regulations 2019* NPWS (2021b) *Conservation objectives for Knocksink Wood SAC [000725].* Version 1.0. Department of Housing, Local Government and Heritage.
Ballyman Glen SAC [000713]	Approximately 17.5km south-east of the Proposed Scheme	Annex I Habitats • Petrifying Springs with Tufa formation (Cratonuerion)* [7220] • Alkaline fens [7230] *S.I. No. 92/2019- European Union Habitats (Ballyman Glen Special Area of Conservation 000713) Regulations 2019* NPWS (2019d) *Conservation objectives: Ballyman Glen SAC [000713].* Version 1.0. Department of Housing, Local Government and Heritage.
Bray Head SAC [002193]	Approximately 21.4km south-east of the Proposed Scheme	Annex I Habitats • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • European dry heaths [4030] *S.I. No. 620/2017 - European Union Habitats (Bray Head Special Area of Conservation 000714) Regulations 2017* NPWS (2017b) *Conservation objectives: Bray Head SAC [000714].* Version 1.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
SPA		
South Dublin Bay and River Tolka Estuary SPA [004024]	Approximately 4.3km east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Oystercatcher *Haematopus ostralegus* [A130]; • Ringed Plover *Charadrius hiaticula* [A137]; • Grey Plover *Pluvialis squatarola* [A140]; • Knot *Calidris canutus* [A143]; • Sanderling *Calidris alba* [A144]; • Dunlin *Calidris alpina* [A149]; • Bar-tailed Godwit *Limosa lapponica* [A157]; • Redshank *Tringa totanus* [A162]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; • Roseate Tern *Sterna dougallii* [A192];

Site Name	Distance	Designation – QIs or SCIs
		• Common Tern *Sterna hirundo* [A193]; • Arctic Tern *Sterna paradisaea* [A194]; and • Wetlands and Waterbirds [A999]. *S.I. No. 212/2010 – European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024) Regulations 2010* Source: Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. (NPWS 2015a) and Natura 2000 – Standard Data Form (NPWS 2020a)
North Bull Island SPA [004006]	Approximately 7.4km east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Teal *Anas crecca* [A052]; • Pintail *Anas acuta* [A054]; • Shoveler *Anas clypeata* [A056]; • Oystercatcher *Haematopus ostralegus* [A130]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141]; • Knot *Calidris canutus* [A143]; • Sanderling *Calidris alba* [A144]; • Dunlin *Calidris alpina* [A149]; • Black-tailed Godwit *Limosa limosa* [A156]; • Bar-tailed Godwit *Limosa lapponica* [A157]; • Curlew *Numenius arquata* [A160]; • Redshank *Tringa tetanus* [A162]; • Turnstone *Arenaria interpres* [A169]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; and • Wetlands and Waterbirds [A199]. *S.I. No. 211/2010 – European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006) Regulations 2010* Source: Conservation Objectives: North Bull Island SPA 004006. Version 1. (NPWS 2015b) and Natura 2000 – Standard Data Form (NPWS 2020c)
Dalkey Islands SPA [004172]	Approximately 15.1km south-east of the Proposed Scheme	• Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and • Arctic Tern *Sterna paradisaea* [A194]. *S.I. No. 238/2010 – European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172)) Regulations 2010* Source: Conservation Objectives for Dalkey Islands SPA [004172]. Generic Version 9.0. Department of Housing, Local Government and Heritage (NPWS 2022a) and Natura 2000 – Standard Data Form (NPWS 2020i)
Baldoyle Bay SPA [004016]	Approximately 12.3km north-east of the Proposed Scheme	• Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Ringed Plover *Charadrius hiaticula* [A137]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141]; • Bar-tailed Godwit *Limosa lapponica* [A157]; and • Wetlands and Waterbirds [A999]. *S.I. No. 275/2010 – European Communities (Conservation of Wild Birds (Baldoyle Bay Special Protection Area 004016) Regulations 2010* Source: Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013f) and Natura 2000 – Standard Data Form (NPWS 2020b)

Site Name	Distance	Designation – QIs or SCIs
Howth Head Coast SPA [004113]	Approximately 15.8km north-east of the Proposed Scheme	• Kittiwake *Rissa tridactyla* [A188]. *S.I. No. 185/2012 – European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012* Source: Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 9.0. Department of Housing, Local Government and Heritage (NPWS 2022b) and Natura 2000 – Standard Data Form (NPWS 2020f)
Wicklow Mountains SPA [004040]	Approximately 11.6km south of the Proposed Scheme	• Merlin *Falco columbarius* [A098]; and • Peregrine *Falco peregrinus* [A103]. *S.I. No. 586/2012 – European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040) Regulations 2012* Source: Conservation Objectives: Wicklow Mountains SPA 004040. Generic Version 9.0. Department of Housing, Local Government and Heritage (NPWS 2022c) and Natura 2000 – Standard Data Form (NPWS 2020j)
Lambay Island SPA [004069]	Approximately 23.1km north-east of the Proposed Scheme	• Fulmar *Fulmarus glacialis* [A009]; • Cormorant *Phalacrocorax carbo* [A017]; • Shag *Phalacrocorax aristotelis* [A018]; • Greylag Goose *Anser anser* [A043]; • Lesser Black-backed Gull *Larus fuscus* [A183]; • Herring Gull *Larus argentatus* [A184]; • Kittiwake *Rissa tridactyla* [A188]; • Guillemot *Uria aalge* [A199]; • Razorbill *Alca torda* [A200]; and • Puffin *Fratercula arctica* [A204]. *S.I. No. 242/2010 – European Communities (Conservation of Wild Birds (Lambay Island Special Protection Area 004069)) Regulations 2010* Source: Conservation objectives for Lambay Island SPA [004069]. Generic Version 9.0. Department of Housing, Local Government and Heritage (NPWS 2022d) and Natura 2000 – Standard Data Form (NPWS 2020h)
Malahide Estuary SPA [004025]	Approximately 14.1km north-east of the Proposed Scheme	• Great Crested Grebe *Podiceps cristatus* [A005]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Pintail *Anas acuta* [A054]; • Goldeneye *Bucephala clangula* [A067]; • Red-breasted *Merganser Mergus serrator* [A069]; • Oystercatcher *Haematopus ostralegus* [A130]; • Golden Plover *Pluvialis apricaria* [A140]; • Grey Plover *Pluvialis squatarola* [A141]; • Knot *Calidris canutus* [A143]; • Dunlin *Calidris alpina* [A149]; • Black-tailed Godwit *Limosa limosa* [A156]; • Bar-tailed Godwit *Limosa lapponica* [A157]; • Redshank *Tringa totanus* [A162]; and, • Wetland and Waterbirds [A999]. *S.I. No. 285/2011 – European Communities (Conservation of Wild Birds (Malahide Estuary Special Protection Area 004025) Regulations 2011* Source: Conservation Objectives: Malahide Estuary SPA 004025. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013g) and Natura 2000 – Standard Data Form (NPWS 2020d)
Ireland's Eye SPA [004117]	Approximately 15.9km north-east of the	• Cormorant *Phalacrocorax carbo* [A017]; • Herring Gull *Larus argentatus* [A184]; • Kittiwake *Rissa tridactyla* [A188];

Site Name	Distance	Designation – QIs or SCIs
	Proposed Scheme	• Guillemot *Uria aalge* [A199]; and • Razorbill *Alca torda* [A200]. *S.I. No. 240/2010 – European Communities (Conservation of Wild Birds (Ireland's Eye Special Protection Area 004117) Regulations 2010* Source: Conservation objectives for Ireland's Eye SPA [004117]. Generic Version 9.0. Department of Housing, Local Government and Heritage (NPWS 2022g) and Natura 2000 – Standard Data Form (NPWS 2020e)
Skerries Islands SPA [004122]	Approximately 28.1km north-east of the Proposed Scheme	• Cormorant *Phalacrocorax carbo* [A017]; • Shag *Phalacrocorax aristotelis* [A018]; • Brent Goose *Branta bernicla hrota [*A046]; • Purple Sandpiper *Calidris maritima [*A148]; • Turnstone *Arenaria interpres* [A169]; • Herring Gull *Larus argentatus* [A184]. *S.I. No. 245/2010 – European Communities (Conservation of Wild Birds (Skerries Islands Special Protection Area 004122)) Regulations 2010.* Source: Conservation Objectives: Skerries Islands SPA 004122. Generic Version 9.0. Department of Housing, Local Government and Heritage (NPWS 2022f) and Natura 2000 – Standard Data Form (NPWS 2020k)
Rogerstown Estuary SPA [004015]	Approximately 18.4km north-east of the Proposed Scheme	• Greylag Goose *Anser anser* [A043]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Shelduck *Tadorna tadorna* [A048]; • Shoveler *Anas clypeata* [A056]; • Oystercatcher *Haematopus ostralegus* [A130]; • Ringed Plover *Charadrius hiaticula* [A137]; • Grey Plover *Pluvialis squatarola* [A141]; • Knot *Calidris canutus* [A143]; • Dunlin *Calidris alpina* [A149]; • Black-tailed Godwit *Limosa limosa* [A156]; • Redshank *Tringa totanus* [A162]; and, • Wetland and Waterbirds [A999]. *S.I. No. 271/2010 – European Communities (Conservation of Wild Birds (Rogerstown Estuary Special Protection Area 004015) Regulations 2010* Source: Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS, 2013h) and Natura 2000 – Standard Data Form (NPWS, 2020g)
Rockabill SPA [004014]	Approximately 28.8km north-east of the Proposed Scheme	• Purple Sandpiper *Calidris maritima* [A148; • Roseate Tern *Sterna dougallii* [A192]; • Common Tern *Sterna hirundo* [A193]; and, • Arctic Tern *Sterna paradisaea* [A194]. *S.I. No. 94/2012 – European Communities (Conservation of Wild Birds (Rockabill Special Protection Area 004014) Regulations 2012* Source: Conservation Objectives: Rockabill SPA [004014]. Version 1. Department of Arts, Heritage and the Gaeltacht (NPWS 2013i) and Natura 2000 – Standard Data Form (NPWS 2020m)
The Murrough SPA [004186]	Approximately 31.5km south-east of the Proposed Scheme	• Red-throated Diver *Gavia stellata* [A001]; • Greylag Goose *Anser anser* [A043]; • Light-bellied Brent Goose *Branta bernicla hrota* [A046]; • Wigeon *Anas penelope* [A050]; • Teal *Anas crecca* [A052]; • Black-headed Gull *Chroicocephalus ridibundus* [A179]; • Herring Gull *Larus argentatus* [A184]; and, • Little Tern *Sterna albifrons* [A195].

Site Name	Distance	Designation – QIs or SCIs
		S.I. No. 298/2011 – European Communities (Conservation of Wild Birds (The Murrough Special Protection Area 004186)) Regulations 2011 Source: Conservation Objectives: The Murrough SPA 004186. Generic Version 9.0. Department of Housing, Local Government and Heritage (NPWS, 2022e) and Natura 2000 – Standard Data Form (NPWS 2020l)

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

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

In addition to NHAs, pNHAs are sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. pNHAs are offered protection in the interim period under the county or city development plans which requires that planning authorities give due regard to their protection in planning policies and decisions. The Proposed Scheme lies within the administrative boundaries of South Dublin County Development Plan 2022-2028 (SDCC 2022) and Dublin City County Development Plan 2016-2022 (DCC 2016).

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

The Liffey Valley pNHA is the closest pNHA to the Proposed Scheme and is slightly overlapped by the Proposed Scheme along the Chapelizod Bypass (north of Palmerstown Drive). The Grand Canal pNHA is the next nearest pNHA to the Proposed Scheme. It is located approximately 735m south of the Proposed Scheme. The Grand Canal pNHA is hydrologically separate from the Proposed Scheme as well as the Royal Canal pNHA, which is located approximately 2.2km north of the Proposed Scheme. Liffey Valley pNHA lies within the administrative boundaries of the South Dublin County Development Plan 2022-2028, 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, Booterstown Marsh pNHA, Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, and South Dublin Bay pNHA. These sites will be hydrologically connected to the Proposed Scheme via the Grand Canal, River Annfield, River Camac and River Liffey. These pNHAs lie within the administrative boundaries of the South Dublin County Development Plan 2022-2028, Dublin City County Development Plan 2016-2022 and / or Fingal County Development Plan 2017-2023 (FCC 2017).

There is one NHA and ten 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, South Dublin Bay pNHA, Booterstown Marsh pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA, Lambay Island pNHA, and Skerries Islands NHA.

There is one NHA and 27 pNHAs located in the wider area of the Proposed Scheme. These are listed in Table 12.6 and illustrated in Figure 12.4 in Volume 3 of this EIAR. Table 12.6 lists these sites, their distance from the Proposed Scheme, and the ecological features for which the sites are designated/proposed. Nineteen of these are located within the ZoI of the Proposed Scheme (see Table 12.6).

These pNHAs are valued as being of National Importance.

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

Site Name	Distance	Description
NHAs		
Skerries Island NHA [001218]	Approximately 28.1km north-east of the Proposed Scheme	See Table 12.5 under Skerries Island SPA

Site Name	Distance	Description
pNHAs		
Booterstown Marsh pNHA [001205]	Approximately 7.1km south-east of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
Grand Canal pNHA [002104]	Approximately 735 south of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
South Dublin Bay pNHA [000210]	Approximately 5.3km 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 2.2km north of the Proposed Scheme	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
North Dublin Bay pNHA [000206]	Approximately 4km east of the Proposed Scheme	See Table 12.5 under North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA
Dolphins, Dublin Docks pNHA [000201]	Approximately 6.2km east of the Proposed Scheme	See Table 12.5 under South Dublin Bay and River Tolka Estuary SPA
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	Approximately 12.3km south-east of the Proposed Scheme	Good example of a coastal system with habitats ranging from sub-littoral to coastal heath. Flora is well developed and includes some scare species. The islands are important bird sites. See also Table 12.5 under Rockabill to Dalkey Island SAC and Dalkey Islands SPA
Liffey Valley pNHA [000128]	Lies immediately adjacent to the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, rare Red List plant species green figwort *Scrophularia umbrosa* and yellow archangel *Lamiastrum galeobdolon* and the diversity of habitat present.
Fitzsimon's Wood pNHA [001753]	Approximately 9.3km south-east of the Proposed Scheme	Birch woodland, which is very rare in County Dublin.
Dingle Glen pNHA [001207]	Approximately 13.7km south-east of the Proposed Scheme	Variety of habitat present, including woodland
Santry Demesne pNHA [000178]	Approximately 6.4km north-east of the Proposed Scheme	Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, and woodland
Dodder Valley pNHA [000991]	Approximately 6km south of the Proposed Scheme	The last remaining stretch of natural riverbank vegetation on the River Dodder in the built-up Greater Dublin Area (GDA).
Ballybetagh Bog pNHA [001202]	Approximately 14.6km south-east of the Proposed Scheme	Marshland
Howth Head pNHA [000202]	Approximately 12.9km north-east of the Proposed Scheme	See Table 12.5under Howth Head SAC and Howth Head Coast SPA
Baldoyle Bay pNHA [000199]	Approximately 11.9km north-east of the Proposed Scheme	See Table 12.5 under Baldoyle Bay SAC and Baldoyle Bay SPA
Feltrim Hill pNHA [001208]	Approximately 11.7km north-east of the Proposed Scheme	Good example of knoll-reef phenomenon. Previously known to contain two rare plant species, namely spring squill *Scilla verna* and long-stalked crane's-bill *Geranium columbinum*
Sluice River Marsh pNHA [001763]	Approximately 12.5km north-east of the Proposed Scheme	Freshwater marsh
Glenasmole Valley pNHA [001209]	Approximately 9.7km south of the Proposed Scheme	See Table 12.5 under Glenasmole Valley SAC
Ireland's Eye pNHA [000203]	Approximately 15.9km east of the Proposed Scheme	See Table 12.5 under Ireland's Eye SAC and Ireland's Eye SPA
Malahide Estuary pNHA [000205]	Approximately 14.1km north-east of the Proposed Scheme	See Table 12.5 under Malahide Estuary SAC and Malahide Estuary SPA
Lugmore Glen pNHA [001212]	Approximately 9.2km south of the Proposed Scheme	Presence of the rare Red Data Book species Yellow Archangel (*Lamiastrum galeobdolon*).
Rye Water Valley/Carton pNHA [001398]	Approximately 4.2km 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

Site Name	Distance	Description
		Whorl Snail *Vertigo angustior* and Desmoulin's Whorl Snail *V. moulinsiana*.
Portraine Shore pNHA [001215]	Approximately 18.6km north-east of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Rogerstown Estuary pNHA [000208]	Approximately 18.4km north-east of the Proposed Scheme	See Table 12.5 under Rogerstown Estuary SAC and Rogerstown Estuary SPA
Lambay Island pNHA [000204]	Approximately 23.1km north-east of the Proposed Scheme	See Table 12.5 under Lambay Island SAC and Lambay Island SPA
The Murrough pNHA [000730]	Approximately 31.5km south-east of the Proposed Scheme	See Table 12.5 under The Murrough Wetlands SAC and The Murrough SPA

12.3.4.3 Other Designated Sites

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

12.3.4.3.1 RAMSAR Sites

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

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

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

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

12.3.4.3.2 UNESCO Dublin Bay Biosphere

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

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

12.3.4.3.3 Special Amenity Area Order (SAAO)

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

Three such special amenity area orders have been recognised in Ireland, all of them in the Greater Dublin Area, and can cross local authority administrative boundaries. They include:

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

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

- Tilled lands (BC3);
- Flower beds and borders (BC4);
- Buildings and artificial surfaces (BL3);
- Tidal rivers (CW2);
- Spoil and bare ground (ED2);
- Recolonising bare ground (ED3);
- Depositing/ lowland rivers (FW2);
- Improved agricultural grasslands (GA1);
- Amenity Grassland (Improved) (GA2);
- Dry meadows and grassy verges (GS2);
- Residential;
- (Mixed) broadleaved woodland (WD1);
- Mixed broadleaf/conifer woodland (WD2);
- Scattered trees and parkland (WD5);
- Hedgerows (WL1);
- Treelines (WL2);
- Scrub (WS1);
- Immature woodland (WS2); and
- Ornamental/ non-native shrub (WS3).

The habitat type tidal rivers (CW2) corresponds with the Annex I habitat Estuaries [1130] and is present in the Liffey Estuary Upper, located adjacent to Heuston Station.

12.3.5.2 Tilled lands (BC3)

This habitat type refers to tilled land that is prepared for planting but where the type of crop or the future use of the land cannot be determined. It was recorded at one location, north of the Proposed Scheme, at R835 Lucan Road and the N4 Junction 3.

This habitat type is of Local Importance (Lower Value) due to its managed nature and largely monocultural planting.

12.3.5.3 Flower beds and borders (BC4)

This habitat includes ornamental planting associated with commercial developments or industrial complexes, as well as landscape planting at roundabouts and roadside verges in suburban areas. This habitat type was identified at two locations across the Proposed Scheme, along the boundary of the Lucan Retail Park adjacent to the R835 Lucan Road and along the boundary of the Foxhunter Bar at the N4 Junction 3. This habitat comprised of two planted beds which included some ornamental shrubs namely; dogwood species *Cornus* spp.

This habitat type was also found in mosaics with the following habitat types; buildings and artificial surfaces (BL3), amenity grassland (GA2) and recolonising bare ground (ED3).

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

12.3.5.4 Buildings and artificial surfaces (BL3)

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

This habitat type was also found in mosaics with the following habitat types; flower beds and borders (BC4), amenity grassland (GA2), dry meadows and grassy verges (GS2), recolonising bare ground (ED3), hedgerows (WL1), treelines (WL2) and scrub (WS1).

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

12.3.5.5 Tidal rivers (CW2)

This habitat type consisted entirely of the Liffey Estuary Upper, located to the north of the Frank Sherwin Bridge. This section of the river is approximately 50m wide and has an average depth of approximately 2-5m with high retaining quay walls either side of the channel. The Liffey Estuary Upper is a transitional waterbody and is within the Liffey Nutrient Sensitive Area. It is fed by a number of watercourses including the Camac_040, Liffey_190 and Poddle_010 and flows into the Liffey Estuary Lower before reaching Dublin Bay.

The Liffey Estuary Upper has a 'Good' status for the period 2013-2018 and is not deemed at risk of failing to meet its requirements under Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (hereafter referred to as the Water Framework Directive or WFD), however it is classified as 'At Risk' of not achieving the WFD objective of Good Status by 2027, which means a deterioration in status is anticipated. The main risk is urban wastewater from Storm Water Overflows (SWOs)at Ringsend. The key impacts are considered to be nutrient pollution and alterations to habitats due to morphological changes. In terms of assigning sensitivity, the Good Status of the Liffey Estuary Upper means that it would be of High sensitivity. Its direct connection to Dublin Bay SAC is also considered and this raises the sensitivity to Very High.

The Liffey Estuary Lower is classified as *'*Good*'* status for the period 2013 to 2018 and is not deemed 'At Risk' of failing to meet its requirements under the Water Framework Directive.

The Liffey Estuary Lower corresponds to the Annex I habitat Estuaries [1130] and its location overlaps with the current favourable reference range and distribution of this Annex I habitat (NPWS 2019b). The current trend for

this habitat at a national scale is assessed as being 'stable', with both its range and area in a 'favourable' condition. Future prospects for the habitat are deemed as 'inadequate' based on its 'poor' structure and functions. Therefore, its overall conservation status is deemed as 'inadequate' (NPWS 2019b).

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

12.3.5.6 Spoil and bare ground (ED2)

This habitat type, which is often ephemeral in nature, was noted along the Old Lucan Road at the N4 Junction 2, and in small areas of bare ground adjacent to the Irish National War Memorial Park, often associated with access or gravel driveways.

Areas of bare ground, which have recently been sown with grass but are not yet adequately vegetated were also classified as being spoil and bare ground habitat. Plant species recorded within this habitat include common poppy *Papaver rhoeas*, broad-leaf dock *Rumex obtusifolius* and rosebay willow-herb *Chamaenerion angustifolium*. This habitat type was also found in mosaics with the following habitats; recolonising bare ground (ED3) and scrub (WS1).

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

12.3.5.7 Recolonising bare ground (ED3)

This habitat type, which is ephemeral in nature/distribution as vegetation cover matures, was assigned to areas of disturbed ground and/or artificial surfaces, which have been recolonised by plants, and vegetation cover is now greater than 50%. This habitat type was identified in eight locations including undeveloped and abandoned land adjacent to Old Lucan Road at the N4 Junction 2 and at Old Lucan Road, Palmerstown.

Most of the vegetation recorded in these areas were ruderal species typical of this habitat type. Common species recorded included Butterfly bush, rosebay willow-herb, broad-leaved dock and common ragwort *Jacobaea vulgaris.* This habitat type also occurred in mosaics with the following habitat types; flower beds and boarders (BC4), buildings and artificial surfaces (BL3), spoil and bare ground (ED2) and scrub (WS1).

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

12.3.5.8 Depositing/lowland rivers (FW2)

This habitat type refers to the River Annfield (Liffey_180), the River Liffey and the River Camac. This habitat type is present at a number of locations across the Proposed Scheme as discussed below.

The River Annfield lies perpendicular to the Proposed Scheme at Lucan Road, close to N4 Junction 3 (illustrated in Figure 12.2 in Volume 3 of this EIAR). The River Annfield is culverted under the N4 Junction 3. The River Annfield is within the Liffey_180 river catchment, whose status is 'Moderate' for the period of 2013-2018 and is deemed to be 'At Risk' of failing to meet its requirements under the Water Framework Directive (i.e. 'Good .Status' by 2027).

The Proposed Scheme crosses the River Camac at St John's Road West adjacent to Heuston station (illustrated in Figure 12.2 in Volume 3 of this EIAR). The River Camac is a tributary of the River Liffey. The River Camac rises in the west of Dublin City and flows through Saggart, Clondalkin, Inchicore and Kilmainham before entering the Liffey Estuary Upper from a discharge point under Heuston Station. Much of its course is dominated by concrete channels and significant culverting, including the section of the Camac_040 which travels under Heuston Station. The River Camac is considered to be a heavily industrialised urban river with similarly associated land use within its catchment. The EPA segment of the River Camac within the study area is Camac_040. This section is 13.57km and includes the primary segment of the River Camac from Clondalkin to where it joins the River Liffey at Heuston Station. The Camac_040 also includes a number of significant and minor tributaries including Ballymount Stream, Robinhood Stream, Walkinstown Stream and Drimnagh Castle or Walkinstown Stream. The Camac_040 section has 'Poor' WFD Status and is 'At Risk' of not achieving 'Good Status' by 2027. The most

recent Biological Q Value assessment of the River Camac was in 2019. Four stations were monitored along the length of the watercourse, Q3 being the lowest assigned Q Value.

The Proposed Scheme is adjacent to the River Liffey at Chapelizod Bypass and Palmerstown (illustrated in Figure 12.2 in Volume 3 of this EIAR). The EPA segments of the River Liffey which are contained within the study area are the Liffey_180 and Liffey_190. The Liffey_180 segment is 24.65km and consists of the main channel of the River Liffey from Lucan and Chapelizod, the River Rusk tributary (from Dunboyne to Lucan) and a number of other minor tributaries (River Hermitage, River Annfield, River Quarryvale, River Astagob, an unnamed River at Carpenterstown, Longmeadow Stream and Glenaulin Stream). The Liffey_190 segment is approximately 3.15km in length and extends between Chapelizod and Islandbridge, consisting of the small section of the main channel of the River Liffey and tributaries, Magazine Stream and the Creosote Stream. Both segments within this catchment are considered to be primarily urban. The Liffey_180 and Liffey_190 run almost parallel to the Proposed Scheme, within the 500m study area and flows the whole length of the Proposed Scheme, including the point at which it enters the Liffey Estuary Upper. There are no proposed route crossings of the Liffey_180 or Liffey_190 segments. The WFD status of the Liffey_180 for the period 2013-2018 is 'Unassigned' and is 'At Risk' of not achieving Good Status by 2027. Significant pressures have been identified including urban wastewater from storm water overflows (SWOs) and urban runoff from diffuse sources causing nutrient and organic pollution. The Liffey_190 has a 'Moderate' WFD Status and is also 'At Risk' of not achieving Good Status by 2027. A range of significant pressures in relation to industry have been identified, in addition to waste, urban wastewater from SWOs and urban runoff from diffuse sources. The most recent Biological Q Value assessment of the River Liffey was in 2019. Sixteen stations were monitored along the length of the watercourse, the lowest Q Value along the River Liffey was Q3.

Riparian vegetation identified along the River Liffey banks included ash *Fraxinus excelsior*, grey willow, goat willow *Salix caprea*, alder *Alnus glutinosa*, pendulous birch *Betula pendula*, downy birch *Betula pubescens*, sycamore *Acer pseudaplatanus*, as well as understorey shrubs and forbs: ivy *Hedera hibernica*, common nettle *Urtica dioica*, foxglove *Digitalis purpurea*, marsh-bedstraw *Galium palustre*, pirri-pirri bur *Acaena novae-zelandiae*, Creeping bent-grass *Agrostis stolonifera*, yellow iris *Iris pseudacorus* and thistle species *Cirsium* sp.

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

12.3.5.9 Improved agricultural grassland (GA1)

Improved agricultural grassland was present at one area (approximately 0.12ha) located along the Old Lucan Road and was grazed by livestock (illustrated in Figure 12.5 in Volume 3 of this EIAR). Grass species present included perennial rye-grass *Lolium perenne*, which dominates the habitat, while forb species present included ribwort plantain *Plantago lanceolata* and white clover *Trifolium repens*, which often increased in extent as the sward ages.

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

12.3.5.10 Amenity grassland (Improved) (GA2)

Amenity grassland was commonly recorded habitat across the Proposed Scheme. It is present in small areas located across the entirety of the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat included Con Colbert Road (approximately1.9ha in total area) associated with a playing pitch, residential landscaping at Kennelsfort Road Lower (approximately 0.3ha in total area) and Glenpark Drive (approximately 0.5ha in total area). Smaller discrete patches were occasional along roadside verges, central medians and property entrances (e.g. entrance to Hermitage Golf Club).

Amenity grassland was dominated by perennial ryegrass with red fescue *Festuca rubra* and Yorkshire-fog *Holcus lanatus*, also recorded. Forb species were recorded interspersed and included silverweed *Argentina anserina*, greater plantain *Plantago major*, creeping buttercup *Ranunculus repens*, curled dock *Rumex crispus*, broad-leaved dock, common dandelion *Taraxacum officinale* agg., birdsfoot trefoil *Lotus corniculatus* as well as low growing shrubs namely: bramble *Rubus fruticosus* agg. or cotoneaster *Cotoneaster* sp.

This habitat type often occurred in mosaics with buildings and artificial surfaces (BL3), flower beds and borders (BC4), ornamental/ non-native shrub (WS3), hedgerows (WL1), treelines (WL2), dry meadows and grassy verges (GS2) and mixed broadleaved woodland (WD1).

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

12.3.5.11 Dry meadows and grassy verges (GS2)

This habitat type is comprised of unmanaged freely draining grassland areas including areas of parkland which are less intensively managed and can include some roadside verges. This habitat type was recorded at a number of areas of varying sizes located across the Proposed Scheme. Prominent areas of this habitat were identified at the N4 / M50 Interchange, and various sites at the N4 Junction 2 (illustrated in Figure 12.5 in Volume 3 of this EIAR).

Grass species present included red fescue, Yorkshire-fog, perennial ryegrass, while forb species present included silverweed, butterfly bush, greater plantain, creeping buttercup, curled dock, broad-leaved dock, common dandelion, bird's-foot trefoil, and common thistle *Cirsium vulgare*. Low growing shrubs namely: bramble *Rubus fruticosus* agg. or cotoneaster *Cotoneaster* sp. were occasionally recorded. Given the low species diversity present in this habitat type, areas of dry meadows and grassy verges (GS2) habitat recorded in the vicinity of the Proposed Scheme were not deemed to align with the Annex I habitat Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510].

This habitat type also occurred in mosaics with other habitat types: buildings and artificial surfaces (BL3), amenity grassland (GA2), treelines (WL2), scrub (WS1), Immature woodland (WS) and ornamental/ non-native shrub (WS3).

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

12.3.5.12 Residential

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

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

12.3.5.13 (Mixed) broadleaved woodland (WD1)

Areas of mixed broadleaved woodland included the following locations along the Proposed Scheme; the boundary of agricultural fields to the north of the R835, the entrance to Hermitage Golf Club to the north of the Lucan Road/ N4, sliproads off Junction 2 of the Lucan Road/ N4, along the Chapelizod Bypass, the Irish National War Memorial Park, to the south of Gaelscoil Inse Chór and St. John of God Special School.

Extensive areas of mixed broadleaved woodland were primarily recorded along the Chapelizod Bypass. Tree species recorded at these locations included sycamore, ash, horse chestnut *Aesculus hippocastanum*, beech *Fagus sylvatica*, hawthorn *Crataegus monogyna*, lime species *Tilia* sp., oak species *Quercus* sp., and birch species. Where coniferous tree species occurred, they were in low abundances compared to deciduous tree species and typically included Scot's pine *Pinus sylvestris*, larch species *Larix* sp*.,* and cypress trees *Cupressus* sp. Ornamental species were occasionally present. Holly *Ilex aquifolium*, butterfly-bush, elder *Sambucus nigra*, bramble, hazel *Corylus avellana* and rowan *Sorbus aucuparia* were recorded in the understorey and occurred occasionally. Where present, understorey and ground flora species included ivy, cleavers *Galium aparine*, bittersweet *Solanum dulcamara*, wood avens *Geum urbanum*, yarrow *Achillea millefolium*, false oat-grass *Arrhenatherum elatius*, tutsan *Hypericum androsaemum*, bush vetch *Vicia sepium*, barren brome *Bromus sterilis*, alexanders *Smyrnium olustrum*, pendulous sedge *Carex pendula* and common nettle *Urtica dioica*.

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

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

12.3.5.14 Mixed broadleaved/conifer woodland (WD2)

Two areas of mixed broadleaved/conifer woodland were recorded along the Proposed Scheme. This habitat type occurred at a 500m stretch adjacent to the Chapelizod Bypass, east of Palmerstown, and at Bully's acre, Royal Kilmainham Hospital.

Typical tree species that were recorded included Scot's Pine *Pinus sylvestris*, Cypress trees *Cupressus* sp., sycamore *Acer pseudoplatanus*, horse chestnut *Aesculus hippocastanum*, beech *Fagus sylvatica*, oak species *Quercus* sp. The ground layer flora was often limited to a small number of commonly occurring species such as cleavers *Galium aparine*, yarrow *Achillea millefolium*, annual meadow-grass *Poa annua,* false oat-grass, perennial rye-grass *Lolium perenne* and common nettle *Urtica dioica*, although the range of other species discretely recorded across this habitat increased the floristic diversity.

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

12.3.5.15 Scattered trees and parkland (WD5)

This habitat classification describes areas of scattered trees, standing alone or in small clusters, which are a prominent structural or visual feature of the habitat. This habitat type was identified at approximately 13 locations across the Proposed Scheme, most of which were associated with parks and peripheral areas of some playing pitches (e.g. Liffey Gaels GAA pitches) (illustrated in Figure 12.5 in Volume 3 of this EIAR). Lands present at Hermitage Golf Club were also categorized under this habitat type, owing to the fact that lands here comprised amenity grassland alongside clusters of trees.

The most significant areas of this habitat type were present at Royal Hospital Kilmainham and at the Irish National War Memorial Gardens. Tree species identified at these locations include Norway maple *Acer platanoides*, sycamore, horse chestnut, alder, sweet chestnut *Castanea sativa*, cypress species, beech, ash, Scot's pine and other unidentified pines *Pinus sp*., London plane *Platanus* × *acerifolia,* poplars *Populus* sp*.,* cherry *Prunus japonica*, oak species, willow species *Salix* sp., elder, whitebeam *Sorbus aria*, rowan, and small-leaved lime *Tilia cordata*. The understory was commonly comprised of cleavers, yarrow, and common nettle. Grasses present included annual meadow-grass, false oat-grass and perennial rye-grass*.*

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

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

12.3.5.16 Hedgerows (WL1)

Hedgerows were present at several areas within the footprint Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). These consisted of linear strips of shrubby vegetation, often containing trees, which frequently demarcated property/field boundaries. Most of the hedgerows which were recorded along the Proposed Scheme consisted of screening vegetation at residential properties, along roadsides and within the vegetated median of larger roads. Substantial areas of this habitat are present along Chapelizod Bypass, Con Colbert Roadat Irish National War Memorial Gardens, along the boundary of the Lucan Retail Park and adjacent to Lucan Road and the N4.

The species composition varied greatly within this habitat type. Shrub species often consisted of ash and hawthorn with cherry Laurel *Prunus laurocerasus* and butterfly bush locally common. Occasionally, semi-mature and mature oaks *Quercus* sp. Were noted in the hedgerows. Ground flora and forb species typically reflected adjacent habitat assemblages, although one species of note was strawberry species *Fragaria vesca*.

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

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

12.3.5.17 Treelines (WL2)

This habitat is comprised of narrow rows or single lines of trees, which are greater than 5m in height. This habitat type was occasionally recorded across the study area of the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). In the context of the Proposed Scheme, treeline habitat is typically urban street planting along footpaths/ strips of amenity grassland and road edges. Substantial areas of this habitat are present along the Chapelizod Bypass, sites adjacent to the N4 and residential areas along the Proposed Scheme. Urban street planting, consisting of young to mature trees planted, often spaced at regular intervals along footpaths/ strips of amenity grassland and road edges, were classified as this habitat type.

Tree species frequently recorded in urban treelines (i.e., street planting) included lime, London plane, sycamore, rowan, hornbeam, beech and silver birch. Additional tree species, recorded in more substantial treelines, included horse chestnut, ash, cypress species, alder, sessile oak, hazel, aspen *Populus tremula*, cypress *Cupressus x leylandii* and Scot's pine.

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

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

12.3.5.18 Scrub (WS1)

Scrub was identified at various locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat were located along the railway adjacent to the Proposed Scheme at Heuston Station, along the road medians of the Chapelizod Bypass, and adjacent to theN4 Junction 1 at Liffey Valley Shopping Centre and M50 Junction 7.
Species recorded consisted of hawthorn, ash, sycamore, hazel, butterfly bush and gorse *Ulex europaeus*. Ground flora species included common thistle, hoary willowherb *Epilobium parviflorum*, bramble, raspberry *Rubus ideaus*, strawberry species, curled dock, rosebay willow-herb and common nettle.

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

This habitat type is of Local Importance (Lower Value) due to single shrub species dominance and the relative lack of overall floristic diversity.

12.3.5.19 Immature woodland (WS2)

Immature woodland was identified at a number of locations across the Proposed Scheme (illustrated in Figure 12.5 in Volume 3 of this EIAR). The largest areas of this habitat were located along a section of the main intercity railway line adjacent to the Proposed Scheme along Con Colbert Road at Kilmainham / Islandbridge. Species recorded consisted of silver birch, ash, cypress species, alder, hazel, and Scot's Pine.

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

This habitat type is of Local Importance (Lower Value), by virtue of its often monocultural planting and paucity of ground flora.

12.3.5.20 Ornamental/ non-native shrub (WS3)

Areas of ornamental / non-native shrub were generally associated with amenity and landscape planting at commercial properties. Substantial areas of this habitat type bordered areas of buildings and artificial surfaces (BL3) habitat at Fonthill Road and adjacent to residential dwellings at Old Lucan Road. Species identified include butterfly bush and dogwood species.

This habitat type was recorded in mosaics with the following other habitat types; buildings and artificial surfaces (BL3), amenity grassland (GA2), dry meadows grassy verges (GS2), and treelines (WL2).

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

12.3.6 Rare and Protected Plant Species

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

The desk study returned records of a total of four species listed on the Flora (Protection) Order across the wider study area (i.e., Grid Squares O03 and O13) and are listed in Appendix 12.1 in Volume 4 of this EIAR. Records of Flora (Protection) Order species included multiple records of opposite-laved pondweed *Groenlandia densa* in the Grand Canal (Grid O13G), as well as one record of hairy violet *Viola hirta* (Grid O1034), one record of betony *Betonica officinalis* (Grid O1034) and one record of meadow barley *Hordeum secalinum* (Grid O104362), all recorded at Phoenix Park, within 1km of the Proposed Scheme (NBDC Online Database 2022). Betony and opposite-leaved pondweed are both listed as 'Near threatened' on Irelands Red List No. 10: Vascular Plants 2016 (Wyse Jackson *et al.,*2016), while meadow barley and hairy violet are listed as 'Vulnerable' in the same document. These species were not recorded within the ZoI.

One species listed as 'Vulnerable' within Ireland Red List No. 10: Vascular Plants (Wyse Jackson *et al.,* 2016) was returned from the desk study within 1km of the Proposed Scheme. Records of yellow archangel *Lamiastrum galeobdolon* subsp*. Montanum* were recorded at the Irish National War Memorial Park adjacent to the north of the Proposed Scheme in 2020. This species was recorded within habitats hydrologically connected to, but outside of the immediate footprint of the Proposed Scheme.

One species listed as "Critically endangered" within Ireland Red List No. 8: Bryophytes (Lockhart *et al. ,*2012) was returned from the desk study within 1km of the Proposed Scheme. Historical records of lance-leaved pottia moss *Tortula lanceola* were recorded at Leixlip within 1km north of the Proposed Scheme. Two other species for which little geographical distribution context is provided include: Tall aloe-moss *Aloina ambigua* was recorded at Grid Square O13, as well as two records of twisting thread-moss *Bryum torquescens* at Grid Square O03.

Results returned from an NPWS Online data search for rare / protected species included four records of the 'Endangered' green figwort *Scrophularia umbrosa* along the River Liffey at Lucan. By virtue of habitat requirements, this species is outside the footprint 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; Japanese knotweed *Reynoutria japonica*. The locations of this non-native invasive plant species is summarised below in Table 12.7 and shown on Figure 12.6 in Volume 3 of the EIAR.

The desk study returned records of a total of 19 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations across the wider study area (i.e., Grid Squares O03 and O13) and are listed in Appendix A12.1 in Volume 4 of this EIAR. There were 12 listed species recorded within 1km of the

Proposed Scheme (NBDC 2020); including water fern *Azolla filiculoides,* curly waterweed and Nuttall's waterweed *Elodea nuttallii* which were recorded at various sites along the River Liffey and Grand Canal. There are also records of Himalayan balsam *Impatiens glandulifera* and Japanese knotweed *Reynoutria japonica* along the River Liffey, River Camac and the Grand Canal while giant knotweed *Reynoutria sachalinensis* was recorded at Waterstown park and giant-rhubarb *Gunnera tinctoria* at the National War Memorial Park. Several records of bohemian knotweed *Reynoutria japonica x sachalinensis = R. x bohemica*, Brazilian giant-rhubarb *Gunnera manicata,* three-cornered garlic *Allium triquetrum,* parrot's-feather *Myriophyllum aquaticum,* curly waterweed *Lagarosiphon major* and rhododendron *Rhododendron ponticum* were recorded at several locations in close proximity to the Proposed Scheme but were not present within the footprint of the Proposed Scheme (NBDC 2020). Canadian waterweed *Elodea canadensis*, which was also documented from along the River Liffey and Grand Canal, was delisted as a third schedule species, with the introduction of the European Communities (Birds and Natural Habitats) (Amendment) Regulations 2015, S.I. No. 355/2015.

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
CBC0006IAPS001	Japanese knotweed *Reynoutria japonica*	2m stand in an inaccessible wood adjacent to St. Laurence's Road.
CBC0006IAPS002	Japanese knotweed *Reynoutria japonica*	3m stand in wooded area at residential compound adjacent to St. Laurence's Road.
CBC0006IAPS003	Japanese knotweed *Reynoutria japonica*	
CBC0006IAPS004	Japanese knotweed *Reynoutria japonica*	
CBC0006IAPS005	Japanese knotweed Reynoutria japonica	Stand observed in a private property opposite Liffey Gaels GAA Club, Kilmainham adjacent to Sarsfields Road R833.

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, with surveys at the Hermitage Golf Club carried out in 2022 (as described in Section 12.2.3.5). Between 2018 and 2020, two transects were surveyed within the footprint of the Proposed Scheme: Chapelizod Bypass from Palmerstown to Chapelizod, referred to as CBC0006BT001, and Con Colbert Road at Islandbridge, referred to as CBC0006BT002. One additional transect was surveyed in August 2021 - the southern boundary of Hermitage Golf Club, as surveyed from the N4, referred to as CBC0006BT003. Three additional transects, within the grounds of Hermitage Golf Club, were surveyed in June 2022; the fairway of the 16th hole, referred to as CBC0006BT004, the fairways of the 15th and 17th holes in the south-western portion of the Golf Club, referred to as CBC0006BT005, and the Golf Club's western boundary, referred to as CBC0006BT006. An additional bat survey at The Hermitage Golf Club was scheduled in August 2022, however permission was not granted to undertake this survey. As mentioned in Section 12.2.3.5.1, considering the data collected in June 2022 (within the optimal survey period for bats), the previous data collected in 2021 and overall habitat suitability of the Golf Club to support populations of bats, the absence of a second survey later in the 2022 season is not considered a significant limitation for the purposes of this assessment. The results of the bat surveys undertaken are described below in Sections 12.3.8.1.1 to Section 12.3.8.1.6 and are also presented in Figure 12.7.1.in Volume 3 of this EIAR. The structure of this Section is such that each bat species is described in turn. The results of the various surveys are presented to allow an understanding of each species in terms of its distribution across the Proposed Scheme.

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

12.3.8.1.1 Leisler's bat *Nyctalus leisleri*

Leisler's bat was recorded on both of the transects surveyed between 2019 and 2020 (there being no records from the 2018 survey); CBC0006BT001 and CBC0006BT002. A total of thirteen bat passes, attributed to Leisler's bat, were recorded in these locations between 2018 and 2020. Leisler's bat activity was highest at CBC0006BT001 (adjacent to Palmerstown Drive). Twelve bat passes, attributed to this species, occurred here; eleven bat passes in the summer survey of 2020 and one in autumn of 2019.

Leisler's bat was also recorded on the transect surveyed in August 2021 along the southern boundary of The Hermitage Golf Club (CBC0006BT003). A total of 44 bat passes was attributed to this species along this transect. The majority of these bat passes (39) were recorded on the 25th of August, while a single bat pass attributed to this species was recorded here on 30th August.

Four recordings, attributed to Leisler's bat, were also made during the survey of The Hermitage Golf Club lands in June 2022, along the lower portion of the access road, contained within transect CBC0006BT005. 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 four records of live sightings within 1km of the Proposed Scheme, including records at the following locations: Phoenix Park and M50/ N4 Interchange (NBDC Online Database 2022).

12.3.8.1.2 Common pipistrelle bat *Pipistrellus pipistrellis*

Common pipistrelle bat activity was recorded in one of two transects surveyed between 2018 and 2020; CBC0006BT001. A total of sixteen bat passes attributed to common pipistrelle bat were recorded near Palmerston Drive on 13th July 2020. In addition, four bat passes, attributed to this species, were recorded here during autumn surveys carried out on 7th October 2019.

Common pipistrelle bat activity was also recorded along transect CBC0006BT003 in August 2021. A total of 17 bat passes attributed to this species were recorded here. Seven of these bat passes were recorded on the 30th August with the remaining ten passes being recorded on the 25th August.

Six recordings of common pipistrelle bat activity were also made during the survey of The Hermitage Golf Club lands in June 2022. Two of these recordings occurred along the fairway of the 16th hole (CBC0006BT004), while the remaining four recordings occurred on lands between the remaining two transects (e.g. CBC0006BT005 and CBC0006BT006). The results of the bat surveys as they relate to 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 four records of live sightings within 1km of the Proposed Scheme, including records in the following locations; Heuston station, Palmerstown; and, M50 / N4 Interchange (NBDC Online Database 2022).

12.3.8.1.3 Nathusius' pipistrelle bat *Pipistrellus nathusii*

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

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

The desk study found that Nathusius' pipistrelle bat are not known to occur within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details) (NBDC Online Database 2022).

12.3.8.1.4 Soprano pipistrelle bat *Pipistrellus pygmaeus*

Soprano pipistrelle bat was recorded at one of two transects surveyed between 2018 and 2020; CBC0006BT001. A total of two bat passes attributed to soprano pipistrelle bat were recorded on 13th July 2020, adjacent to Palmerstown Drive. No other recordings of this species were made over the course of the surveys undertaken.

Seven bat passes attributed to soprano pipistrelle bat were recorded at transect CBC0006BT003 in August 2021. Six of these were recorded on 25th August with only a single bat pass, attributed to this species, being recorded on 30th August.

Three recordings attributed to soprano pipistrelle bat were also made during the survey of The Hermitage Golf Club lands in June 2022. These recordings were made in within a copse of small trees between the fairways of the 16th and 17th holes. 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 five records of live sightings within 1km of the Proposed Scheme, including records at the following locations; Palmerstown, M50 / N4 Interchange, and the River Liffey adjacent to the M50 bridge (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 in Phoenix Park in 2007 (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 2020. A single bat pass, attributed to a *Myotis* species, was recorded along transect CBC0006BT003 on the 25th August 2021.

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

The desk study found that *Myotis* bat species, including Daubenton's bat *Myotisdaubentonii,* Natterer's bat *M. nattereri,* and Whiskered bat *M. mystacinus* 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 the following locations; Castleknock golf course; Waterstown Park; Irish National War Memorial Gardens; and the Grand Canal (NBDC Online Database 2022).

There are also records of Natterer's bat and Whiskered bat at one site in the Phoenix Park (Grid O098358) (NBDC 2022).

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

Two of the trees containing PRFs are inside the temporary landtake boundary for the Proposed Scheme but are being retained, as indicated on the General Arrangement Landscaping Drawing (BCIDA-ACM-UBR_ZZ-0006_XX_00-DR-LL-9001) for the Proposed Scheme. Five additional trees, containing PRFs, were identified within the boundary of Hermitage Golf Club and may be removed as part of the proposed works in this area.

Table 12.8: Summary of Potential Roost Features (PRFs) recorded

Reference	Species	Description
CBC0006PRF001	Beech *Fagus sylvatica*	Dense Ivy
CBC0006PRF002	Beech *Fagus sylvatica*	Dense Ivy
CBC0006PRF003	Group PRF: Horse chestnut *Aesculus hippocastanum* Lime species *Tilia* sp.	Suitable size to contain PRFs
CBC0006PRF004	Group PRF: Horse chestnut *Aesculus hippocastanum* Lime species *Tilia* sp.	Suitable size to contain PRFs
CBC0006PRF005	Group PRF: Horse chestnut *Aesculus hippocastanum* Lime species *Tilia* sp.	Suitable size to contain PRFs
CBC0006PRF006	Group PRF: Sycamore *Acer pseudoplantus*	Suitable size to contain PRFs, dense ivy
CBC0006PRF007	Group PRF: Sycamore *Acer pseudoplantus*	Suitable size to contain PRFs, dense ivy
CBC0006PRF008	Group PRF: Sycamore *Acer pseudoplantus* Horse chestnut *Aesculus hippocastanum* Scots pine *Pinus sylvestris* Beech *Fagus sylvatica*	Suitable size to contain PRFs
CBC0006PRF009	Group PRF: Sycamore *Acer pseudoplantus* Horse chestnut *Aesculus hippocastanum*, Scots pine *Pinus sylvestris* Beech *Fagus sylvatica*	Suitable size to contain PRFs
CBC0006PRF010	Horse chestnut *Aesculus hippocastanum*	Suitable size to contain PRFs
CBC0006PRF011	Group PRF: Beech *Fagus sylvatica*, Horse chestnut *Aesculus hippocastanum*	Several mature trees within WD2 habitat with PRFs (knotholes). Cannot survey fully due to access issues.
CBC0006PRF012	Ash *Fraxinus excelsior*	Thick Ivy growth and lifted bark
CBC0006PRF013	Poplar species *Populus* sp.	Butt-rots, dry internally
CBC0006PRF014	Sycamore *Acer pseudoplantus*	2 no. knotholes at height
CBC0006PRF015	Ash *Fraxinus excelsior*	Knotholes at multiple aspects
CBC0006PRF016	Ash *Fraxinus excelsior*	Wounds and decay

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

In addition, one derelict, unoccupied building along the western boundary of the Hermitage Golf Club, was identified as having moderate potential to support populations of roosting bats, based on an external examination. Dense ivy growth was recorded and there was no roof present on the building, with collapsed joists and ceiling boards visible. This building is not contained within the temporary or permanent land take boundary of the Proposed Scheme.

12.3.8.2 Badger

Badger, and their breeding and resting places, are legally protected under the Wildlife Acts. Evidence of badger activity was recorded in one location over the course of the multi-disciplinary surveys carried out along the Proposed Scheme - within the grounds of the Hermitage Golf Club. It should be noted that no setts (badger resting places) were recorded along the Proposed Scheme, including within the boundary of the Hermitage Golf Club, during any multidisciplinary surveys undertaken. Within the Hermitage Golf Club badger faeces was recorded in multiple locations and snuffle holes (signs of badger foraging behaviour) was also recorded.

Despite the overall low level of badger activity across the Proposed Scheme, badger are widely distributed throughout the Greater Dublin Area (GDA), often utilising public parks and residential gardens. The desk study returned 10 records, including nine live sightings, found within 1km of the Proposed Scheme (see Appendix A12.1 in Volume 4 of this EIAR for further details). The nearest record is from the Strawberry Beds along the Lower Road on the northern bank of the River Liffey. 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 multi-disciplinary surveys carried out along the Proposed Scheme. The watercourses which will be intersected by the Proposed Scheme are culverted and are therefore not likely to be favourable to support otter.

The desk study found that otter are known to occur within 1km of the Proposed Scheme and across the wider study area (see Appendix A12.1 in Volume 4 of this EIAR for further details). The River Liffey runs almost parallel to the north of the Proposed Scheme and a tributary of the Liffey (the River Annfield) runs perpendicular to the Proposed Scheme to the north of the Texaco petrol station at N4 Junction 3. The River Liffey, Liffey Estuary Upper, and Liffey Estuary Lower are known to support a local otter population (Macklin *et al*., 2019; NPWS 2019a). A total of 19 signs were recorded along the River Liffey, most of which occurred south of the Phoenix Park at Chapelizod and along the quay walls of Dublin City Centre. A disused holt, several spraints and slides were recorded to the west of St Marys Hospital, Phoenix Park which is within 1km of the Proposed Scheme at locations in Chapelizod and Ballyfermot (Macklin *et al*., 2019). Other holts have been identified in Chapelizod, Dublin Port, and at the North Quays adjacent to MV Cill Airne (Macklin *et al*., 2019, NBDC Online Database 2022). Described as a regular sprainting site on the River Liffey, the MV Cill Airne Restaurant at North Wall Quay is situated approximately 2.2km downstream of the Frank Sherwin Bridge. An active holt was also present alongside this pontoon in a quay wall (Macklin *et al.,* 2019). Results returned from an NPWS Online data search for rare/ protected species included records along the River Liffey at Glenaulin and Palmerstown.

The grand Canal is known for otter activity with records returned between Inchichore (Grid O115329) and Inchicore at Suir Road (NBDC Online Database 2022). Otter are known to the Grand Canal for foraging and commuting purposes.

The Camac River returned records of otter signs, eight in total, at Kilmainham Gaol/ Richmond Park. Further signs were observed at Bluebell, which is within 2km of the Proposed Scheme (Macklin *et al*., 2019). The Camac is culverted beneath the Proposed Scheme adjacent to Heuston Station.

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) and is listed on Annex II and Annex IV of the Habitats Directive.

Wicklow Mountains SAC, which is located approximately 11km upstream of the Proposed Scheme (from the Liffey Estuary Lower), is the closest European site designated for otter. Typically, otter territories are within the range of 7.5km for females and up to 21km for males (Ó'Neill *et al.,* 2009). The Proposed Scheme only interacts with the following watercourses: Annfield River, River Camac, Grand Canal, River Liffey, Liffey Estuary Upper and Liffey Estuary Lower. Whilst these watercourses lie within the typical territorial ranges of otters, none of them share any hydrological connection to the Wicklow Mountains SAC- it is the River Dodder which provides the key hydrological pathway between the Wicklow Mountains SAC and Dublin City. In addition, the Wicklow Mountains SAC lies within the Dodder_SC_010 subcatchment and the Proposed Scheme lies within the Liffey_SC_090 subcatchment. Given the separation which exists between the Wicklow Mountains SAC and the Proposed Scheme the otter population in the vicinity of the Proposed Scheme is regarded to be distinct to that of the SAC.

The national population of adult breeding female otters in the Republic of Ireland was estimated at 7,800 in the National Otter Survey of Ireland 2010/12 (Reid *et al.,* 2013), the most recent survey of its type undertaken. The local otter population in relation to the Proposed Scheme is not likely to be in the region of 1% of the national population (e.g. 78 breeding female otters).

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

The Proposed Scheme will cross one watercourse, the River Camac, and will interact with the River Liffey via surface water discharges. Furthermore, the Proposed Scheme lies in close proximity to the Liffey Estuary Upper near Heuston Station. Given the number of watercourses which the Proposed Scheme is likely to interact with, and the known abundance of otters within watercourses in and around Dublin City, the local otter populations likely to be affected by the Proposed Scheme are likely to be >1% of the County population. Therefore, the local otter population is valued as being of County importance.

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

12.3.8.4 Marine Mammals

The Proposed Scheme proceeds as far as Victoria Quay at the Liffey Estuary Upper before joining the prevailing traffic management regime on the City Centre Quays. It is hydrologically connected to Dublin Bay through the Liffey Estuary Lower via the River Annfield (Liffey_180), River Camac (Camac_040), River Liffey (Liffey_180 and Liffey_190) Liffey Estuary Upper and Liffey Estuary Lower and the Grand Canal. There were no protected marine mammals identified along the Proposed Scheme during the multidisciplinary surveys. There were no dedicated marine mammal surveys carried out as part of the assessment.

Harbour seal, grey seal, and Harbour porpoise are known from Dublin Bay and these species are all protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive, while all cetacean species are listed on Annex IV of the Habitats Directive. Harbour porpoise is a QI species designated as part of Rockabill to Dalkey Island SAC which is located approximately 13km 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. 18km north-east 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, all are considered to be species of high conservation concern.

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

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

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

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

12.3.8.5 Other Mammal Species

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

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

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

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

12.3.9 Birds

12.3.9.1 Breeding Birds

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

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

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

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

The desk study returned records of a total of 115 breeding bird species across the study area (i.e. Grid Squares O03 and O13). Records included 20 species listed under Annex I of the Birds Directive, 43[1] SCI species, and an additional 11 Red Listed and 18 Amber Listed species. This includes 33 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 gulls, cormorant and puffin (Merne & Madden 2000). Gulls favour nesting along coasts on shingle and cliffs but may go inland to 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 Hermitage Park, Mount Andrew Park, Old Lucan Road, Kings Hospital, Palmerstown Drive, Chapelizod Bypass, Irish National War Memorial Gardens, and Royal Hospital Kilmainham. These species therefore are likely to use lands within the footprint of the Proposed Scheme for breeding and foraging.

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

Several species of warblers and raptors which favour woodlands, agricultural lands and upland heathland areas were identified during the desk study (Appendix A12.1. in Volume 4 of this EIAR). Agricultural lands, uplands and open areas were identified at locations to the north and west of the Proposed Scheme. As such, some of these species may utilise the lands at these locations. Due to the largely urban setting of the Proposed Scheme, these habitat types are not present, or are highly fragmented within the boundary of the Proposed Scheme. As such,

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

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., Hermitage Park, Mount Andrew Park, Old Lucan Road, Kings Hospital, Palmerstown Drive, Chapelizod Bypass, Irish National War Memorial Gardens, Phoenix Park, and Royal Hospital Kilmainham (NPWS 2022 – January).

Wetland and riverine bird species identified during the desk study (Appendix A12.1. in Volume 4 of this EIAR), include gulls, waders, waterfowl, swans, ducks, and herons which utilise intertidal zones, freshwater lakes, ponds, canals, and rivers. Suitable habitats within close proximity to the Proposed Scheme include the River Liffey alongside the Irish National War Memorial Gardens which contains known populations of mute swan, wagtails and kingfisher; the River Annfield at Old Lucan Road, and the River Camac at Kilmainham which contain populations of waterfowl, wagtails and park and garden birds. Rivers are important nesting and foraging sites for species such as kingfisher, mute swan, and coot within the Proposed Scheme. The River Camac is culverted in its entirety where it will be crossed by the Proposed Scheme, therefore is not suitable for breeding birds. The River Annfield and River Liffey provide suitable nesting and foraging habitat for breeding birds.

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

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

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

Common Name / *Scientific Name* / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA Designated for SCI Species
Barn Swallow *Hirundo rustica* (SL)	Through all gird squares	Red (B)	-	-
Common coot *Fulica atra* (CO)	Phoenix Park Grid O127347	Amber (B/W)	-	Lough Ennell SPA approximately 60.9km
Common kestrel *Falco tinnunculus* (K.)	Phoenix Park Grid O13C Palmerstown O03X	Red (B)	-	
Common Kingfisher *Alcedo atthis* (KF)	River Liffey Lucan O020355	Amber (B)	✓	River Boyne and River Blackwater SPA approximately 27.8km
Common linnet *Carduelis cannabina* (L.)	Through all grid squares	Amber (B)	-	-
Common snipe *Gallinago gallinago* (SN)	Palmersown Lower Grid O081356	Red (B/W)	-	-
Common starling *Sturnus vulgaris* (SG)	Through all grid squares	Amber (B)	-	-
Common swift *Apus apus* (SI)	Kilmainham Grid Square O13G Liffey Valley Park Grid Square O083357	Red (B)	-	-
Eurasian sparrowhawk *Accipiter nisus* (SH)	Heuston Station Grid Square O134342 Liffey Valley Park Grid Square O083357	Green (B)	-	-
European greenfinch *Carduelis chloris* (GR)	Through all grid squares	Amber (B)	-	-
Goldcrest *Regulus regulus* (GC)	Through all grid squares	Amber (B)	-	-
Grey heron *Ardea cinerea* (H.)	Throughout the River Liffey	Green (B/W)	-	Wexford Harbour and Slobs SPA approximately 85.2km
Grey wagtail *Motacilla cinerea* (GL)	River Liffey Grid Square O138343 Liffey Valley Park Grid Square O083357	Red (B)	-	
House martin *Delichon urbicum* (HM)	Liffey Valley Park Grid Square O083357	Amber (B)	-	-

Common Name / *Scientific Name* / BTO Code	Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W – Wintering)	Annex I	Nearest SPA Designated for SCI Species
House sparrow *Passer domesticus* (HS)	Liffey Valley Park Grid Square O083357	Amber (B)	-	
Little egret *Egretta garzetta* (ET)	Chapelizod Grid O122339 River Liffey Lucan O033355	Green (B/W)	✓	-
Little grebe *Tachybaptus ruficollis* (LG)	Phoenix Park Grid O127347 Palmerstown Grid O0935	Green (B/W)	-	Wexford Harbour and Slobs SPA approximately 95.7km
Mallard *Anas platyrhynchos* (MA)	River Liffey Grids O063357 & O135343	Amber (B/W)	-	Dundalk Bay SPA approximately 58.3km
Meadow pipit *Anthus pratensis* (MP)	Phoenix Park Grid O13C Liffey Valley Park Grid O083357	Red (B)	-	
Mistle thrush *Turdus viscivorus* (M.)	Liffey Valley Park Grid O083357	Green (B)	-	
Mute Swan *Cygnus olor* (MS)	River Liffey Grid O135343 Lucan Grid O03H	Amber (B/W)	✓	-
Peregrine falcon *Falco peregrinus* (PE)	Oblate Park Grid O1133 Liffey Valley Park Grid O0835	Green (B)	✓	Wicklow Mountains SPA approximately.9.6km
Sand martin *Riparia* (SM)	Phoenix Park Grid O13H	Amber (B)	-	-
Skylark *Alauda arvensis* (S.)	Phoenix Park Grid O1134 Liffey Valley Park Grid O083357	Amber (B)	-	
Stonechat *Saxicola torquate* (SC)	Palmerstown Grid O03S	Green (B)	-	
Tufted duck *Aythya fuligula* (TU)	Phoenix Park Grid O129350	Red (B/W)	-	Lough Ennell SPA approximately 60.9km
Yellowhammer *Emberiza citronella* (Y)	Phoenix Park Grid O13H	Red (B)	-	

Due to the presence of suitable breeding and / or foraging habitat directly adjacent to the Proposed Scheme, the local breeding bird populations are considered to be of International Importance where they belong to 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 15 wintering bird surveys were carried out for the Proposed Scheme at site CBC0006WB001, at the Liffey Gaels GAA playing pitches adjacent to the Chapelizod Bypass / Con Colbert Road between October 2020 to March 2022 on a fortnightly basis. One survey in early January 2021 was cancelled owing to change in government restrictions in relation to COVID-19 and clarification of permission to undertake fieldwork. Winter bird surveys were also undertaken here between November 2021 and March 2022 to capture data during the 2021-2022 season. Species identified included herring gull, black-headed gull, and common gull.

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

The survey area of amenity grassland is maintained through cutting. Grass cover was moderate across the survey period and had a high herbaceous layer throughout the transect. The western area was locally wet in comparison to the rest of the site. Disturbance was noted as high on this site due to animals (dogs off leash and horse grazing/walking), evidence of vehicles (motocross and quad bikes) and public disorder activities (fireworks and large material littering) being frequent. Large numbers of gulls or other wintering birds were not recorded during surveys.

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

Common Name / Scientific Name / BTO Code	Site: Peak Count and Activity in the Study Area (Date)	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA Designated for SCI Species
Common gull *Larus canus* (CM)	Nine birds foraging on site (28/02/2022)	Amber (B/W)	-	Dundalk Bay SPA approximately 57km
Black-headed gull *Chroicocephalus ridibundus* (BH)	19 birds loafing on site (09/03/2022)	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 7.2km
Herring gull *Larus argentatus* (HG)	12 birds foraging on site (21/12/2021)	Amber (B/W)		Ireland's Eye SPA approximately 15.8km

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

Common Name/Scientific Name/BTO Code	Site Peak Counts	Associated European sites within the ZoI	1% of International Population	1% of National Population
Common gull *Larus canus* (CM)	9	-	16,400	n/a
Black-headed gull *Chroicocephalus ridibundus* (BH)	19	South Dublin Bay and River Tolka Estuary SPA North Bull Island SPA The Murrough SPA	31,000	n/a
Herring Gull *Larus argentatus* (HG)	12	Ireland's Eye SPA Lambay Island SPA Skerries Islands SPA	14,400	n/a

A review of a study into light-bellied Brent goose inland feeding sites[2] has identified no known SPA wintering bird feeding sites in the footprint of the Proposed Scheme. There are also no known inland wintering bird feeding sites within approximately 300m of the Proposed Scheme i.e., the disturbance ZoI[3]. Droppings attributed to light-bellied Brent goose were recorded on two dates during the 2021-2022 survey season. A total of 294 light-bellied Brent goose droppings were recorded at the Liffey Gaels GAA pitches on the 21/12/2021 and 16 light-bellied Brent goose droppings were recorded here on 28/02/2022. No goose droppings were recorded at the Liffey Gaels GAA pitches during the 2020-2021 survey season. This data suggests that the Liffey Gaels GAA pitches have recently started to be used on an infrequent basis by irregular numbers of light-bellied Brent geese, for foraging/ loafing purposes. The inconsistency of recorded use of the site suggests that it is not a significant inland foraging resource for this SCI bird species and is more likely to be use sporadically / infrequently.

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

Given the habitats present at Hermitage Golf Club, it is likely that winter bird species may utilise some of the lands within. This has been considered in this impact assessment and appropriate mitigation measures have been prescribed as a result.

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 47 regularly occurring wintering bird species across the study area (i.e. Grid Squares O03 and O13). Records included 11 species listed under Annex I of the Birds Directive, 37[4] SCI species, and an additional two Red Listed and one Amber Listed species. This includes 28 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.

The wider study area of Dublin Bay is considered of significant ornithological importance as it supports an Internationally Important population of light-bellied Brent goose. This SCI species may use open parkland and grassland adjacent to the study area for foraging purposes. A review of a study into light-bellied Brent goose inland feeding sites (Scott Cawley Ltd. 2017) has identified no known inland wintering bird feeding sites within 300m of the Proposed Scheme. However, there are large areas of suitable foraging and/or roosting habitat available for wintering bird species both adjacent to, and in the wider locality of the Proposed Scheme (i.e., beyond the 300m study area the footprint of the Proposed Scheme) including:

- A single site within the Proposed Scheme; Liffey Gaels GAA Club pitch between the Chapelizod Bypass and Con Colbert;
- Parks and greenspaces such as Palmerston / Glenaulin Park, Longmeadows Park, Markievicz Park, Gaels-Drumfinn Avenue Park, Waterstown Park Palmerstown, Hermitage Golf Club; and
- Wetland habitat associated with South Dublin Bay and River Tolka Estuary SPA, and North Dublin Bay SPA.

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

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

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

Common Name / Scientific Name / BTO Code	Activity and Distribution in the Study Area	Conservation Importance		
		BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest SPA designated for SCI species
Black-headed gull *Chroicocephalus ridibundus* (BH)	River Liffey Grid O134	Red (B/W)	-	South Dublin Bay and River Tolka Estuary SPA approximately 7.2km
Common coot *Fulica atra* (CO)	Phoenix park O127347 Grand canal Grid O138326	Amber (B/W)	-	Lough Ennell SPA approximately. 65km
Common Pochard *Aythya ferina* (PO)	Phoenix Park Grid O13H	Red (W)	-	Lough Ennell SPA approximately. 65km
Common snipe *Gallinago gallinago* (SN)	Palmersown Lower O081356	Red (B/W)	-	-
Common redshank *Tringa totanus* (RK)	Adamstown Grid O03G	Red (W)	-	South Dublin Bay and River Tolka Estuary SPA approximately4.2km
Eurasian teal *Anas crecca* (T.)	Phoenix Park Grid O13C & O13H	Amber (B/W)	-	North Bull Island SPA approximately7.3km
Eurasian wigeon *Anas Penelope* (WN)	Phoenix Park Grid O13C & O13H	Amber (W)	-	The Murrough SPA approximately31.4km
Great black-backed *gull Larus marinus* (GB)	River Liffey Grid O135343 Liffey Valley Park Grid O083357	Amber (B/W)	-	-
Herring gull *Larus argentatus* (HG)	Heuston station Grid O1334	Amber (B/W)	-	Ireland's Eye SPA approximately15.8km
Lesser Black-backed *Gull Larus fuscus* (LB)	Kilmainham Grid O1334	Amber (B/W)	-	Lambay Island SPA *c*.17.5km
Light-bellied brent goose *Branta bernicla* (BG)	Ballyfermot / Le Fanu Park Grid O0933	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA approximately4.2km
Little egret *Egretta garzetta* (ET)	Chapelizord Grid O122339 River Liffey Lucan Grid O033355	Green(B/W)	✓	-
Little grebe *Tachybaptus ruficollis* (LG)	Phoenix Park Grid O127347 Palmserstown Grid O0935	Green(B/W)	-	Wexford Harbour and Slobs SPA approximately95.7km
Tufted duck *Aythya fuligula* (TU)	Phoenix Park Grid O129350	Amber (B/W)	-	Lough Ennell SPA approximately65km

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 was confirmed within the footprint of the Proposed Scheme.

The desktop study did not return records of common lizard within the immediate footprint of the Proposed Scheme, although three are records from 2.8km away at Lucan Golf Club. 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, or adjacent to, the Proposed Scheme. This includes scattered areas of vegetated riverbank along the River Liffey and unculverted sections of the River Camac.

The desktop study returned records for common frog and smooth newt within 1km of the Proposed Scheme. This includes records of common frog at Palmerstown in 2020 and records of smooth newt at Dublin Castle (NPWS 2019a). Amphibians are deemed to be of Local Importance (Higher Value).

12.3.12 Fish

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

The Proposed Scheme lies within the Liffey_SC_090 WFD subcatchment. The EPA segments of the River Liffey which are contained within the study area are Liffey_180 and Liffey_190. Liffey_180 segment is 24.65km and consists of the main channel of the River Liffey from Lucan and Chapelizod. The River Liffey flows in an easterly direction, discharging into the Liffey Estuary Upper at Islandbridge. The River Liffey was surveyed by Inland Fisheries Ireland during the 2014 monitoring season. Monitoring occurred at Lucan Bridge approximately 1.3km upstream of the Proposed Scheme, with the river being assigned an Ecological Fish Status of 'Good' at this location (Kelly *et al*., 2015).

The River Camac catchment was surveyed by Inland Fisheries Ireland in September 2017. Monitoring locations within close proximity to the Proposed Scheme included Yellow Meadow's, approximately 4.3km upstream of the Proposed Scheme and Lansdowne Valley Park approximately 1.3km upstream of the Proposed Scheme. The River Camac was assigned an Ecological Fish Status of 'Moderate' and 'Poor' respectively at these two locations (Matson *et al.,* 2018).

The Liffey Estuary Upper was surveyed by Inland Fisheries Ireland in October 2010. Monitoring locations within close proximity to the Proposed Scheme included in the vicinity of Heuston Station. The estuary was assigned an Ecological Fish Status of 'Moderate' at this location (Kelly *et al*., 2010).

12.3.12.1 Salmonid Species

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

The River Camac is a recognised salmonid system, under significant ecological pressure as a result of its largely urban situation. The River Camac section located directly adjacent to the Proposed Scheme are culverted and not directly hydrologically connected. Although considerable sections of the main channel are culverted, lengths of this river that remain on the surface invariably support self-sustaining populations of brown trout *Salmo trutta* (Matson *et al*. 2018).

The desk study returned no records for salmonid species in the River Annfield.

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 are 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 on the River Camac and River Liffey (in the case of River Liffey, 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 Camac is reported to contain juvenile lamprey, with suitable unculverted habitat located approximately 6.8km upstream of the Proposed Scheme at Corkagh Park (King *et al,.* 2011). The desk study for the River Annfield returned no records for Lamprey species species.

Lamprey species are valued as being of National Importance.

12.3.12.3 European Eel

The desk study returned records for European eel *Anguilla Anguilla* on the River Camac at Riverside, Clondalkin approximately 6.5km upstream from the Proposed Scheme (King *et al.,* 2011). The desk study returned no European eel records for the River Annfield. The Liffey Estuary serves as the natural linkage for European eel migrating between freshwater and marine environments (Central and Regional Fisheries Board 2008).

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

European eel populations are valued as being of National Importance.

12.3.12.4 All Other Fish Species

Water sampling undertaken along the River Camac by Inland Fisheries Ireland during 2011 reported very low fish diversity, with only minnows *Phoxinus phoxinus* and three-spined stickleback *Gasterosteus aculeatus* noted (King *et al.,* 2011). The River Annfield returned no records for fish sampling. Fish sampling records from the River Liffey included common goby *Pomatoschistus microps*, flounder *Platichthys flesus*, gadoid species, perch *Perca fluvialtilis*, pike *Esox lucius*, roach *Rutilus* and three-spined stickleback (Kelly *et al*. 2012).

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 non-native invasive roach, a species listed on the of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (Waterways Ireland 2021).

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

12.3.13 Invertebrates

12.3.13.1 White-clawed Crayfish

White-clawed crayfish *Austropotamobius pallipes* are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive. Surveys for white clawed crayfish were not carried out as part of this assessment. The desk study (see Appendix A12.1 in Volume 4 of this EIAR) did not return records for white-clawed crayfish within the footprint of the Proposed Scheme. However, white-clawed crayfish are known to occur approximately 4km upstream of the Proposed Scheme, with a live record identified along the River Camac at Clondalkin (see Appendix A12.1 in Volume 4 of this EIAR). Healthy white-clawed crayfish populations are also known in the River Camac and selected tributaries upstream of the Proposed Scheme (Triturus Environmental Ltd., 2020; Sweeney Consultancy, 2018). Due to the underground nature of the Camac at the crossing point of the Proposed Scheme, there is no suitable habitat for white-clawed crayfish within the footprint of the Proposed Scheme, or downstream of the River Camac crossing point.

White clawed crayfish are known from the River Liffey, approximately 1km upstream of the Proposed Scheme at Leixlip Bridge. They have not been recorded downstream of Leixlip bridge. There will be no direct interaction with

the freshwater sections of channel of the River Liffey itself, except via existing distal surface water discharges at discrete points.

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

12.3.13.2 Freshwater Molluscs

Surveys for freshwater molluscs were not carried out as part of this assessment by virtue of the Proposed Scheme and lack of instream works. The desk study (see Appendix A12.1 in Volume 4 of this EIAR) returned two records for Red Listed freshwater molluscs located approximately 700m north of Proposed Scheme within a millrace, hydrologically connected to the River Liffey. Species identified included duck mussel *Anodonta anatine* and ear pond snail *Radix Auricularia* at Liffey Valley Park, Waterstown in 2011. Both species are classified as "Vulnerable" in Ireland (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 8.9km 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 *Tropaeleum majus*, common holly *Ilex aquifolium* and common ivy *Hedera helix* (Butterfly Conservation Ireland 2020). Corresponding habitats along the Proposed Scheme are located in parkland with scattered trees (WD5), dry meadows and grassy verges (GS2) and amenity grasslands (GA2); present within Royal Hospital Kilmainham and the Irish National War Memorial Gardens, and also in smaller areas along sections of Old Lucan Road, Con Colbert Road, Kennelsfort Road lower and Glenpark Drive; where suitable grasses, birdsfoot trefoil, and common nettle *Urtica dioica* were recorded. These habitats were identified along the route of the Proposed Scheme in fragmented pockets of small and medium size. Species diversity was low in terms of foodplants in these habitats. Butterfly communities that are known to survive in highly fragmented landscapes are mobile species that can feed off a range of plants (Öckinger *et al,.* 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; depositing/ lowland rivers (FW2), such as the River Liffey along the Chapelizod Bypass and tidal rivers (CW2) such as the Liffey Estuary Upper, in close proximity to Victoria Quay. The preferred foodplants for bees are native species with white, blue or yellow flowers (Fitzpatrick *et al,.* 2006). Additional fragmented sites where suitable floral species were recorded along the Proposed Scheme include ornamental flower beds and borders (BC4) within residential gardens, parkland with scattered trees (WD5), and amenity grasslands (GA2); in parks and along the banks of the River Liffey.

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; wildflower areas in Waterstown Park, managed by SDCC described as wildflower meadows; Phoenix Park managed by DCC; and Farmleigh Estate managed by the OPW as part of the All-Ireland Pollinator Plan. These other invertebrate species favour species rich semi-natural grasslands and meadows, upland heathland and sand dunes. Habitats within close proximity to the Proposed Scheme which correspond to species requirements include areas of ornamental planting along roadsides, parkland, canals, and gardens. Such habitats are fragmented and highly disturbed and are therefore deemed unsuitable for significant populations of red-listed invertebrates (Biesmeijer *et al.,* 2006; Öckinger *et al.,* 2010). As such, other invertebrates are not considered further in the assessment.

12.3.14 Summary Ecological Valuation and Identification of KERs

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

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

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

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

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

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

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

Table 12.13: Summary of Ecological Valuation and Identification of KERs

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
North Dublin Bay SAC [000206]	International Importance	Yes
South Dublin Bay SAC [000210]	International Importance	Yes
Rockabill to Dalkey Island SAC [003000]	International Importance	Yes
Lambay Island SAC [000204]	International Importance	Yes
South Dublin Bay and River Tolka Estuary SPA [004024]	International Importance	Yes
Baldoyle Bay SPA [004016]	International Importance	Yes
North Bull Island SPA [004006]	International Importance	Yes
Malahide Estuary SPA [004025]	International Importance	Yes
Ireland's Eye SPA [004117]	International Importance	Yes
Howth Head Coast SPA [004113]	International Importance	Yes
Rogerstown Estuary SPA [004015]	International Importance	Yes
Lambay Island SPA [004069]	International Importance	Yes
Dalkey Islands SPA [004172]	International Importance	Yes
Skerries Islands SPA [004122]	International Importance	Yes
The Murrough SPA [004186]	International Importance	Yes
Rockabill SPA [004014]	International Importance	Yes
All other SAC or SPA sites	International Importance	No – beyond ZoI
Liffey Valley pNHA [000128]	National	Yes
Grand Canal pNHA [002104]	National Importance	Yes
North Dublin Bay pNHA [000206]	National Importance	Yes
South Dublin Bay pNHA [000210]	National Importance	Yes
Dolphins, Dublin Docks pNHA [000201]	National Importance	Yes
Booterstown Marsh pNHA [001205]	National Importance	Yes
Baldoyle Bay pNHA [000199]	National Importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	National Importance	Yes
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
Skerries Island NHA [001218]	National Importance	Yes
All other NHA or pNHA sites	National Importance	No – beyond ZoI
Habitats		

Ecological Receptor	Ecological Valuation	KER?
Tilled lands (BC3	Local Importance (Lower Value)	No
Flower beds and borders (BC4)	Local Importance (Lower Value)	No
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	No
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Yes
Spoil and bare ground (ED2)	Local Importance (Lower Value)	No
Recolonising bare ground (ED3)	Local Importance (Lower Value)	No
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Yes
Improved agricultural grasslands (GA1)	Local Importance (Lower Value)	No
Amenity grassland (improved) (GA2)	Local Importance (Lower Value)	No
Dry meadows and grassy verges (GS2)	Local Importance (Lower Value)	No
Residential	Local Importance (Lower Value)	No
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Yes
Mixed broadleaf/conifer woodland (WD2	Local Importance (Higher Value)	Yes
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Yes
Hedgerows (WL1)	Local Importance (Higher Value)	Yes
Treelines (WL2)	Local Importance (Higher Value)	Yes
Scrub (WS1)	Local Importance (Lower Value)	No
Immature woodland (WS2)	Local Importance (Lower Value)	No
Ornamental / non-native shrub (WS3)	Local Importance (Lower Value)	No
Flora Species		
Flora Species listed on the Flora Protection Order 2022	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	County Importance	Yes
Marine mammals (Annex I species of nearby SACs: harbour porpoise, harbour seal and grey seal)	International Importance	Yes
Marine mammals (all other marine mammals)	County Importance	Yes
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Yes
SCI / Annex I bird species	International Importance	Yes
All other Red listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other Amber listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Yes
Reptiles	Local Importance (Higher Value)	Yes

Ecological Receptor	Ecological Valuation	KER?
Amphibians	Local Importance (Higher Value)	Yes
Atlantic salmon	International Importance	Yes
Brown trout	Local Importance (Higher Value)	Yes
European eel / Lamprey	National Importance	Yes
All other fish species	Local Importance (Higher Value)	Yes
Invertebrates (Freshwater molluscs)	Local Importance (Higher Value)	Yes
All other non-Red listed Invertebrates and Insects	Local Importance (Lower Value)	No
Non-native invasive animal species	N/A	N/A
Local Biodiversity Areas (Local Biodiversity Areas not discussed under designated sites, flora and / or fauna – of which overlap in part with national designation as listed previously and / or are intersected by the Proposed Scheme)		
Liffey Valley SAAO	Local Importance (Higher Value)	Yes (but covered by pNHA above)
River Liffey Corridor – regionally important salmonid catchment	County Importance (Higher Value)	Yes
River Camac – recognized Salmonid system (in upper, unculverted reaches only, beyond the Proposed Scheme)	Local Importance (Higher Value)	Yes

12.4 Potential Impacts

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

12.4.1 Characteristics of the Proposed Scheme

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

12.4.1.1 Construction Phase

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

- Site preparation and clearance;
- Removal of existing boundaries, pavements, lighting columns, bus stops, bridge ramp, gantries and signage;
- Protection and/or diversion of buried services;
- Road widening, pavement reconstruction, and kerb improvements;
- Reconfiguration of traffic lanes throughout;
- Reconnection of existing and new drainage infrastructure into the existing surface water drainage infrastructure;
- Installation of new bus stops and junction / roundabout modification;
- Provision of new structures (bridges, retaining walls etc (e.g. replacement pedestrian and cyclist bridge over the N4 at Ballyowen Road; pedestrian bridge over the N4 at Liffey Valley Shopping

Centre; widening of Chapelizod Hill Road bridge; and; retaining walls along the N4, including at Hermitage Golf Club and Hermitage Medical Clinic))

- Temporary and permanent land take at a number of key areas including;
  - Hermitage Golf Club- boundary wall and trees removed and relocated;
  - The Hermitage Medical Clinic- boundary wall removed and relocated;
  - SDCC Council compound at Junction 2 N4- temporary landtake here for provision of a construction compound;
  - Land take between the N4 National Road and the Old Lucan Road for provision of a construction compound;
  - Temporary land-take of amenity grassland north of the R148 Palmerstown Bypass, on the M50 Junction 7 to Con Colbert Road section of the Proposed Scheme for provision of a construction compound: and
  - Amenity grassland at Liffey Gaels GAA Club for the provision of a construction compound
- Property boundary reinstatement, signage replacement; relocation of and/or installation of lighting columns; and
- Landscaping and tree planting, and reinstatement of temporary land acquisitions.

12.4.1.1.1 Structural Works

The principal structures which form part of the Proposed Scheme are set out below:

- Liffey Valley Pedestrian Bridge (Structure Reference: 01);
- Chapelizod Hill Road Bridge Widening (Structure Reference: 02);
- Ballydowd Pedestrian and Cycle Bridge (Structure Reference: 03); and
- Retaining Walls (Structure References: RW01 – RW05).

12.4.1.1.1.1 Liffey Valley Pedestrian Bridge (Structure Reference: 01)

The Liffey Valley Pedestrian Bridge will be constructed over the N4 to connect the new bus stops on Old Lucan Road with the new bus stops on N4 and Liffey Valley Bus Interchange. A new pedestrian ramp and steps will be constructed on both sides of the bridge. This will require the construction of a retaining wall (RW02) on the south side of the bridge.

The Liffey Valley Pedestrian Bridge will be a single span, warren truss structure, with a span length of approximately 42.8m. The structure will be painted structural steel, supported on braced steel supports to the north and south of the N4. The warren truss will be designed with a full through construction where the structure is built up around the deck. This structure will be fully integral and will not require bearings or expansion joints. The parapets will be detailed to a height of 1.25m along the length of the truss. A further painted steel, simply supported, 9.1m ladder beam structure will span over the bridge approach ramps connecting the pedestrian bridge to the Liffey Valley Shopping Centre. The approach ramps servicing the eastbound bus stop will be formed of a combination of ladder beam structures and retained earthworks. The westbound bus stop approach ramp will be formed of a combination of ladder beam structure and graded earthworks embankment on approach to Fonthill Road.

The construction methodology broadly comprises the following activities:

- Installation of Construction Traffic Management Measures: Temporary closure of the existing bus lanes on the N4 in each direction;
- Site Clearance and Excavation: Excavation works will be carried out to the north and south of the bridge, to facilitate the bridge supports, and for the approach ramp and stair support locations;
- Construction of Foundations: Foundation and column support for the bridge will be constructed on site. The foundations will be placed and poured for both supports, and for the ramp and stair supports;

- Construction of Substructure: The superstructure will be supported on braced steel supports to the north and south of N4. The support piers / trestles will be erected;
- Construction of the Superstructure: The truss will be prefabricated and assembled off site in two separate units that will then be erected and lifted on site. The bridge superstructure and approach ramps and stairs will be fabricated off site and brought to the N4 in sections for assembly. The bridge will be craned into position and assembled. During the bridge erection, N4 carriageways will be closed in both directions, over a night or weekend. A diversion will be implemented, via N4 Junction 2, Liffey Valley Shopping Centre, Coldcut Road, Kennelsfort Road, and to Chapelizod Bypass. The ramp and stairs will be assembled and lifted into place. Erection of the ramps and stairs will not require road closures. Erection of the superstructure will be carried out by a crane positioned on the N4 carriageway / hard shoulders; and
- Finishing works: this will be minor tie in works, signage, etc.

12.4.1.1.1.2 Chapelizod Hill Road Bridge Widening (Structure Reference: 02)

The Chapelizod Hill Road Bridge will be widened to facilitate the provision of new bus stop layby on the east side of Chapelizod Bypass.

The existing bridge is an in-situ box structure, with an internal span of 9.8m, and a vertical clearance of minimum 5.2m on the southern side. The existing bridge will be widened by 6.0m, with the provision of a new portal frame.

The construction methodology broadly comprises the following activities:

- Installation of Construction Traffic Management Measures: Temporary closure of the existing bus lanes on the Chapelizod Bypass in each direction. Chapelizod Hill Road will be closed to vehicular through traffic at the worksite for approximately three months to facilitate the works. A local diversion will be put in place during the works period. Access for pedestrians and cyclists will be facilitated during the construction of the substructure. Chapelizod Hill Road will be closed to all users when the contiguous bored piles are being constructed. The Chapelizod Bypass eastbound carriageway will be closed when the superstructure is being lifted into place. This will likely occur over night, or over a weekend;
- Site Clearance and Excavation: Trees and vegetation under the proposed ramps and steps will be removed. The existing embankment and foundations will be removed, and the existing wingwall will be demolished;
- Construction of Embankment: Placement and Compaction of Fill Material: The proposed embankment will be built up along the widened section of Chapelizod Bypass embankment. The earth fill material will be placed and compacted to the rear of the structure, and retained by the combined resistance of the superstructure, substructure and foundations. Fill to the sides of the structure will be retained by the major piled retaining walls (RW03 and RW04) on either side of the structure;
- Construction of Foundations: The substructure will be formed on bored concrete piled foundations rock socketed to the bedrock substrate;
- Construction of Substructure: The substructure will be formed of contiguous bored piles with an in-situ concrete capping beam and pilecap. The bored piles will be constructed from a fill embankment parallel to the Chapelizod Bypass. The capping beam will be placed and poured;
- Construction of the Superstructure: The superstructure will be formed using a precast portal frame cast off site, delivered and lifted into position from the Chapelizod Bypass A concrete parapet will also be provided to prevent falls from height; and
- Finishing works: High containment kerbs and raised verges will be constructed, and an additional 0.55m high steel fence with mesh infill will be provided to the top of the concrete parapet. The bridge deck will be waterproofed, and new high-quality pavement will be established, to tie in the new structure with the adjoining carriageway. Finally, the existing parapet to Chapelizod Hill Road Bridge will be removed.

12.4.1.1.1.3 Ballydowd Pedestrian and Cycle Bridge (Structure Reference: 03)

The Ballydowd Pedestrian and Cycle Bridge (Structure Reference: 03) will be constructed over the N4 at Junction 3, parallel to Ballyowen Road bridge. The existing pedestrian bridge will be removed and replaced with a wider structure, accommodating the new two-way cycle track and pedestrian footpath across the N4.

The new bridge has been designed to match the form and aesthetic of the existing footbridge being replaced, where practicable and will comprise a single-span fully integral structure formed of painted steel three-dimensional arched trusses (50m) spanning the N4 carriageways. The superstructure will be approximately, 5.9m (internal) wide with a span of approximately 50m. The superstructure will be supported on cast in-situ reinforced, concrete abutments with spread footing foundations. The longitudinal top, middle and bottom chords, vertical and diagonal bracing will be formed from steel circular hollow sections. The deck will be formed of a structural steel plate welded to the truss members. The plate will be surfaced with a combined waterproofing and surfacing material providing appropriate slip resistance. The sub structure will be formed of in situ reinforced concrete abutment located within the existing N4 embankments. The abutments will be designed and detailed to match the geometry of the existing abutments to be removed.

The construction methodology broadly comprises the following activities:

- Installation of Construction Traffic Management Measures: Temporary closure of the existing bus lane and hard-shoulder on the N4 in each direction.
- Demolition of Existing Pedestrian Bridge;
- Excavation for Bridge Supports;
- Construction of the New Pedestrian and Cycle Bridge; and
- Finishing Works.

Demolition of Existing Pedestrian Bridge

Demolition of the superstructure of the fully integral Ballydowd Footbridge will be carried out by crane lift. The superstructure shall be lifted out of place as a single unit which includes all steel members including the parapet. The crane shall be a truck mounted unit positioned on the main carriageways of the N4. During the bridge removal, N4 carriageways will be closed in both directions, over a night or weekend. Once in position the superstructure will be connected to the crane before being released from the integral connections at both abutments. As the bridge is fully integral the steel members will need to be mechanically cut at the connection point to the abutments to release the structure. Upon release the superstructure will be lifted out of position on to the back of a truck for transport away from site. The superstructure may be cut into additional sections if required to facilitate easier transport. The superstructure will likely be disassembled off site into its constituent elements before being recycled.

The abutments will then need to be demolished. This demolition will be carried out from the existing embankments limiting the need for road closures. Demolition will use mechanical means such as a rock breaker. The broken-down concrete sections will be removed from site before being crushed and recycled if practicable to do so.

Excavation for Bridge Supports

Excavation works will be carried out on either side of the bridge, to provide suitable footing for the bridge support.

Construction of the New Pedestrian and Cycle Bridge

Once the ground has been excavated, concrete foundations will be poured on either side of the bridge, to provide supports for the bridge.

Following completion of the foundations, the main truss span will be assembled. The substructure will be formed within the embankments of the N4 carriageways. The superstructure will be prefabricated off-site within a steel fabricators manufacturing yard. The fabricated elements will be transported to site in large sections and assembled within the Construction Compound (LU1b). This will reduce the requirement for fabrication activity on site next to the N4, increasing safety, adding efficiency, and enhancing quality for the construction process. Once

the superstructure is assembled, it will be transported along the N4 from the Construction Compound to the bridge location. This will require a temporary closure of the N4 westbound carriageway and should be carried out at night to minimise disruption to road users.

The main truss span will be lifted into position. Erection of the superstructure will be carried out by cranes positioned on the main carriageways of the N4. During the bridge erection, N4 carriageways will be closed in both directions, over a night or weekend. The construction sequence will need to prioritise minimal construction within / over the N4 and avoid the need for substantial traffic management measures on the N4 where possible. The carriageway vertical clearance of 5.7m will need to be maintained at all times during the construction stage.

Finishing Works

New high-quality pavement will be established, to tie in the new structure with the adjoining carriageway.

12.4.1.1.1.4 Retaining Walls (Structure References: RW01 – RW05)

Retaining walls with a retained height greater than 1.5m are classed as principal structures. There are five principal retaining walls along the Proposed Scheme, as detailed in Table 12.14.

Table 12.14 Principal Retaining Walls along the Proposed Scheme

Structure Reference	Structure Type	Details	Length (m)	Max Retained Height (m)
RW01	Secant Piled Wall	Located on the eastbound verge of N4, the Hermitage Golf Club Retaining Wall is required to facilitate the provision of continuous two-way cycle track and footway along N4. A piled retaining structure has been proposed to minimise the removal of mature trees along the N4 carriageways. The retaining wall will be clad to match the masonry cladding of the existing retaining wall. The existing retaining wall is to be demolished and replaced to facilitate the required widening.	306.4	3.5
RW02	Reinforced Concrete Gravity Retaining Wall	Located on the westbound verge of the N4 beside Abbott Pharmaceuticals, the N4 Retaining Wall is required to facilitate carriageway widening and the creation of a new bus stop and associated infrastructure along the N4. A gravity retaining wall structural form is proposed for this wall. The existing boundary wall on site is to be demolished and replaced. A new boundary wall will be provided to the top of the retaining wall with a minimum height of 1.8m and patterned profile finish.	135.05	2.6
RW03	Contiguous Piled Wall	Located on the eastbound verge of the Chapelizod bypass this retaining wall will be formed of a piled retaining structure. The structure is required to retain the earthwork embankment of a widened Chapelizod Bypass to facilitate a new bus stop at Chapelizod Hill Road Bridge. The wall will also retain fill from proposed access steps and ramps between the Chapelizod Bypass and Chapelizod Hill Road. The wall will be finished in precast concrete fascia panels with a pattern profile finish.	38	4.5
RW04	Soil Nails with Shotcrete Facing	Located on the westbound verge of the Chapelizod bypass this retaining wall will be required to facilitate Chapelizod Bypass carriageway widening to form a new bus stop at Chapelizod Hill Road Bridge. The wall will be formed of soil nails with a shotcrete facing. A supplementary insitu reinforced concrete facing with a pattern profile finish shall be provided to the front of this shotcrete.	68	1.95
RW05	Reinforced Concrete Gravity Retaining Wall	Located on the eastbound verge of the N4 and Junction 2 off-slip beside Hermitage Medical Centre, this wall will be approximately 83m in length with a maximum retained height of 1.5m. The wall is required to facilitate carriageway widening of the slip road. It will be formed by a gravity retaining structure with a combined boundary wall. The boundary wall will have a minimum height of 2.0m and finished with a masonry stone cladding to match the masonry cladding of the existing boundary wall.	83	1.5

Retaining walls are typically installed to cater for level differences between the road and adjoining lands. RW02 will form part of the ramp and steps at the Liffey Valley Pedestrian Bridge (Structure Reference: 01), RW03 and RW04 will form part of the ramp and steps at the Chapelizod Hill Road Bridge (Structure Reference: 02). The existing retaining walls at RW01 and RW02 will be demolished and replaced by new walls. The retained area behind the existing retaining walls will be dug out first and the wall will then be demolished with a hydraulic breaker mounted to an excavator.

Retaining walls will generally be constructed of reinforced concrete, with railing and cladding as required, with suitable materials depending on the local environs. Retaining walls will generally be constructed by first isolating the site of the retaining wall using fencing, as appropriate, to the location. The existing ground will then be stripped to formation level. Existing services will be diverted as required to enable wall construction. A side slope will be battered back to enable construction. Blinding will be installed at formation level. Formwork and reinforcing steel for the wall will be fixed in place. Then concrete will be poured in sections and formwork removed after initial curing of concrete. After a sufficient curing period the area behind the wall will be backfilled.

12.4.1.1.2 Surface Water Drainage Infrastructure

The surface water drainage system for the Proposed Scheme will discharge to four surface water receptors: Liffey_170, Liffey_180, Liffey_190 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 6,646m^2 in the impermeable area ultimately discharging to Dublin Bay. The drainage design principles ensure that all runoff from increases in impermeable areas will be attenuated and there will be no net increase in the surface water flow discharged to these receptors.

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

12.4.1.1.3 Construction Compounds

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

- Construction Compound LU1a will be located immediately north-east of the N4 Junction 2, between the Old Lucan Road and the R113;
- Construction Compound LU1b will be located between the N4 National Road and the Old Lucan Road;
- Construction Compound LU2 will be located north of the R148 Palmerstown Bypass, on the M50 Junction 7 to Con Colbert Road section of the Proposed Scheme ; and,
- Construction Compound LU3 will be located to the south-west of the junction of the R148 Chapelizod Bypass / R833 Con Colbert Road.

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

The Construction Compounds will be in place for the duration of the Construction Phase of the Proposed Scheme.

The Construction Compound LU1a will be located northeast of the N4 Junction 2, with access / egress from Old Lucan Road, as shown in Image 12.1. The area of Construction Compound LU1a is approximately 1,020m^2 (metres squared).

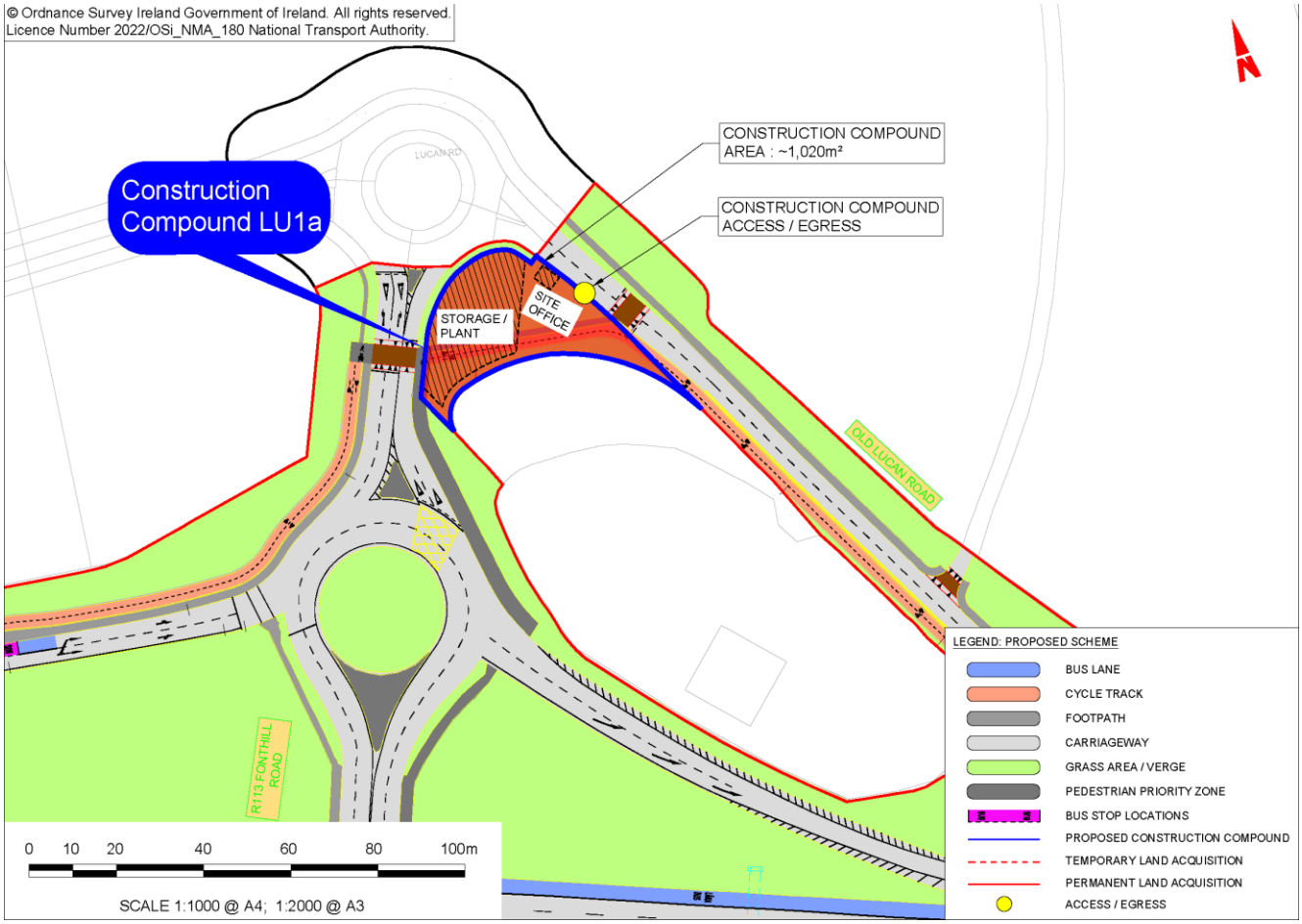

Image 12.1: Location and Extent of Construction Compound LU1a

Construction Compound LU1b will be located between the N4 National Road and the Old Lucan Road, on a narrow strip of grass lined with trees and shrubs of the north side of the road, and a low stone boundary wall at the roadside, with access / egress as shown in Image 12.2. The area of Construction Compound LU1b is approximately 2,760m^2.

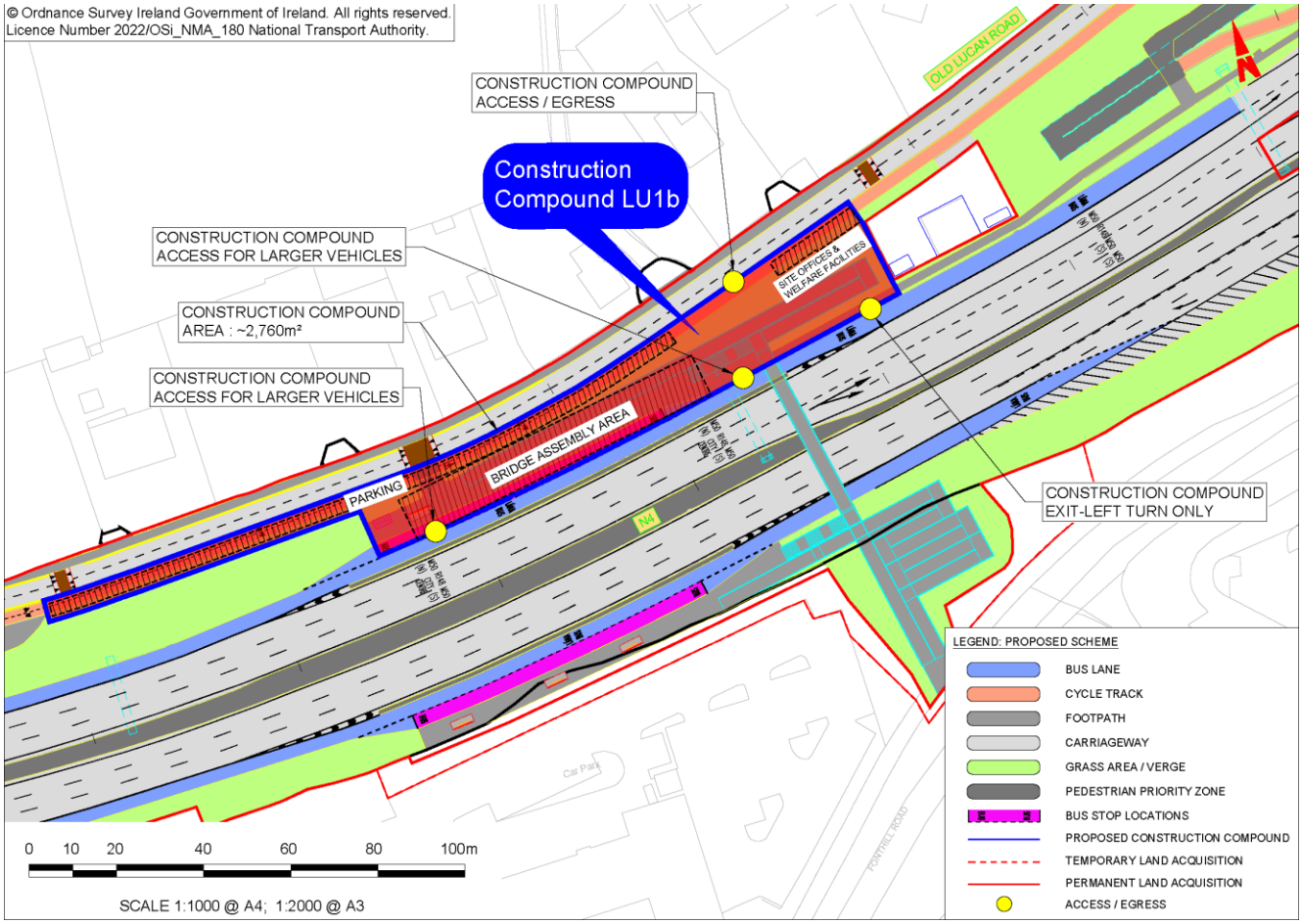

Image 12.2: Location and Extent of Construction Compound LU1b

Construction Compound LU2 will be located north of the R148 Palmerstown Bypass, on the M50 Junction 7 to Con Colbert Road section of the Proposed Scheme, as shown in Image 12.3. The area of Construction Compound LU2 is approximately 2,310m^2.

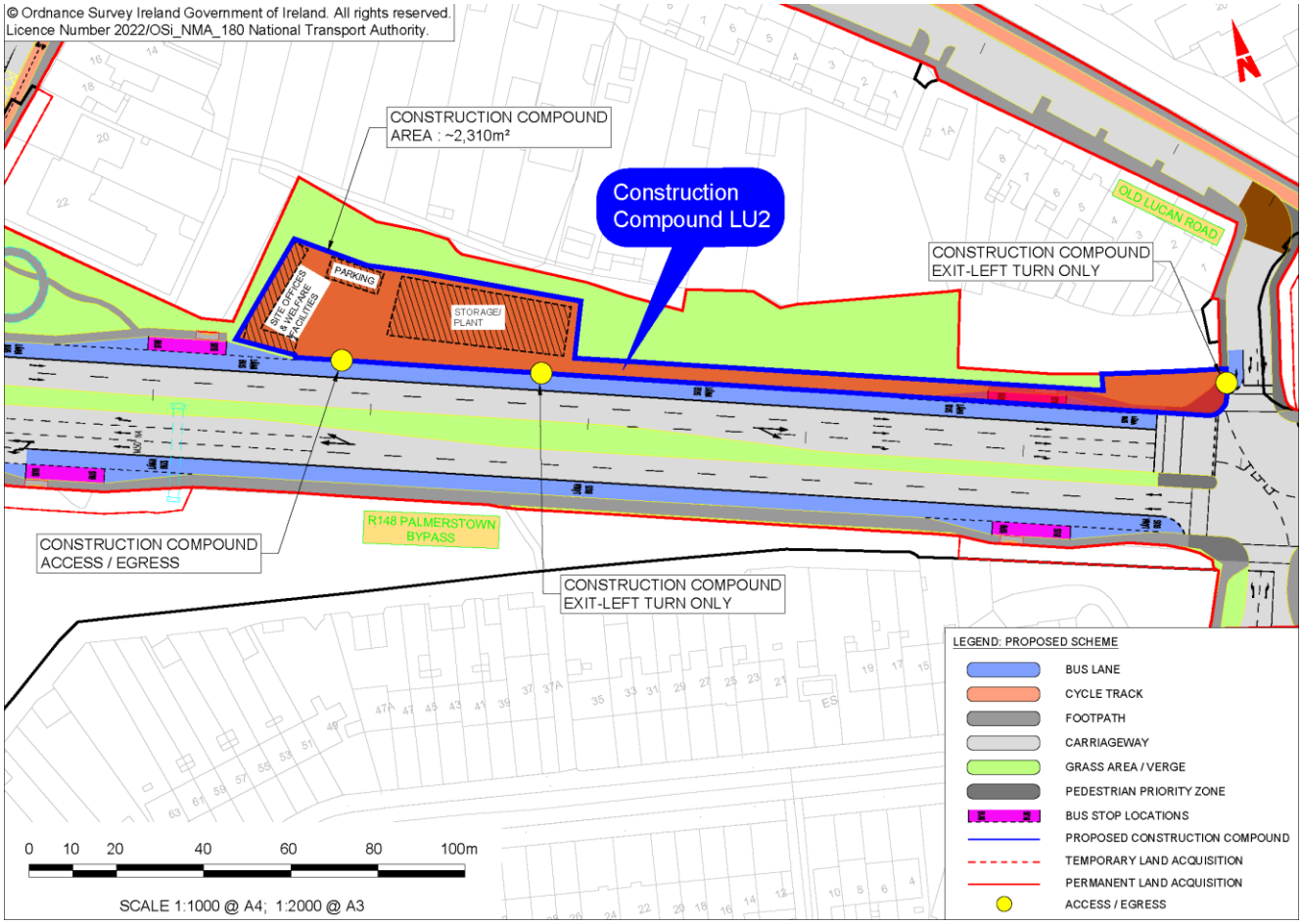

Image 12.3: Location and Extent of Construction Compound LU2

Construction Compound LU3 will be located within Liffey Gaels Park, south of Chapelizod Bypass, at the Con Colbert Road Junction, with access / egress from Con Colbert Road, as shown in Image 12.4. The area of Construction Compound LU3 is 4,460m^2.

It is intended that this area will also be used as a Construction Compound on the Liffey Valley to City Centre Core Bus Corridor Scheme (Construction Compound LV3), pursuant to conditions imposed by An Bord Pleanála, should they grant approval. It is envisaged that the Construction Phases of the Proposed Scheme, and the Liffey Valley to City Centre Scheme will not overlap. Depending on the respective timing of the proposed schemes, the area may continue to be used uninterrupted as a Construction Compound if the second scheme commences construction within a relatively short period of time after the first scheme finishing construction. Alternatively, in the eventuality that there is likely to be a substantial time period (e.g., greater than one year) between the Construction Phases of the two schemes, the NTA in discussion with the Local Authority will identify the most appropriate interim use of the area. When the area has ceased to be used as a construction compound it will be returned to its original condition by the appointed contractor for the second scheme.

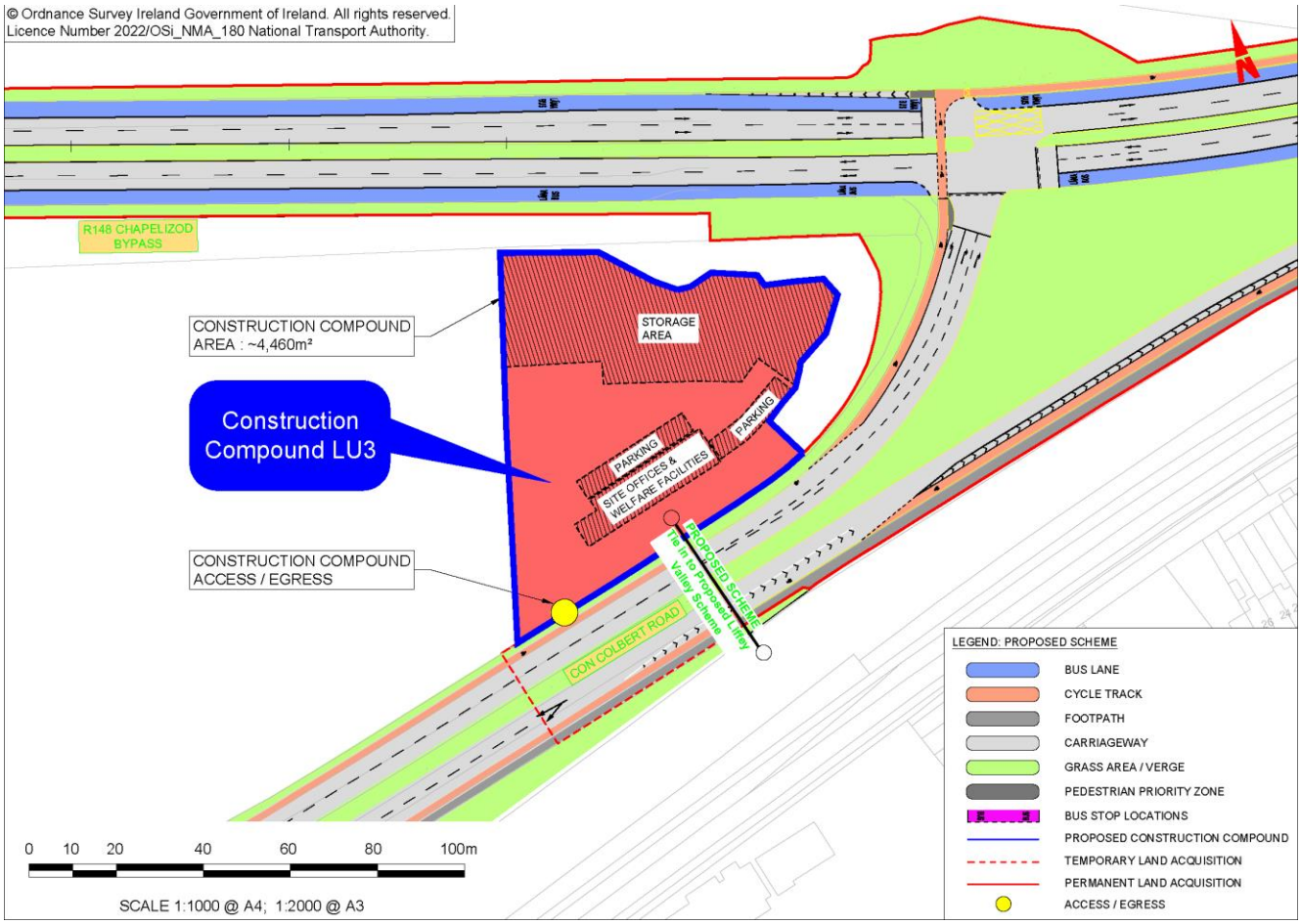

Image 12.4: Location and Extent of Construction Compound LU3

12.4.1.1.4 Estimated Project Duration

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

12.4.1.2 Operational Phase

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

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

12.4.2 'Do Nothing' Scenario

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

The Baseline Environment (see Section 12.3) describes the existing land use surrounding the Proposed Scheme. The Greater Dublin Area is highly urbanised with existing trends resulting in added pressure to water resources and habitat losses to ongoing development. As the full extent of the Proposed Scheme passes through lands zoned under the South Dublin County Development Plan 2022-2028 (SDCC 2022) and Dublin City 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 South Dublin County Development Plan 2022-2028 (SDCC 2022) and Dublin City County Development Plan 2016-2022 (DCC 2016) and overarching pollution control objective in the River Basin Management Plan (RBMP) (DHPLG, 2018).

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

12.4.3 Construction Phase

12.4.3.1 Designated Areas for Nature Conservation

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

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

12.4.3.1.1 European sites

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

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

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

The mechanism to define the ZoI is summarised as follows:

- Consider the nature, size and location of the Proposed Scheme;
- Consider the sensitivities of the ecological receptors;
- Identify impact sources and pathways; and
- Determine the ZoI based on the extent of the impact.

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

- South Dublin Bay SAC [000210];
- North Dublin Bay SAC [000206];
- Rockabill to Dalkey Island SAC [003000];
- Lambay Island SAC [000204];
- 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 introducing / spreading non-native invasive species; and,
- Disturbance and displacement impacts.

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

12.4.3.1.1.1 Habitat Loss and Fragmentation

The Proposed Scheme does not overlap with any European site. The nearest European site to the Proposed Scheme is the Rye Water Valley/ Carton SAC, which is located 4.3km away. The nearest European site with a hydrological connection to the Proposed Scheme is also the Rye Water Valley/ Carton, however this site is located approximately 6.5km upstream of the Proposed Scheme. South Dublin Bay and River Tolka Estuary SPA lies approximately 7km downstream of the point at which the River Camac is crossed by the Proposed Scheme. This is followed by South Dublin Bay SAC, which is located approximately 7.8km downstream of the proposed crossing point on the River Camac. Therefore, there is no potential for direct habitat loss and fragmentation to occur as a result of the Proposed Scheme. Habitat loss may occur indirectly as a consequence of severe habitat degradation arising from a reduction in water quality and/or a change to the hydrological regime, as described in the section below.

Special Conservation Interest (SCI) species for which SPAs in the vicinity of the Proposed Scheme have been designated are known to utilise *ex situ* feeding sites in the Dublin area (i.e. Malahide Estuary SPA, Baldoyle Bay SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA, Rogerstown Estuary SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA and The Murrough SPA).

A single potential inland feeding site within the footprint of the Proposed Scheme was surveyed to inform this assessment - CBC006WB001 Liffey Gaels GAA pitch, located between the Chapelizod Bypass and Con Colbert Road. This site will be lost, at least in the short-term, during the construction period (i.e., 24 months) of the Proposed Scheme as it will be used as a Construction Compound to facilitate nearby works. According to the data collected during winter bird surveys undertaken here during both the 2020-2021 and 2021-2022 winter bird season, the CBC006WB001 site is not deemed to be a significant inland foraging resource for light-bellied Brent goose, given the infrequent nature of the recorded use of the site by this species. Likewise, numbers of black-headed gull and herring gull recorded here during surveys undertaken are not significant with respect to their national or international populations. Regardless, the Proposed Scheme will result (for the duration of the construction period) in the loss of a suitable inland feeding site for these SCI bird species.

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

Regarding the two raptor species for which Wicklow Mountains SPA are designated, according to the Scottish Natural Heritage Guidance (SNH, 2016) during the breeding season the core foraging range for peregrine is estimated at 2km from the nest site, with the maximum recorded distance of 18km in Britain. During the winter season the mean foraging range reduces to 3km with the maximum range being 6.5km. Likewise, during the breeding season merlin are known to forage within 5km of the next site, while in winter this generally reduces to 500m but can extend to 1.5km. Wicklow Mountains SPA lies approximately 11.7km south of the Proposed Scheme, which is well outside the typical foraging ranges for both peregrine and merlin. Therefore, likely significant effects on these two SCI bird species, as a result of ex-situ habitat loss/ fragmentation, can be excluded.

With the exception of otter, the location of the Proposed Scheme and its construction will not result in any direct loss or fragmentation of Annex I habitats or supporting habitats to Annex II species, for which European sites are designated for within the ZoI of the Proposed Scheme. In terms of otter, while the Proposed Scheme does cross the River Camac, it does so at an existing crossing location within which the river is culverted. 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 has the potential to result in habitat degradation/ effects on QI/ SCI species as a consequence of hydrological impacts during both the construction and operation phases. The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during construction, or operation, has the potential to affect water quality in the receiving aquatic environment, which in turn can affect any species which utilise this aquatic environment. Otter use riparian habitats for foraging and commuting purposes and therefore would be potentially at risk of hydrological impacts. Wicklow Mountains SAC, which is located approximately 11.9km south of the Proposed Scheme (from the Liffey Estuary Lower), is the closest European site for which otter is the QI species. Typically, otter territories are within the range of 7.5km for females and up to 21km for males (Ó'Neill *et al*., 2009). The Proposed Scheme only interacts with the following watercourses: Annfield River, River Camac, Grand Canal, River Liffey, Liffey Estuary Upper and Liffey Estuary Lower. Whilst these watercourses lie within the typical territorial ranges of otters, none of them share any hydrological connection to the Wicklow Mountains SAC- it is the River Dodder which provides the key hydrological pathway between the Wicklow Mountains SAC and Dublin City. In addition, the Wicklow Mountains SAC lies within the Dodder_SC_010 subcatchment and the Proposed Scheme lies within the Liffey_SC_090 subcatchment. Given the separation which exists between the Wicklow Mountains SAC and the Proposed Scheme the otter population in the vicinity of the Proposed Scheme is regarded to be distinct to that of the SAC. Therefore, habitat degradation/ effects on the QI otter population for Wicklow Mountains SAC, as a result of hydrological impacts by the Proposed Scheme, can be excluded.

However, the Proposed Scheme is hydrologically connected to Dublin Bay via the River Liffey (Liffey_180 and Liffey_190), River Camac (Camac_040), Liffey Estuary Upper and Liffey Estuary Lower, as well as a network of established combined sewer/surface water pipes which discharge via Ringsend WwTP. The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during construction, or operation, has the potential to affect water quality in the receiving aquatic environment. Such a potential pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and the accidental spillage and/or leaks of contaminants into receiving waters. This occurrence could happen at any time during construction but could potentially be exacerbated by the removal of vegetation. It should be noted that a highly substantial event/events would be required to generate such quantities, which is not deemed likely.

In the absence of mitigation, the associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the discharge point or location of the accidental pollution event. Such an occurrence, of a sufficient magnitude, either alone or in combination with other pressures on water quality, could undermine the conservation objectives of the European sites downstream in Dublin Bay (i.e., North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA and Dalkey Islands SPA). The QI habitats for which Howth Head SAC is designated (i.e., vegetated sea cliffs [1230] and European dry heaths [4030]) lie above the high-water mark. Pollution is not regarded to be a threat or pressure which could potentially impact this SAC site (NPWS, 2021b) and is not regarded to be a significant threat/ pressure to this habitat at a national level (Barron *et al*., 2011). Therefore, the QI habitats of Howth Head SAC will be unaffected by a degradation in the surface water quality of the coastal waters of Dublin Bay and significant effects in that regard can be excluded.

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

As the Proposed Scheme has the potential to result in habitat degradation and effects on SCI bird species and QI marine mammal species associated with European sites located in Dublin Bay, as the result of hydrological impacts, there is the potential for in combination effects to occur.

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

Four areas of Japanese knotweed, a species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations, are present within, or in close proximity to, the Proposed Scheme. In the absence of mitigation, there is potential for this species to spread or be introduced, during construction and/or routine maintenance/management works, to terrestrial and habitat areas in European sites downstream in Dublin Bay (i.e., North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA). These in turn may result in the degradation of the existing habitats, in particular those habitats not permanently or regularly inundated by seawater, potentially outcompeting other native species and affecting species compositive and physical structure of the habitat. Therefore, it is possible that the spread/ introduction of invasive species could undermine the conservation objectives of these European sites.

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

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

12.4.3.1.1.4 Disturbance and Displacement Impacts

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

There are a number of 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, blacked-headed gull, herring gull and lesser black-backed gull. Suitable inland foraging / roosting sites, which these bird species utilise, are located within the potential ZoI of the Proposed Scheme.

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

12.4.3.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

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

Considering the ZoI of the Proposed Scheme, in the absence of mitigation measures the Proposed Scheme has the potential to have a likely significant effect upon the following one NHA and 14 pNHAs:

- Liffey Valley pNHA [000128];
- 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];
- Portraine Shore pNHA [001215];
- Rogerstown Estuary pNHA [000208];
- Lambay Island pNHA [000204];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 pNHAs are primarily designated for similar reasons. The Proposed Scheme also has the potential to affect biodiversity in a broader sense than just the QIs / SCIs of those European sites. Where biodiversity receptors in these pNHAs or NHAs do not form part of the QIs / SCIs in the Natura Impact Statement (NIS) assessment, they are considered under the other individual impact assessment headings for each KER below. Potential impacts arising from the Proposed Scheme on these pNHA sites would result in a likely significant negative effect at a national geographic scale.

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

12.4.3.1.2.1 Habitat Loss and Fragmentation

The Proposed Scheme will not result in any direct impacts to the Liffey Valley pNHA, although at its closest point the Proposed Scheme lies immediately adjacent to its boundary along the R148 Chapelizod Bypass and R112 Lucan Road. The proposed works in this area are very limited, with the arrangements remaining largely as they currently are. In order to widen the existing footpaths for pedestrian and cyclist use, the width of the carriageway lanes and median will be reduced, with no land take required from within the pNHA boundary that is not already occupied by the existing transport corridor. The Proposed Scheme will not result in any habitat loss or fragmentation effects on the Liffey Valley pNHA and therefore no significant effects, in that regard, are predicted.

12.4.3.1.2.2 Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and / or an accidental spillage or pollution event directly into the River Liffey or indirectly via the River Annfield or any surface water feature, including existing drainage infrastructure, has the potential to have a significant negative effect on water quality and consequently affect aquatic and wetland habitats in the receiving environment, including the Liffey Valley pNHA. The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, large extents of the River Liffey, including the Liffey Valley pNHA, downstream could also be affected. It is considered unlikely that a pollution event of such a magnitude would occur during construction, or if it did occur, it would be temporary in nature. Nevertheless, a precautionary approach has been adopted in the assessment of potential risk of impacts on water quality.

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

12.4.3.1.2.3 Habitat Degradation – Groundwater

The potential for hydrogeological impacts are highly variable depending on the nature of the proposed works at specific locations and the receiving environment ground conditions. The Liffey Valley pNHA is located downgradient of the Proposed Scheme. There is a 1.5m deep cutting proposed 360m south of the pNHA, a 3.5m deep cutting proposed 250m south of the pNHA and a 4.5m deep cutting proposed 730m south of the pNHA. Any drawdown from the excavation is expected to be limited, localised, not extending into the boundary of the pNHA site, and temporary. In the absence of mitigation, there is a risk of pollutants entering the groundwater as a result of spillages or accidents, and in such circumstances, this would constitute a significant effect on the Liffey Valley pNHA. Therefore, mitigation measures, as described in Section 12.5.1.2.3 are required to address this potential impact.

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

Four areas of Japanese knotweed, a species listed on the Third Schedule of the (Birds and Natural Habitats) Regulations, are present within, or in close proximity to, the Proposed Scheme. In the absence of mitigation, there is potential for this species to spread or be introduced, during construction and/or routine maintenance/management works, to downstream pNHA sites including Liffey Valley pNHA and pNHA sites downstream in Dublin Bay (i.e., North Dublin Bay pNHA and South Dublin Bay pNHA).These in turn may result in the degradation of the existing habitats, in particular those habitats not permanently or regularly inundated by seawater, in the case of pNHAs located within Dublin Bay, potentially outcompeting other native species and affecting species compositive and physical structure of the habitat. Therefore, it is possible that the spread/ introduction of invasive species could affect the integrity of the Liffey Valley pNHA and pNHA sites in Dublin Bay.

It is not considered possible that the listed invasive species could spread to pNHA sites that are located a considerable distance from the outfall locations of the River Camac, Grand Canal, River Liffey, Liffey Estuary Upper and Liffey Estuary Lower and separated by a large marine waterbody (i.e. Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA and Baldoyle Bay pNHA).

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

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

12.4.3.1.2.5 Habitat Degradation – Air Quality

Dust Emissions

Dust emissions associated with construction works could, in extreme circumstances, affect adjoining habitats, potentially burying sensitive habitats or plant species (e.g., hairy St. John's-wort *Hypericum hirsutum*, green figwort *Scrophularia umbrosa* and yellow archangel *Lamiastrum galeobdolon*, all known to occur in Liffey Valley pNHA). Best practice construction methodologies and mitigation measures have been designed to minimise construction generated dust and to contain it within the Proposed Scheme boundary. Mitigation measures in respect of managing construction dust are provided in Section 7.5.1 of Chapter 7 (Air Quality).

Vehicle Derived Emissions

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

The current understanding of air quality impacts from roads and their interaction / effects on ecology are set out in the TII guidance document Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (NRA 2011) and three UK reports: The Ecological Effects of Diffuse Air Pollution from Road Transport (Bignal *et al.,* 2004), The Ecological Effects of Air Pollution from Road Transport: An Updated Review (Natural England 2016), and Advice on Ecological Assessment of Air Quality Impacts (CIEEM 2021).

An assessment of the impact of the Proposed Scheme has been undertaken using the approach outlined in the IAQM guidance document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM 2020). Vehicle-derived air emissions were modelled during the construction phase along the proposed road development at the Liffey Valley pNHA (Chapelizod Bypass) crossing as well as several crossing points outside of the Proposed Scheme, e.g., Grand Canal pNHA (Davitt Road) (refer to Section 7.4.3.3.4 of Chapter 7 (Air Quality) for details). The worst-case predicted annual average NOx concentrations at various distances from the proposed road edge exceed the 30µg/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 NOx concentrations are predicted to increase slightly at Grand Canal pNHA (Davit Road) (36.3µg/m3 to 36.5µg/m3) and decrease at Liffey Valley pNHA (Chapelizod Bypass) (93.4µg/m3 to 66.3 µg/m3). During the construction phase of the Proposed Scheme, the ecological impacts associated with the Construction Phase traffic emissions are overall negative, slight and short-term. Mitigation measures have been designed to avoid this potential impact (see Section 12.5.1

The contribution of the construction phase of the Proposed Scheme to the NO_2 dry deposition rate was modelled at the Liffey Valley pNHA (Chapelizod Bypass) and Grand Canal pNHA (Davitt Road). Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Grand Canal pNHA and Liffey Valley pNHA. These include canals (FW3), dry meadow / grassy verges (GS2), reed and large sedge swamps (FS1), tall-herb swamps (FS2) and mixed broadleaved / conifer woodland (WD2). The Grand Canal pNHA site is below the lower critical load of inland and surface water habitats of 5-10 Kg(N)/ha/yr (National Road Authority, 2011), while the Liffey Valley pNHA site lies on the lower edge of the range (5.0kg/(N)/h/yr exactly). There is no change in the NO_2 dry deposition rate at the Grand Canal pNHA site as a result of the construction of the Proposed Scheme. The rate decreases to 3.9kg(N)/ha/yr at the Liffey Valley pNHA site as a result of construction. Therefore, harmful effects on vegetation within the Liffey Valley pNHA and the Grand Canal pNHA from NO_2 are not likely, nor will there be any reduction in habitat area of the pNHA habitats, and mitigation is therefore not required.

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

12.4.3.2 Habitats

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

12.4.3.2.1 Habitat Loss and Fragmentation

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

The habitat type tidal rivers (CW2), which is considered to be of National Importance given is Annex I status under the Habitats Directive (i.e. Estuaries [1130]), refers to the Liffey Estuary Upper. The Proposed Scheme proceeds as far as Victoria Quay to the south of the Frank Sherwin Bridge, under which the Liffey Estuary Upper flows. As the Proposed Scheme only proceeds as far as Victoria Quay and does not cross the River Liffey, the Liffey Estuary Upper will not be directly affected by the Proposed Scheme and therefore there is no potential for significant negative effects at any geographic scale.

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

A number of habitat types considered to be of Local Importance (Higher Value) will be lost as a result of the Proposed Scheme. These include relatively small areas of (mixed) broadleaved woodland (WD1), scattered trees and parkland (WD5), hedgerow (WL1), and treeline (WL2) habitats. 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 12.15. It should be noted that the extent of tree loss is calculated across the length of the Proposed Scheme and is captured under treelines (WL2) as the majority of habitat loss affects this habitat type. However small numbers of these trees may be lost from the habitat classification scattered trees and parkland (WD5). This distinction is considered in the habitat loss impact assessment. The permanent loss of such habitat types which are considered to be of Local Importance (Higher Value) has the potential to affect the conservation status of each of these habitat types and, therefore, result in a significant negative effect at the local geographic scale.

The remaining areas within the footprint of the Proposed Scheme comprise of habitats considered to be of a Local Importance (Lower Value). These include, improved amenity grasslands (GA2), dry meadows and grassy verges (GS2), tilled land (BC3), planted flowers beds (BC4), ornamental/non-native shrub (WS3), areas of disturbed ground (ED2 and ED3), scrub (WS1) and hard standing (BL3). These habitats are located next to existing urban development, and as such are highly disturbed. With the exception of the temporary loss of 0.446ha of GA2 habitat for the LU3 Construction Compound, habitat loss will consist of small, isolated sections adjacent to the existing road infrastructure. The overall total area of these habitat types which overlaps with the Proposed Scheme boundary and will potentially be lost as a direct impact during construction of the Proposed Scheme is not considered to be significant at any geographical scale.

The various KER habitat types affected and corresponding total areas which overlap with the Proposed Scheme boundary are summarised in Table 12.15. 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 12.15: Extent of KER habitat types within the Proposed Scheme

Habitat Type	Extent of permanent habitat loss	Extent of temporary habitat loss
National Importance		
Tidal rivers (CW2) (corresponding to Annex I Estuaries [1130])	*0*ha	0ha
Local Importance (Higher Value)		
Depositing/ lowland rivers (FW2)	0m	0m
Mixed broadleaved woodland (WD1)	Approximately 3.3ha	Approximately 0.19ha
Mixed broadleaved/ conifer woodland (WD2)	Approximately. 0.005ha	Approximately 0ha

Habitat Type	Extent of permanent habitat loss	Extent of temporary habitat loss
Scattered trees and parkland (WD5)	Approximately. 0.1ha	Approximately. 1.02ha
Hedgerows (WL1)	Approximately. 2,183m	Approximately. 50m
Treelines (WL2)	Approximately. 2,420m	Approximately 85m
Immature woodland (WS2)	Approximately 0.07ha	Approximately. 0ha
Local Importance (Lower Value)		
Amenity grassland (GA2)	0ha	Approximately 0.446ha

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

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

12.4.3.2.2 Habitat Degradation – Surface Water Quality

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

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

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

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

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

12.4.3.2.3 Habitat Degradation – Hydrological Regime

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

/ mitigation measures have been identified for implementation to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase.

12.4.3.2.4 Habitat Degradation – Groundwater

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

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

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

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

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

12.4.3.2.5 Habitat Degradation – Air Quality

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

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

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

12.4.3.2.6 Habitat Degradation – Non-native Invasive Plant Species

Planting, dispersing, or allowing / causing the dispersal, spread or growth of certain non-native plant species (and / or vector material such as soil that is contaminated with these non-native species) is controlled under regulation 49 of the (Birds and Natural Habitats) Regulations and refers to plant or animal species listed on the Third Schedule of those regulations (see also Section 12.3.7).

The accidental spread of such non-native invasive plant species as a result of construction works has the potential to impact on terrestrial as well as riparian/ aquatic habitats, potentially affecting plant species composition, diversity and abundance over the long-term. This is not only confined to habitats immediately adjacent to the

footprint of the Proposed Scheme but includes habitat areas along the network of proposed haul routes associated with the Proposed Scheme (Figure 12.6 in Volume 3 of this EIAR).

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

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

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

12.4.3.3 Rare and Protected Plant Species

12.4.3.3.1 Habitat Loss

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

Of these, only one species, listed as 'Vulnerable' within Ireland (Wyse Jackson *et al.,* 2016) was recorded in close proximity of the Proposed Scheme. Yellow archangel *Lamiastrum galeobdolon* subsp*. montanum* was recorded at the Irish National War Memorial Park adjacent to the eastbound corridor of the Proposed Scheme in 2020. This species was recorded within the habitats hydrologically connected to, but outside of the immediate footprint of the Proposed Scheme.

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

12.4.3.3.2 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora (Protection) Order were recorded within the Proposed Scheme during field surveys. However, the desk study returned records of opposite-leaved pondweed from the Grand Canal, as well as other species along the River Liffey, namely the 'Endangered' green figwort *Scrophularia umbrosa*.

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

In the absence of mitigation, habitat degradation of the Grand Canal or River Liffey 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 green figwort, 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. Two trees with Potential Roosting Features (PRFs) were identified within the footprint of the Proposed Scheme; two beech trees with dense ivy coverage located within the temporary landtake boundary along the Lucan Road (R835) to the north of Lucan retail park. However, the Proposed Scheme will not result in any direct impacts to these trees. Five trees with PRFs were identified within the boundary of Hermitage Golf Club. Works in the vicinity of the Golf Club include the relocation of the boundary wall and installation of sports netting. These five trees containing PRFs are within the proposed temporary land take boundary for these works, and therefore these trees may be removed as part of the Proposed Scheme. One building located along the western boundary of the Hermitage Golf Club was considered to have moderate potential to support roosting bats. This building is not contained within the temporary or permanent land take boundary of the Proposed Scheme and will therefore be unaffected by the construction of the Proposed Scheme.The construction of the Proposed Scheme will not result in the loss of any breeding / resting sites for any bat species and therefore, there is no potential for 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, 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 12.15 and shown in the Landscape General Arrangement drawings (BCIDA-ACM-UBR_ZZ-0006_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*."

There is evidence of bats foraging and commuting within the study area of the Proposed Scheme, particularly along the Chapelizod Bypass near the slip road for the R112 Lucan Road (CBC0006BT001). All parts of the Proposed Scheme which contain suitable habitat are likely to be within the CSZ of at least one bat roost. Considering the type of works proposed (e.g. upgrading of existing infrastructure for the most part), there is limited potential for the Proposed Scheme to act as a barrier to flight paths for bat species, as there will be no major changes to pre-existing habitats along most of the route.

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

and hedgerows which could all be used by local bats. These habitats constitute a landscape feature which could be used by foraging / commuting bats and their loss, will result in a reduction of foraging / commuting habitat for local bats in this area.

The provision of cycle tracks along the N4 will require the removal of a long linear feature of existing trees (largely but not exclusively non-native Leylandii) from the boundary of Hermitage Golf Club and Hermitage Medical Clinic. However, the existing vegetated boundaries in these areas are relatively wide, typically consisting of screening treeline dominated by a single row of Leylandii, which back on to other mixed age/mixed species broadleaf-dominated woodland planting within the golf course. Tree removal at this location would result in the removal of approximately 218 trees (i.e., those currently closest to the N4) while trees further back would be retained. Therefore, the removal of the linear band of non-native trees at this location would not result in habitat fragmentation as the overall landscape features (i.e., existing mixed aged/ broadleaf planting) would remain, albeit at a reduced width. Works along the Chapelizod Bypass in the vicinity of the slip road for the R112 Lucan Road (CBC0006BT001) and near the junction with Con Colbert Road (CBC0006BT002) will not result in the removal of any substantial vegetation, which could constitute habitat fragmentation. A significant portion of mixed broadleaved woodland habitat (WD1) will be removed along Chapelizod Hill Road and the Chapelizod Bypass, to facilitate the provision of bus stop lay-bys and associated access ramps and stairs, and necessitating widening of the existing bridge deck. Considering the existing width of this habitat at this location, and the fact that a large portion of the habitat will be retained, thereby avoiding complete fragmentation, this impact will be significant at the local level only.

Removal of suitable habitat for foraging and/commuting bats within the footprint of the Proposed Scheme is calculated as approximately 8.3ha. Habitat removal is within a highly disturbed urban environment with low numbers of species records, and, as such is not deemed to provide significant contributions to core sustenance zones of roosts outside of the footprint of the Proposed Scheme. The effect of habitat fragmentation and barrier effect associated with the construction of the Proposed Scheme is therefore considered to be significant at the local level only.

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

Construction Compounds are proposed in the following four locations:

- Construction Compound LU1a will be located immediately north-east of the N4 Junction 2, between the Old Lucan Road and the R113;
- Construction Compound LU1b will be located between the N4 National Road and the Old Lucan Road;
- Construction Compound LU2 will be located north of the R148 Palmerstown Bypass, on the M50 Junction 7 to Con Colbert Road section of the Proposed Scheme ; and,
- Construction Compound LU3 will be located to the south-west of the junction of the R148 Chapelizod Bypass / R833 Con Colbert Road.

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

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

12.4.3.4.2 Badger

Multi-disciplinary surveys did not confirm any badger setts within the footprint of the Proposed Scheme. Evidence of badger activity (e.g. badger faeces and evidence of foraging behaviour) was recorded within the boundaries of the Hermitage Golf Club, and appropriate precautionary mitigation has been proposed.

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

12.4.3.4.2.1 Loss of Foraging Habitat and Breeding / Rest Sites

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

Surveys within the boundaries of the Hermitage Golf Club, revealed evidence of badger activity. Considering this, and the habitats present within the Hermitage Golf Club lands, and the connectivity of these lands to suitable habitats in the wider environment (e.g. agricultural fields and woodland along the River Liffey), there is the potential for badgers to utilise the area for breeding and resting purposes, in addition to confirmed foraging purposes. This impact assessment has progressed on this precautionary basis.

Badger, and their breeding and resting places, are legally protected under the Wildlife Acts. Works in the vicinity of the Hermitage Golf Club include the demolition and relocation of the existing boundary wall, the erection of sports netting (requiring piled foundations) and the felling of a large number of trees along the existing boundary. In the event that a badger sett is located within close proximity to the works, the works could result in disturbance and potentially abandonment of the sett. Depending on the significance of the sett, if present (i.e. maternal sett, outlier sett etc), these effects could be significant at the local geographic scale and could affect local populations of badger.

Construction may result in the permanent loss of approximately 12ha (hectares) of suitable foraging/ commuting habitat for badgers (e.g. amenity grassland, scattered trees and parkland, dry meadows and grassy verges, scrub, mixed broadleaved woodland and treelines / hedgerows). In addition, the provision of construction compounds LU2 and LU3 for the duration of the Construction Phase will result in the temporary loss of 0.68ha of amenity grassland habitat, which could be used by commuting / foraging badgers. Given the relative abundance of suitable habitat in the wider vicinity (e.g., agricultural lands to the north of the N4 and woodland associated with Liffey Valley pNHA), the temporary loss of these habitats is not considered significant at any geographic scale. As the majority of the proposed location of construction compound LU1a 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. Similarly, Construction Compound LU1b is composed of treeline habitat, which is unlikely to be of high significance for use by foraging badgers given its location between an existing busy transport corridor and residential area.

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

12.4.3.4.2.2 Disturbance / Displacement

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

As construction works in areas of suitable foraging habitat will typically be undertaken during normal daylight working hours and badgers are nocturnal in habit, displacement of badgers from foraging areas (outside of areas

where foraging habitat will be lost as a result of the Proposed Scheme) is extremely unlikely to affect the local badger population and will not result in a likely significant negative effect, at any geographic scale. In addition, badgers residing within the wider study area are likely to be habituated to disturbance within the urban environment and therefore would be less sensitive to very localised, temporary increases in disturbance.

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

12.4.3.4.3 Otter

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

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

12.4.3.4.3.1 Loss of Breeding / Resting Sites

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

12.4.3.4.3.2 Loss / Fragmentation of Foraging / Commuting Habitat

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

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

The Proposed Scheme is not expected to result in any loss / fragmentation to habitats used by otter. This is because it does not include any works to watercourses or associated riparian vegetation in the vicinity of the Proposed Scheme. There are no works proposed over the River Liffey, and the River Annfield and River Camac are both culverted where they occur in close proximity to the Proposed Scheme. Therefore, there is no potential for the Proposed Scheme to result in the loss/ fragmentation of foraging/ commuting habitat for otter.

Otter are known to routinely use highly modified habitat within culverts and beneath bridges. Any habitat loss arising from the Proposed Scheme would not constitute a significant decline in the extent of available otter habitat and will not affect the local otter population's ability to maintain itself, even in the short-term.

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

12.4.3.4.3.3 Habitat Severance / Barrier Effect

There are no works proposed over the River Liffey. The River Annfield and River Camac are both culverted where they occur in close proximity to the Proposed Scheme. Therefore, there is no potential for severance/barrier effects, as a result of construction works, to significantly affect the local otter population.

12.4.3.4.3.4 Habitat and Food Source Degradation – Water Quality

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

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

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

Habitat degradation as a result of effects on surface water quality during Construction Phase has the potential to affect the species' conservation status and result in a 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 study area, as revealed in the results of the desk study.

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

12.4.3.4.3.5 Disturbance / Displacement

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

Similarly, otter activity has been documented within the lower reaches of the Liffey Estuary Upper and in the vicinity of the Frank Sherwin Bridge. The river channel is modified at both sides with no natural bank. Notwithstanding the location in a metropolitan setting alongside Heuston Station, otter activity is not predicted to alter. Construction activities in proximity to the River Liffey at this location may include road planning, utility diversion, construction/installation of new infrastructure, carriageway and resurfacing. Noise and vibrations associated with these works will have the potential to create disturbance within the vicinity of the works. Noise and disturbance levels associated with these works lie within the range 62-83dB, depending on the activity, at

10m from the Proposed Scheme boundary and return to background levels within 50m (average daytime noise levels within the Con Colbert Road to Frank Sherwin Bridge section of the Proposed Scheme was in the order of 72dB- refer to Chapter 9 Noise and Vibration). As such disturbance for mammals is estimated to reach approximately 50m from the Proposed Scheme in this highly urbanized area. Active otter holts are outside of this Zol, disturbance effects from the Proposed Scheme are not deemed to cause displacement affects leading to abandonment of holts or territory.

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

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

12.4.3.4.4 Marine Mammals

12.4.3.4.4.1 Habitat and Food Resource Degradation – Water Quality

As discussed in Section 12.4.3.2.2the Construction Phase of the Proposed Scheme could result in contamination of receiving water bodies. This could result in significant negative impacts on marine mammals either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats). Habitat degradation due to effects on surface water quality during construction has the potential to affect the species' conservation status and result in a 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 and hedgehog.

12.4.3.4.5.1 Habitat Loss

The construction of the Proposed Scheme will result in the temporary loss of suitable habitat for small mammals located within the boundary of the Proposed Scheme. Given the relatively low numbers of individuals of each species that are likely to be affected (i.e., 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 (February to October inclusive depending on species) when juveniles would be present in nests, or in the case of hedgehog impacts may be greater during their hibernation period. Furthermore, the potential for direct mortality to small mammals would be greater in more vegetated areas, as opposed to disturbed ground/ urban habitats, as these areas would offer

more in terms of breeding/ resting habitat for small mammal species. Given the relatively low numbers of individuals of each species that are likely to be affected, and that these species are highly mobile, site clearance is unlikely to result in a level of mortality that would affect the species' conservation status, and result in a significant negative effect, even at a local geographic scale.

12.4.3.4.5.3 Disturbance / Displacement

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

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

12.4.3.5 Birds

12.4.3.5.1 Breeding Birds

The assessment carried out in the NIS for the Proposed Scheme (which is a standalone document provided within the planning application to enable the Board, as competent authority to carry out an Appropriate Assessment for the purposes of Article 6(3) of the Habitats Directive) considered the potential for the Proposed Scheme to affect the bird species listed as SCIs of European sites. That assessment concluded that the Proposed Scheme would not affect their breeding colonies or have any long-term effects on the local breeding populations. Therefore, for these species, the Proposed Scheme will not affect the conservation status of the breeding populations and will not have any adverse effects on the integrity of European sites.

12.4.3.5.1.1 Habitat Loss and Loss of Breeding / Resting Sites

The Proposed Scheme will result in the loss of breeding bird nesting and foraging habitat within the footprint of the Proposed Scheme. The areas of habitat loss within the Proposed Scheme boundary are provided in Section 12.4.3.2 and tabulated in Table 12.15 for all KER habitat types. These areas comprise a total area of approximately 5.6ha of hedgerows and treelines (also KERs), mixed broadleaved woodland (KER) and approximately 0.1ha of 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, these habitats may provide nesting and / or foraging habitat for birds. These areas will be removed during construction of the Proposed Scheme resulting in an additional loss of breeding bird nesting and / or foraging habitat. In summary, the habitats that may be lost comprise:

- Treeline habitat located along N4 Lucan Road, in particular at Hermitage Golf Club and R835 Lucan Road and proposed location of Construction Compound LU1b;
- Hedgerow habitat at the junction between the Old Lucan Road and the R113, to accommodate the proposed Construction Compound LU1a;
- Treeline habitat west of The King's Hospital School;
- Mixed broadleaved woodland habitat to accommodate proposed bus stops either side of the Chapelizod Bypass where it crosses over Chapelizod Hill Road;
- Amenity grassland to the north of the R148 Palmerstown Bypass, on the M50 Junction 7 to Con Colbert Road section of the Proposed Scheme, to accommodate proposed Construction Compound LU2; and,
- Amenity grassland at Liffey Gaels GAA pitches at the junction of Con Colbert Road and the Chapelizod Bypass, to accommodate the proposed Construction Compound LU3.

The primary consequence of habitat loss will be increased competition for resources (e.g., nesting habitat and / or prey / food source) both between and amongst breeding bird species. The magnitude of this effect will be

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

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

- Parks and greenspaces with hedgerow, treeline and/or scrub boundaries such as Hermitage Golf Club, Castleknock Golf Club, the grounds of The King's Hospital School, Hermitage Park, Mount Andrew Park, Ballyowen Park, Collinstown Park, Waterstown Park, Phoenix Park, Markievicz Park, Irish National War Memorial Gardens, St. John Bosco Football Club, Templeogue Synge Street GAA Club, St. Patrick's Park and TU Dublin Grangegorman playing pitches;
- Woodland such as that present in Liffey Valley pNHA;
- Wildfowl and waterbird habitat within the Upper Liffey Estuary, Lower Liffey Estuary and wider Dublin Bay area; and,
- Sections of the River Liffey both upstream and downstream of the Proposed Scheme.

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

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

12.4.3.5.1.2 Mortality Risk

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

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

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

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

12.4.3.5.1.3 Disturbance / Displacement

The noise, vibration, increased human presence and the visual deterrent of construction traffic, associated with site clearance and construction will temporarily disturb breeding bird species and is likely to displace breeding birds from habitat areas adjacent to the footprint of the Proposed Scheme. Construction activities will largely involve carriageway and pavement resurfacing / reconstruction as required, readjustment of kerbs and new road. However, as an important transport corridor in a heavily urbanized landscape, there is an existing relatively high level of human disturbance within the immediate environment of the Proposed Scheme (e.g. Chapelizod Bypass and N4/M50 Interchange) and as such it is likely that breeding species present are habituated to a certain degree

of disturbance. The magnitude of the impact will be dependent on the type of construction works and their duration; general construction activities will have a less pronounced affect than blasting, in terms of its ZoI, but will be on-going from periods of up to 24 months and multiple breeding seasons across the entirety of the Construction Phase. However, phasing of the construction works in scheme section will reduce the temporary nature of this impact to approximately one to twelve month disturbances in each section of the Proposed Scheme. With regards the proposed Construction Compounds disturbance impacts will be short-term in nature as they will be ongoing for the duration of the Construction phase.

Table 12.16 provides a summary of the indicative construction noise calculations at varying distances, which have been modelled in the Chapter 9 Noise and Vibration in Volume 3 of this EIAR. Areas within the Proposed Scheme, which will be subject to construction activities which generate noise levels greater than 50dB (*e.g.,* piling, rock-breaking *etc.*), include Chapelizod Hill Road and R835 Lucan Road. These activities will result in a greater magnitude of effect on the baseline environment. As a result, noise and vibration from these activities, will have the potential to result in the reduced breeding success of breeding bird species in the vicinity of the works. Breeding pairs will be temporarily displaced during the construction works. The area over which disturbance / displacement effects will occur, forms a relatively small part of larger expanses of similar habitat types in the wider locality (i.e. mixed broadleaved woodland along the Chapelizod Bypass). As such, given the availability of suitable habitat in the wider locality of the Proposed Scheme, the construction works are therefore not likely to affect the conservation status of breeding birds and will not result in a likely significant negative effect, above the local geographic scale. Although it is not possible to quantify the magnitude of this potential impact (or the potential effect zone) with precision, it could potentially extend for several hundred metres from the Proposed Scheme. The results of noise modelling carried out for the Proposed Scheme confirmed that at 150m, noise levels for all construction activities will be below 60dB (See Chapter 9 (Noise & Vibration)). Given the temporary to short-term nature of the construction works, coupled with the existing levels of disturbance within these urban areas, disturbance or displacement effects associated with the Construction Phase of the Proposed Scheme will also be over the short-term. Therefore, these impacts will not affect the conservation status of breeding bird species and will not result in a negative effect, above the local geographic scale.

12.4.3.5.1.4 Habitat Degradation – Surface Water Quality

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

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

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

12.4.3.5.2 Wintering Birds

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

12.4.3.5.2.1 Habitat Loss and / or Disturbance / Displacement

Potential impacts may arise due to the direct short term loss of feeding habitat including a grassed area adjacent to Liffey Gaels GAA playing pitches (approximately 0.446ha in total area), to accommodate the proposed Construction Compound LU3 (referred to as CBC0006WB001). Numbers recorded during winter bird surveys undertaken here suggested that the site was not a significant wintering bird site, and that there was considerable potential for other for wintering birds in the wider vicinity (refer to Section 12.3.9.2).

The short-term loss of suitable GA2 habitat at the proposed Liffey Gaels GAA Club grounds Construction Compound LU3 is not deemed to have a significant impact on the wintering bird population at any geographical scale due to the following reasons:

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

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

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

Current understanding of construction related noise disturbance to wintering waterbirds is based on the research presented in Cutts *et al.* (2009) and Wright *et al*. (2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds, i.e., birds becoming alert and some behavioural changes (e.g., reduced feeding activity), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity (BS 5228) are generally below 60dB or, in most cases, are approaching the 50dB threshold. As such, disturbance effects for general construction activities across the majority of the Proposed Scheme would not be expected to extend beyond a distance of approximately 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond. Table 12.16 provides the indicative construction noise calculation associated with different construction activities of the Proposed Scheme at varying distances.

Table 12.16 Indicative Construction Noise Calculations at Varying Distances

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

None of the construction activities proposed would be expected to result in any more than a moderate level of disturbance effect on wintering birds at distances beyond 250m. At 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 winter bird sites would contribute to further reducing the ambient noise at any given distance. Therefore, 300m is considered to be a precautionary buffer in defining the ZoI of disturbance effects.

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

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

The majority of wintering birds identified in the desk study are typically found in coastal, estuarine and intertidal habitats including the Liffey Estuary and Dublin Bay, and therefore will not be impacted directly during construction. Certain species, such as light-bellied Brent geese, often forage on inland sites in the Greater Dublin Area. Suitable sites are usually composed of open parkland/ playing pitches. No confirmed inland wintering bird feeding sites are known to occur within approximately 300m of the Proposed Scheme, the distance within which birds would be expected to be displaced. The grounds adjacent to the Liffey Gaels GAA pitch, for which a Construction Compound is proposed to be located, was identified as having potential to support wintering birds. However, the survey results indicate relatively low frequency of occurrence of wintering bird species on these lands and suggests these species do not regularly use or rely upon these lands as foraging and/or roosting habitat. The peak flocks of each respective wintering bird species recorded at these sites are also relatively low in particular, when compared to 1% of their international flyway and national populations. A wetland is considered to be of international importance if it regularly supports 1% of the relevant international, or flyway, population or if it supports a population of >20,000 waterbirds (Nagy and Lanngendoen, 2018).

Table 12.17: Wintering bird species recorded during wintering bord surveys in comparison to the 1% of its International and National Populations

Common Name/Scientific Name/BTO Code	Peak Count Recorded at Site – Date Recorded	Threshold of International Population (1% of International Population)	Threshold of National Population (1% of National Population)
Common gull *Larus canus* (CM)	9	16,400	n/a
Black-headed gull *Chroicocephalus ridibundus* (BH)	19	31,000	n/a
Herring Gull *Larus argentatus* (HG)	12	14,400	n/a

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

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

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

- Parks and greenspaces such as Palmerston/Glenaulin Park, Liffey Gaels GAA Club, Longmeadows Park, Markievicz Park, Gaels-Drumfinn Avenue Park, Waterstown Park, Hermitage Golf Club; and
- Wetland habitat associated with South Dublin Bay and River Tolka Estuary SPA, and North Dublin Bay SPA.

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

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

12.4.3.5.2.2 Habitat Degradation – Surface Water Quality

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

Habitat degradation as a result of effects on surface water quality during construction has the potential to result in a 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

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

12.4.3.7 Amphibians

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

12.4.3.7.1 Disturbance / Mortality Risk

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

12.4.3.7.2 Habitat Severance / Barrier Effect

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

12.4.3.7.3 Habitat Degradation – Surface Water Quality

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

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a 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 habitat nor result in a barrier effect in respect of aquatic biodiversity.

12.4.3.8.2 Habitat Degradation – Surface Water Quality

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

The effects of frequent and / or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects. It is considered unlikely that a pollution event of such a magnitude would occur during construction or if such an event did occur, it would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality

impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Scheme having any perceptible effect on water quality during construction.

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

Desk study records, as presented in Section 12.2.3 revealed that the River Camac is known to support populations of Brown trout. Furthermore, the River Liffey is recognised as a highly significant regional salmonid catchment for species of Atlantic salmon and brown trout. Given that salmonid species are protected under both national and international legislation, habitat degradation, as a result of effects on surface water quality on the River Camac 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 Camac and River Liffey, as outlined in the desk study. Suitable lamprey habitat occurs in upstream sections of the River Camac. 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 eel is known to occur in the River Camac, upstream of the Proposed Scheme. In addition, the Liffey estuary serves as the gateway for Eels migrating between freshwater and ocean environments, providing the necessary habitat for their transition. Habitat degradation, as a result of effects on surface water quality during construction, has the potential to result in a likely significant effect at the County level on eel, given the presence of suitable habitat and declining trend of eel in Irish waters.

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

12.4.3.9 Invertebrates – Freshwater

12.4.3.9.1 Habitat Loss / Mortality Risk

As revealed in the desk study, healthy white-clawed crayfish populations are known in the River Camac and selected tributaries upstream of the Proposed Scheme (Triturus Environmental Ltd., 2020; Sweeney Consultancy 2018). Due to the underground nature of the River Camac at the crossing point of the Proposed Scheme, there is no suitable habitat for white-clawed crayfish within the footprint of the Proposed Scheme, or downstream of the point at which the River Camac is crossed by the Proposed Scheme. The Proposed Scheme will not interact with the stretches of watercourses in the vicinity in which white-clawed crayfish are known to occur. Therefore, no significant effects on this species as a result of the construction of the Proposed Scheme are predicted.

The desk study also revealed records for two Red Listed freshwater molluscs, duck mussel *Anodonta anatine* and ear pond snail *Radix Auricularia,* located approximately 700m north of Proposed Scheme within a millrace, hydrologically connected to the River Liffey.

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

12.4.3.9.2 Habitat Degradation – Surface Water Quality

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

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

Table 12.18: 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	International Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Dalkey 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

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
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
Liffey Valley pNHA	National Importance	Habitat Degradation (hydrology; hydrogeology, air quality, non-native invasive plant species)	Likely significant effect at the national geographic scale
Grand Canal pNHA	National Importance	Habitat Degradation (hydrology; hydrogeology, air quality,non-native invasive plant species)	Likely significant effect at the national geographic scale
Habitats (outside of designated areas for nature conservation)			
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Mixed broadleaf/conifer woodland (WD2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Rare / Protected Plant Species			
Greonlandia densa	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Scrophulria umbrosa	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Non-native Invasive Plant Species	N/A	Spread at expense of other Habitats, Habitat Degradation (hydrology)	Likely significant effect at the local to International scale geographic scale
Fauna Species			
Bats	Local Importance (Higher Value)	Habitat loss / fragmentation; Disturbance/displacement	Likely significant effect at the local geographic scale
Badger	Local Importance (Higher Value)	Disturbance / displacement	Likely significant effect at the local geographic scale
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals	International to County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
SCI bird species	International Importance	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Fish Species	Local Importance (Higher Value) – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Non-Annex fish species	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Invertebrates- Freshwater molluscs	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Local Biodiversity Areas			
Liffey Valley SAAO River Liffey Corridor	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
River Camac	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale

12.4.4 Operational Phase

12.4.4.1 Designated Areas for Nature Conservation

12.4.4.1.1 European sites

12.4.4.1.1.1 Habitat Loss and Fragmentation

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

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

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

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

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

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

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

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

12.4.4.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

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

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

12.4.4.1.2.1 Habitat Degradation – Air Quality

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

Vehicle-derived air emissions were modelled during the construction phase along the proposed road development at the Liffey Valley pNHA (Chapelizod Bypass) crossing as well as several crossing points outside of the Proposed Scheme, e.g. Grand Canal pNHA (Davitt Road) (refer to Section 7.4.3.3.4 of Chapter 7 (Air Quality) for details). The worst-case predicted annual average NOx concentrations at various distances from the proposed road edge exceed the 30µg/m3 limit value. In all cases where exceedances occur, the baseline environment is already in excess of this value. During the operational year (2028) of the Proposed Scheme, annual mean NOx concentrations are predicted to increase slightly at Grand Canal pNHA (Davit Road) (36.6µg/m3 to 37.5µg/m3) and decrease at Liffey Valley pNHA (Chapelizod Bypass) (94.5µg/m3 to 94.3 µg/m3). During the operational phase of the Proposed Scheme, the ecological impacts associated with the Operational Phase traffic emissions are overall positive, slight and long-term. As such, no mitigation measures are required.

The contribution of the operational phase of the Proposed Scheme to the NO_2 dry deposition rate was modelled at the Liffey Valley pNHA (Chapelizod Bypass) and Grand Canal pNHA (Davitt Road). Nitrogen deposition levels have been compared to the lower and higher critical loads for habitats associated with the Grand Canal pNHA and Liffey Valley pNHA. These include canals (FW3), dry meadow / grassy verges (GS2), reed and large sedge swamps (FS1), tall-herb swamps (FS2) and mixed broadleaved / conifer woodland (WD2). The Grand Canal pNHA site is below the lower critical load of inland and surface water habitats of 5-10 Kg(N)/ha/yr (National Road Authority, 2011), while the Liffey Valley pNHA site lies on the lower edge of the range (5.1kg/(N)/h/yr exactly). There is a very slight increase in the NO_2 dry deposition rate at the Grand Canal pNHA site as a result of the operation of the Proposed Scheme. The rate increases from 2.4kg(N)/ha/yr to 2.5 kg(N)/ha/yr. There is no change in the NO_2 dry deposition rate at the Liffey Valley pNHA site as a result of operation of the Proposed Scheme. Therefore, significant effects on vegetation within the Liffey Valley pNHA and the Grand Canal pNHA from NO2 are not predicted likely, nor will there be any reduction in habitat area of the pNHA habitats, and mitigation is therefore not required.

12.4.4.2 Habitats

12.4.4.2.1 Habitat Degradation - Surface Water Quality

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. The drainage system for the Proposed Scheme will discharge to four surface water receptors: Liffey_170, Liffey_180, Liffey_190 and Liffey Estuary Upper, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP, before ultimately draining to Dublin Bay. All drainage outfall discharges to surface waters represent point discharges. For the Proposed Scheme, there will be a net increase of 6.646m^2 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 attenuated oversized pipes, bioretention areas and tree pits and additional permeable areas will also be provided by the softening of public realm along the routes. Where no new paved areas are proposed, the existing drainage network will be retained and utilised (see Chapter 4 (Proposed Scheme Description) for more detail on drainage design).

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

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

Mitigation measures to maintain SuDS are provided in Section 12.5.2.

12.4.4.2.2 Habitat Degradation – Non-Native Invasive Plant Species

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

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

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

12.4.4.2.3 Habitat Degradation – Air Quality

As discussed above in Section 12.4.4.1.2.1, air quality modelling of NO_x concentrations and deposition rates were modelled for the Operational Phase of the Proposed Scheme at distances up to 200m from the Proposed Scheme (refer to Chapter 7 (Air Quality) for details). The results from the Air Quality modelling deem the Proposed Scheme overall positive 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, 2022, were recorded within the Proposed Scheme during field surveys. However, the desk study returned records a number of species listed on the Flora (Protection) Order from within 1km of the Proposed Scheme. None of these species lie within the footprint of the Proposed Scheme. Some are terrestrial in nature whilst others are aquatic or riparian species.

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

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

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

Mitigation measures to maintain SuDS are provided in Section 12.5.2.

12.4.4.4 Mammals

12.4.4.4.1 Bats

12.4.4.4.1.1 Habitat Severance/ Barrier Effect

The provision of the proposed footbridge over the N4, opposite Liffey Valley Shopping Centre, will not result in any barrier effect to local bats. This is because it is unlikely that bats would currently commute/ forage over this highly disturbed and well-lit road. Therefore, the provision of this footbridge at this location will not result in any significant effects on populations of local bats.

12.4.4.4.1.2 Indirect Disturbance of Light Patterns Due to Operational Lighting

Additional permanent lighting features within suitable habitat may result in avoidance behaviour by bats. Such displacement (which would be a matter of metres) could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Given the urban environment of the Proposed Scheme, and the fact that artificial lighting is already present along the footprint of the Proposed Scheme, the effects of displacement as a result of increased artificial lighting are not considered to be significant at any geographic scale. This is because the lighting strategy involves the upgrade / relocation of existing lighting infrastructure and given that artificial lighting is already in place along the Proposed Scheme, bat species who utilise the area would already be habituated to some level of artificial lighting. The effects of operational artificial lighting on bat species is therefore not considered to be significant at any geographic scale. The exception to this is the access road to Hermitage Golf Club, which is currently unlit. The Proposed Scheme proposes to install artificial lighting along the southern portion of this access road which lies parallel to the N4. The additional lighting here could result in displacement effects on bats commuting/ foraging along the field boundaries of the agricultural lands which lie to the north of this access road. This impact would be considered insignificant, given the discrete location over which effects on bats would be felt. Mitigation to avoid light spill are detailed in Section 12.5.

12.4.4.4.1.3 Disturbance / Displacement – Increased Human Activity

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

12.4.4.4.1.4 Collision Risk

Bats have been recorded using the lands within the boundary of the Hermitage Golf Club for foraging and commuting purposes. The installation of 130m of sports netting (15m in height) along the existing golf club boundary with the N4 has the potential to result in a collision risk to local bat populations. Likewise, the provision of the proposed replacement pedestrian and cyclist bridge over the N4 at Ballyowen Road and proposed pedestrian bridge over the N4 at Liffey Valley Shopping Centre also have the potential to result in a collision risk to local bat populations. However, the likelihood of bats using the area around the sports netting and proposed new bridge structures during the operation of the Proposed Scheme is considered to be extremely low, as bats are known to be perturbed by roads (Berthinussen & Altringham, 2012). Given the proposed location of the proposed new bridge structures and sports netting, over and adjacent to a well-lit busy infrastructure route, which is likely to be creating an existing barrier effect to local bat populations already, it is considered unlikely that significant numbers of bats commute/ forage in this area. Therefore, the collision risk of the sports netting and new bridge structures is not likely to result in a significant effect on the local bat populations or their conservation status and is therefore not likely to be significant at any geographic scale.

12.4.4.4.2 Badger

No evidence of badger setts was recorded along the Proposed Scheme during surveys undertaken. However, evidence of badger activity (e.g. badger faeces and foraging signs) were recorded within the boundary of the Hermitage Golf Club. In addition, the results of the desktop study also show that badger are known to occur within the wider vicinity and therefore potential 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). Although the majority of the Proposed Scheme corridor is already lit artificially, the proposal will result in the introduction of artificial lighting to one previously unlit area- the access road to Hermitage Golf Club, as well as additional light spill onto golf course from existing illumination along the N4 owing to removal of some linear boundary vegetation. Given the location of this access road to the south of agricultural lands, which would constitute suitable commuting/ foraging habitat for badgers, the introduction of artificial lighting along this road could result in displacement effects on badgers foraging/ commuting along the adjacent field boundary. This impact would be considered significant at the local level only, given the discrete location over which effects in local badgers would be felt.

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

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

12.4.4.4.3 Otter

No evidence of otter was recorded along the Proposed Scheme during surveys undertaken. However, based on the results of the desk study, otter are known to occur within the wider vicinity, particularly along the River Liffey, River Camac and Grand Canal. 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. Previously unlit areas, which will be artificially lit as a result of the Proposed Scheme are limited to the access road to Hermitage Golf Club. This access road lies within 50m of the River Annfield. However, it should be noted that this section of the River Annfield is culverted at its closest location to the area of the access road proposed to be lit. Given the distance between the most easterly proposed lighting column and the River Annfield, no significant displacement effects on otter are predicted.

Disturbance or displacement associated with the operation of the Proposed Scheme is not likely to affect the conservation status of otter and therefore, will not result in a 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 is therefore, not likely to be significant at the 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 marine mammals in the wider vicinity and the relative abundance of marine mammals across the wider environment, as demonstrated in the results of the desk study.

12.4.4.4.5 Other Mammals

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

12.4.4.4.5.1 Habitat Severance / Barrier Effect

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

As the Proposed Scheme, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on mammals is not considered to be significant at any geographic scale. The existing infrastructure itself already acts as a barrier to 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. Previously unlit areas which will be artificially lit as a result of the Proposed Scheme are limited to the access road to Hermitage Golf Club which lies to the south of agricultural lands and/or increased light spill onto the golf course as a result of the removal of taller screening vegetation.

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

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

12.4.4.5 Birds

12.4.4.5.1 Breeding Birds

12.4.4.5.1.1 Disturbance / Displacement

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

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

Localised disturbance effects on breeding birds will most likely be of greater impact at the Hermitage Golf Club and other areas where greater quantities of vegetation may be lost than the remainder of the scheme (e.g. Chapelizod Hill Road). The removal of screening vegetation and the installation of sports netting along the reconfigured boundary of the Hermitage Golf Club along the N4 is likely to result in reduced height vegetation and a new artificial barrier. This could result in localised displacement, owing to the creation of this artificial barrier. It is therefore considered that there may be a temporary significant effect on breeding birds at a local scale, until such a time that they have become habituated to the physical barrier.

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 during operation is not predicted to affect the conservation status of aquatic or wetland bird species and will therefore, not result in a likely significant negative effect, at any geographic scale.

12.4.4.5.1.3 Collision Risk

During operation there is the potential for collision risk for local populations of breeding passerine birds, as a result of the installation of proposed 130m of sports netting (15m in height) along the boundary of the Hermitage Golf Club. In the absence of mitigation this is likely to be a short-term impact, until such a time that local breeding passerine bird populations become habituated to the presence of the sports netting here. Nonetheless, should the netting be erected during the breeding season, when fledglings are learning to fly, the impact of collision risk on breeding bird populations could be significant at the local level. This impact is not expected to affect raptor species, owing to the fact that the treeline along the Hermitage Golf Club boundary, which may have provided foraging/ commuting habitat for raptors will no longer be present. Therefore, raptors will no longer utilise this area and collision risk with the erected sports netting will be unlikely.

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. No known major wintering bird feeding sites occur within the footprint of the Proposed Scheme or immediately adjacent to it. The only area within the Proposed Scheme which was considered to have potential to support wintering birds was the Liffey Gaels GAA pitch. Survey evidence reveled low usage of the site, by a small number of SCI or wintering bird species. With the removal of the Construction Compound LU3 post-construction, the area will be returned to it's managed state, with no loss of territory. As any operational noise increases are not likely to alter the existing baseline noise effect on wintering birds in the locality, effects of noise disturbance can also be excluded.

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

12.4.4.5.2.2 Habitat Degradation – Surface Water

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

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

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e. the Liffey_170, Liffey_180, Liffey_190 and Liffey Estuary Upper, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

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

12.4.4.6 Reptiles

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

12.4.4.7.1 Habitat Severance / Barrier Effect

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

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

12.4.4.7.2 Mortality Risk

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

12.4.4.7.3 Habitat Degradation – Surface Water

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

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

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e., the Liffey_170, Liffey_180, Liffey_190 and Liffey Estuary

Upper, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

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

12.4.4.8 Fish

12.4.4.8.1 Habitat Degradation – Surface Water

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).

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

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e., the Liffey_170, Liffey_180, Liffey_190 and Liffey Estuary Upper, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

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

12.4.4.9 Invertebrates

12.4.4.9.1 Habitat Degradation – Surface Water

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

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

Sections of the Proposed Scheme that do not increase impermeable surface area will continue to discharge, directly to the receiving surface water network, i.e. the Liffey_170, Liffey_180, Liffey_190 and Liffey Estuary Upper, as well as existing combined sewers which ultimately discharge to the Liffey Estuary Lower via Ringsend WwTP.

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

Table 12.19: 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	International Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international geographic scale
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Dalkey 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

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
The Murrough SPA The Murrough pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale
Liffey Valley pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Grand Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale
Habitats (outside of designated areas for nature conservation)			
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Mixed broadleaf/conifer woodland (WD2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale
Rare / Protected Plant Species			
Greonlandia densa	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Scrophulria umbrosa	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Non-native Invasive Plant Species	N/A	Spread at expense of other Habitats	Likely significant effect at the local to International scale geographic scale
Fauna Species			
Otter	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local geographic scale
Marine mammals	County Importance	Habitat degradation (hydrology)	Likely significant effect at the local to national geographic scale
SCI bird species	International Importance	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Degradation (hydrology); Collision Risk	Likely significant effect at the local geographic scale
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Fish Species	Local Importance (Higher Value) – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
Non-Annex fish species	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale

Ecological Receptor	Ecological Valuation	Potential Impacts	Potential Significance
Invertebrates- Freshwater molluscs	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale
Local Biodiversity Areas			
Liffey Valley SAAO River Liffey Corridor	Local Importance (Higher Value)	Construction; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale
River Camac	Local Importance (Higher Value)	None	No likely significant effect at any geographic scale

12.5 Mitigation and Monitoring Measures

12.5.1 Construction Phase

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

12.5.1.1 Designated Areas for Nature Conservation

12.5.1.1.1 European sites

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

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

12.5.1.1.2 National sites

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

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

12.5.1.2 Habitats

12.5.1.2.1 Habitat Loss & Fragmentation

Where practicable, areas of vegetation including habitats of Local Importance (Higher Value), (i.e., mixed broadleaved woodland, mixed broadleaved conifer 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 [BCIDA-ACM-UBR_ZZ-0006_XX_00-DR-LL-9001] in Volume 3 of this EIAR. These areas will be protected for the duration of construction works and fenced off at an appropriate distance Vegetation to be retained is shown in further detail on the Landscape General Arrangement Drawings [BCIDA-ACM-UBR_ZZ-0006_XX_00-DR-LL-9001] in Volume 3 of this EIAR.

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 [BCIDA-ACM-UBR_ZZ-0006_XX_00-DR-LL-9001] in Volume 3 of this EIAR:

- 479 trees planted;
- 281m of proposed hedgerow;
- 7,979m^2 of proposed species rich grassland;
- 1,373m^2 of proposed ornamental planting;
- 2,975^2 of proposed native planting; and,
- 14,531m^2 of proposed amenity grassland planting.

12.5.1.2.2 Habitat Degradation – Surface Water Quality

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

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

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

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

- For works close to the Liffey_180 at the entrance to Hermitage Golf Club, surface water drains will be bunded during the removal of existing surfaces and the works being carried out on the boundary wall to prevent sediment entering the water body via this route. No refuelling of plant or machinery will take place in this location;
- For the widening north of the N4 to accommodate the two-way cycleway and footway requiring the removal of trees at Hermitage Golf Club and Hermitage Medical Clinic, temporary infiltration (cutoff) ditches or silt-fences will be used to prevent silty water runoff entering the surface water system on the N4;
- For the Construction Compounds (LU1a, LU1b and LU2), bunding or silt-fences will be incorporated into boundary fencing to prevent silty water runoff entering surface water drains nearby. At LU1b the silt fence will be reinforced with additional bunding to ensure no leakage of silty water under the silt curtain in hard standing areas. Also, in this location, the surface water manholes will be sealed to ensure no pathway to the sewer exists through that route. Fuel and other materials will be stored to the rear of the compound as far from the surface water drains as is reasonably practicable. Concrete batching will also be carried out towards the rear of the compound and as far from the surface water drains as is reasonably practicable; and
- For the full depth construction works in Sections 1 and 2, surface water drains in the road network will be protected through the use of silt fences or infiltration ditches, as above. Refuelling of plant or machinery will only take place at least 10m from surface water drains and with the use of drip trays. For other measures relating to fuel, please see the SWMP.

12.5.1.2.3 Habitat Degradation – Groundwater

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

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

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

12.5.1.2.4 Habitat Degradation – Air Quality

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

- Public roads affected by the Proposed Scheme works will be regularly inspected for soiling associated with the construction activities and cleaned as necessary;
- Material handling systems and stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays (or similar dust suppression methods) will be used as required if particularly dusty activities associated with the construction contract are necessary during dry or windy periods;
- During movement of dust generating materials both on and off-site, trucks will be covered with tarpaulin, and before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place;
- 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 has confirmed the presence of previously identified Third Schedule non-native invasive species, or identifies newly established non-native invasive species within the footprint of the Proposed Scheme, the ISMP produced will provide a detailed description of the infestations (e.g. approximate area of the respective colonies (m^2), where feasible; approximate total number of stems, pattern of growth and information on other vegetation present), and where necessary, include calculations of volumes of infested soils to be excavated;

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

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

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

12.5.1.3 Rare and Protected Plant Species

12.5.1.3.1 Habitat Degradation – Surface Water Quality

No protected plant species listed on the Flora (Protection) Order 2015 were recorded during the field surveys within or in close proximity to the Proposed Scheme. Therefore, no species-specific mitigation is proposed.

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

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

12.5.1.4 Mammals

12.5.1.4.1 Bats

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

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

- Wildlife Acts;
- The Habitats Directive; and

- Birds and Habitats Regulations.

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

Two trees with Potential Roost Features (PRFs), were identified within the footprint of the Proposed Scheme (permanent and temporary land-take) during the multidisciplinary surveys (see Figure 12.7.2 in Volume 4 of this EIAR). These trees will not be removed during the Construction Phase of the Proposed Scheme, and the following mitigation measures will be implemented by the appointed contractor:

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

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

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

12.5.1.4.1.2 Roost Loss

Five additional trees containing PRFs were identified within the temporary landtake boundary within the Hermitage Golf Club. These trees may be removed as part of the works in this area.

As previously mentioned, no other trees with Potential Roost Features (PRFs) will be removed during the Construction Phase (i.e. outside the Hermitage Golf Club), however trees that are currently unsuitable may become roosts between the pre-planning assessment contained within this EIAR and the Construction Phase of the Proposed Scheme.

The building along the western boundary of the Hermitage Golf Club which was considered to be of moderate potential to support bats will be unaffected by the Proposed Scheme and therefore no mitigation in that regard is required.

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

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

- Confirm that previously identified PRFs which are to be retained are still standing; and

- Identify whether new PRF features (if any) may have developed owing to damage or management change to PRF in the intervening period between the original surveys and grant of planning.

Preconstruction Survey

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

- In advance of any clearance all trees deemed to be PRF which are subject to felling/clearance will be checked for the presence of bats by a *suitably qualified/ licenced bat specialist* (using an endoscope under a separate licence held by that individual);
- In the unlikely event that bats are found during construction works such as vegetation clearance, works will immediately cease in that area and the local NPWS Conservation Ranger will be contacted;
- An application will then be made to the National Parks and Wildlife Service for a derogation licence to permit actions affecting bats or their roosts that would normally be prohibited by law;
- After licence approval from the NPWS (which may include the necessity for additional mitigation measures to those recommended here) bats may be removed by a bat specialist licenced to handle bats and released in the area in the evening following capture; and
- Only then will PRF trees be felled, and this should be undertaken 'in sections' where the section can be handled to avoid sudden movements or jarring of the sections.

Installation of Bat Boxes

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

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

12.5.1.4.1.3 Habitat Loss & Fragmentation

Where practicable, habitats of importance to bats such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted by the Proposed Scheme will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on Landscaping General Arrangement drawings (BCIDA-ACM-UBR_ZZ-0006_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

To minimise the loss of habitat associated with the Proposed Scheme, there are also areas within the Proposed Scheme footprint which are included for mitigation planting where general construction works will not be undertaken. Proposed planting incorporated into the Proposed Scheme will be implemented, shown as design mitigation, is listed below and displayed on the Landscaping General Arrangement Drawings [BCIDA-ACM-UBR_ZZ-0006_XX_00-DR-LL-9001] in Volume 3 of this EIAR:

- 479 trees planted; and,
- 281m of proposed hedgerow.

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

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

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

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

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

Mitigation measures to reduce light spill will include the following:

- the use of sensor / timer triggered lighting;
- LED luminaires to be used where 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

Signs of badger activity was recorded in one location along the Proposed Scheme- within the boundary of the Hermitage Golf Club. No evidence of badger setts were recorded.

Badger could potentially establish new territory within the ZoI of the Proposed Scheme. Therefore, the NTA will ensure that a confirmatory pre-construction check of all suitable badger habitat will be completed within 12 months prior to any construction works commencing.

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

Notwithstanding the requirement for completion of a confirmatory pre-construction survey, the following specific mitigation measures are proposed in the vicinity of the Hermitage Golf Club, considering the nature of the works that are proposed there and the suitability of the surrounding habitat for badgers:

- The pre-construction survey, covering a radius of 150m from the proposed works associated with this element (including piling works to facilitate the installation of the sports netting along the golf club boundary) will be undertaken, in line with the NRA's Guidelines for the Treatment of Badgers

prior to the Construction of National Road Schemes (NRA, 2005b). The results of this survey will dictate any further mitigation deemed necessary, as advised by the suitably experienced and qualified ecologist, employed by the appointed contractor;

- Following on from the pre-construction survey and in the absence of the presence of a sett, hoarding will be erected, around the boundary of the works area to delineate it from the remainder of the golf club and to create a visual and physical barrier between the works area and the course. This will reduce the potential disturbance effect on local badgers, if present;
- Access and egress to the works will be from the N4 side so as to avoid extending the zone of disturbance impact on badgers, if present;
- In the event that a badger sett is discovered within a radius of 150m from the proposed works, the following works which are deemed to constitute a high disturbance impact on badgers shall be completed within the months of September, October and November, so as to avoid the badger breeding season (generally December to June), noting overlapping seasonal constraints with respect to breeding birds and bats (see Section 12.5.1.5.1.2 and Section 12.5.1.4.1.1):
  - felling of trees along the boundary with the N4,
  - piling for foundations of sports netting, and,
  - demolition of existing boundary wall and foundations of proposed replacement retaining wall.

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

For mitigation to reduce the impact of lighting on local badger please refer to Section 12.5.1.4.1.4.

12.5.1.4.3 Otter

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

12.5.1.4.3.1 Loss of Breeding / Resting Sites

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

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

12.5.1.4.3.2 Measures to Prevent Injury / Mortality Impacts

As detailed above in Section 12.5.1.4.3.1 prior to construction works commencing, the appointed contractor will engage the services of a suitably qualified ecologist to conduct a pre-construction otter survey of the Proposed

Scheme in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2006b).

12.5.1.4.3.3 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 12.5.1.4.1.4 for lighting mitigation measures.

12.5.1.4.4 Marine Mammals

12.5.1.4.4.1 Habitat and Food Source Degradation – Water Quality

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

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

12.5.1.4.5 Other Mammals

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

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

12.5.1.5 Birds

12.5.1.5.1 Breeding Birds

12.5.1.5.1.1 Habitat 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 (BCIDA-ACM-UBR_ZZ-0006_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 (BCIDA-ACM-UBR_ZZ-0006_XX_00-DR-LL-9001) in Volume 3 of this EIAR for locations.

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

12.5.1.5.1.2 Mortality Risk

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

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

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

12.5.1.5.1.3 Disturbance / Displacement

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

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

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

12.5.1.5.1.4 Collision Risk

To reduce the potential impact of collision risk on breeding passerine birds as a result of the installation of the proposed 130m of sports netting (15m in height) along the boundary of the Hermitage Golf Club, the netting shall be installed outside the breeding bird season which is generally regarded as 1st March - 31st August.

12.5.1.5.1.5 Habitat Degradation – Water Quality

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

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

12.5.1.5.2 Wintering Birds

12.5.1.5.2.1 Measures to Prevent Disturbance and Displacement Impacts during Construction

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

- The appointed contractor will undertake the establishment of the construction compound LU3 outside of the wintering bird season (October to March). However, where the construction programme does not allow this seasonal restriction to be observed, then the construction compounds will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to establishment. Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken;
- Hoarding of the Construction Compounds will be in place prior to the arrival of wintering birds and will be retained on all sides of the compound for the duration of the works;
- The use of lighting at Construction Compounds where required shall be such that it is not excessively tall thus providing an obstacle to low-flying birds potentially moving between feeding sites. Furthermore, and where security lighting is not required, lighting should not be continuously on when compound is closed. Sensor-operated lighting timers as necessary should be installed; and
- In addition to lighting at the Construction Compound aligning with Section 12.5.1.4.1.4 the lighting column heights will be considered by the appointed contractor, so as not to act as an obstacle to birds.

12.5.1.5.2.2 Habitat Degradation – Water Quality

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

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

12.5.1.6 Reptiles

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

12.5.1.7 Amphibians

12.5.1.7.1 Habitat Loss, Disturbance and Mortality Risk

No amphibian species were recorded during the multi-disciplinary surveys carried out along the Proposed Scheme, despite the presence of suitable habitat adjacent to the footprint of the Proposed Scheme (e.g. Liffey Valley pNHA and the Irish War Memorial Gardens).

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

- In the case of common frog, any frog spawn, tadpoles, juvenile or adult frogs present will be captured, under a licence from NPWS and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat, beyond the ZoI of the Proposed Scheme;
- In the case of smooth newt, individuals will be captured, under a licence from NPWS, and removed from affected habitat either by hand net or by trapping and translocated to the nearest area of available suitable habitat, beyond the ZoI of the Proposed Scheme. If used, the type and design of traps shall be approved by the NPWS. This is a standard and proven method of catching and translocating smooth newt;
- If the size or depth of the habitat feature is such that it cannot be determined by a visual survey whether all amphibians have been captured, the suitably qualified ecologist engaged by the appointed

contractor will advise on the appropriate course of action to confirm that no amphibian species remain. If drainage of the habitat feature is deemed to be the appropriate course of action, any mechanical pumps used will have a screen fitted, and be sited, such that no amphibian species can be sucked into the pump mechanism; and

- Any capture and translocation works shall be undertaken immediately in advance of site clearance / construction works commencing.

12.5.1.7.2 Habitat Degradation- Water Quality

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

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

12.5.1.8 Fish

12.5.1.8.1 Habitat Degradation – Surface Water Quality

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

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

12.5.1.9 Invertebrates – Freshwater Molluscs

12.5.1.9.1 Habitat Degradation – Surface Water Quality

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

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

12.5.2 Operational Phase

12.5.2.1 Designated Areas for Nature Conservation

12.5.2.1.1 European Sites

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

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

12.5.2.1.2 National Sites

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

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

12.5.2.2 Habitats

12.5.2.2.1.1 Habitat Degradation – Surface Water Quality

The proposed SuDS drainage system, as shown in Proposed Surface Water Drainage Works drawings (BCIDA-ACM-DNG_RD-0006_XX_DR-CD-9001 in Volume 3 of this EIAR), will be installed by the appointed contractor during the Construction Phase.

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

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

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

12.5.2.2.1.2 Habitat Degradation – Non-Native Invasive Plant Species

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

12.5.2.2.1.3 Habitat Degradation – Groundwater

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

12.5.2.3 Rare and Protected Flora Species

12.5.2.3.1 Habitat Degradation- Surface Water Quality

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

12.5.2.4 Mammals

12.5.2.4.1 Bats

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

12.5.2.4.2 Badgers

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

12.5.2.4.3 Otter

12.5.2.4.3.1 Habitat Degradation - Surface Water

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

12.5.2.4.4 Marine Mammals

12.5.2.4.4.1 Habitat Degradation - Surface Water

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

12.5.2.4.5 Other Mammals Species

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

12.5.2.5 Birds

12.5.2.5.1 Breeding Birds

12.5.2.5.1.1 Habitat Degradation - Surface Water

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

12.5.2.5.2 Wintering Birds

12.5.2.5.2.1 Habitat Degradation - Surface Water

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

12.5.2.6 Reptiles

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

12.5.2.7 Amphibians

12.5.2.7.1 Habitat Degradation- Surface Water

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

12.5.2.8 Fish

12.5.2.8.1 Habitat Degradation - Surface Water

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

12.5.2.9 Invertebrates – Freshwater Molluscs

12.5.2.9.1 Habitat Degradation - Surface Water

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

12.6 Residual Impacts

12.6.1 Construction Phase

Following the implementation of the mitigation measures outlined in Section 12.5, the Proposed Scheme will not result in any significant residual effects above the local scale on the KERs identified (see Table 12.20) on its own, or cumulatively together with other proposed developments during the Construction Phase.

Table 12.20: 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 North Dublin Bay pNHA Booterstown Marsh pNHA	International Importance National Importance National Importance National Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species);	Likely significant effect at the international to national geographic scale;	No significant residual effect
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
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)	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
Liffey Valley pNHA	National Importance	Habitat Degradation (hydrology; air quality; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
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)				
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national to local geographic scale	No significant residual effect
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
(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
Mixed broadleaf/conifer woodland (WD2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Treelines (WL2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Rare / Protected Plant Species				
Greonlandia densa	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Scrophulria umbrosa	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
Marine Mammals	County Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
SCI bird species	International Importance	See SPAs above	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (Habitat Degradation (hydrology) Mortality risk;) Likely significant residual effect at the local geographic scale (Habitat Loss; Disturbance / Displacement)
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Fish species	Local Importance (Higher Value) – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to 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)
Non-Annex 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)	Likely significant effect at the local geographic scale	No significant residual effect
Local Biodiversity Areas				
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

12.6.2 Operational Phase

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

Table 12.21: Summary of Operational Phase Significant Residual Impacts

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Designated Areas for Nature Conservation				
North Dublin Bay SAC; North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
South Dublin Bay SAC South Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
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; 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)
Baldoyle Bay SPA Baldoyle Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
North Bull Island SPA North Dublin Bay pNHA	International Importance National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the international to national geographic scale	No significant residual effect
Malahide Estuary SPA Malahide Estuary pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Ireland's Eye SPA Ireland's Eye pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Howth Head Coast SPA Howth Head pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Rogerstown Estuary SPA Portraine Shore pNHA Rogerstown pNHA	International Importance National Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Lambay Island SPA Lambay Island pNHA	International Importance National Importance	Habitat Degradation (hydrology)	Likely significant effect at the international to national geographic scale	No significant residual effect
Dalkey 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
Liffey Valley pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
The Grand Canal pNHA	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the national geographic scale	No significant residual effect
Habitats (outside of designated areas for nature conservation)				
Tidal Rivers (CW2) (corresponding to Annex I Estuaries [1130])	National Importance	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
Depositing/ lowland rivers (FW2)	Local Importance (Higher Value)	Habitat Degradation (hydrology; non-native invasive plant species)	Likely significant effect at the local geographic scale	No significant residual effect
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	No significant residual effect

Ecological Receptor	Ecological Valuation	Potential Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation and Monitoring)
Mixed broadleaf/conifer woodland (WD2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	No significant residual effect
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	No significant residual effect
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				
Greonlandia densa	National Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
Scrophulria umbrosa	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	Likely significant effect at the local to International geographic scale	No significant residual effect
Fauna Species				
Otter	County Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Marine Mammals	County Importance	Habitat Degradation (hydrology)	Likely significant effect at the local to national geographic scale	No significant residual effect
SCI bird species	International Importance	See SPAs above	See SPAs above	See SPAs above
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Disturbance / Displacement; Habitat Degradation (hydrology); Collision Risk	Likely significant effect at the local geographic scale	No significant residual effect
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Amphibians	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Fish Species	Local Importance (Higher Value) – International Importance	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Non-Annex fish species	Local Importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Invertebrates - Freshwater molluscs	Local importance (Higher Value)	Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect
Local Biodiversity Areas				
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

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