Chapter 8
Biodiversity

CONTENTS

8. BIODIVERSITY

8.1 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 DART+ Coastal North Scheme ("the Proposed Development").

The DART+ Coastal North project, as part of the DART+ Programme, will deliver an improved and extended electrified rail network and will enable increased passenger capacity and an enhanced train service between Dublin City Centre and Drogheda, including the Howth Branch. This increased rail capacity will be achieved by implementing an extended electrified railway network with high-capacity DART trains and an increased frequency of rail services. In addition, the DART+ Coastal North project requires that some track modifications are implemented, including the provision of turnback facilities at Malahide, Clongriffin and Howth Junction & Donaghmede Stations. These modifications are essential to facilitate the increase in train services by improving operational flexibility, allowing trains to be turned back clear of continuing services and enabling a higher frequency and a more reliable service. The objectives of the Proposed Development are described in Chapter 1 (Introduction). The Proposed Development, which is described in Chapter 4 (Description of the Proposed Development) has been designed to meet these objectives.

The design of the Proposed Development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Development 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.

The purpose of the report is to:

- Establish and evaluate the baseline ecological environment, as relevant to the Proposed Development;
- Identify, describe and assess all potentially significant ecological effects associated with the Proposed Development;
- Set out the mitigation measures required to address any potentially significant ecological effects and ensure compliance with relevant nature conservation legislation;
- Provide an assessment of the significance of any residual ecological effects; and,
- Identify any appropriate compensation, enhancement or post-construction monitoring requirements.

This chapter has assessed the potential effects on flora and fauna arising from the Proposed Development during the Construction and Operational Phases based on the draft Railway Order, Chapter 4 (Description of Proposed Development) and Chapter 5 (Construction Strategy).

8.2 Legislation, Policy and Guidance

8.2.1 Legislation

The collation of ecological baseline data and the preparation of this assessment has had regard to the following legislation and policy documents. This is not an exhaustive list but the most relevant legislative and policy basis for the purposes of preparing this Biodiversity Chapter.

The following international legislation is relevant to the Proposed Development:

- Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 ('the EIA Directive').
- Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended); hereafter, referred to as the 'Habitats Directive'. The Habitats Directive is the legislation under which the Natura 2000 network[1] was established and special areas of conservation (SACs) are designated for the protection of natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of that directive.
- Directive 2009/147/EEC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds; hereafter, referred to as the 'Birds Directive'. The Birds Directive is the legislation under which special protection areas are designated for the protection of endangered species of wild birds listed in Annex I of that directive.
- 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'. The Water Framework Directive' is the legislation requiring the protection and improvement of water quality in all waters (rivers, lakes, groundwater, and transitional coastal waters) with the aim of achieving good ecological status by 2015 or, at the latest, by 2027.

The following national legislation is relevant to the Proposed Development:

- Wildlife Acts 1976 to 2023 hereafter collectively referred to as the 'Wildlife Acts'. The Wildlife Acts are the principal pieces of legislation at national level for the protection of wildlife and for the control of activities that may harm wildlife. All bird species, 22 other animal species or groups of species, and 86 species of flora are protected under this legislation;

[1] The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special Areas of Conservation are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special Protection Areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.

In Ireland these sites are designed as *European sites* - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

- The Transport (Railway Infrastructure) Act, 2001 (the 2001 Act) (as amended and substituted). The 2001 Act has, in particular, been amended by the European Union (Railway Order) (Environmental Impact Assessment) (Amendment) Regulations (S.I. 743 of 2021) in order to give further effect to the EIA Directive.
- Planning and Development Act 2000 (as amended); hereafter collectively referred to as the 'Planning and Development Acts'. This piece of legislation is the basis for Irish planning. Under the legislation, development plans (usually implemented at local authority level) must include mandatory objectives for the conservation of natural heritage and for the conservation of European Sites. It also transposes the requirements of the Habitats and Birds Directive into Irish law;
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) (as amended); hereafter the 'Birds and Habitats Regulations'. This legislation transposes the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the regulations);
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). This legislation transposes 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 (the Water Framework Directive) into Irish Law; and
- Flora (Protection) Order, 2022 (S.I. No. 235 of 2022). This lists species of plant protected under Section 21 of the Wildlife Acts.

8.2.2 Policy

This section summaries National policy relevant to this Chapter, including national policy documents and policies and objectives in the relevant county development plans.

- Ireland's 4th National Biodiversity Action Plan 2023 -2030 (Department of Housing, Local Government and Heritage, 2023);
- All-Ireland Pollinator Plan 2021-2025 (National Biodiversity Data Centre, 2021);
- Dublin City Development Plan 2022 – 2028 (Dublin City Council, 2022);
- Fingal County Development Plan 2023 – 2029 (Fingal County Council, 2023);
- Meath County Development Plan 2021 – 2027 (Meath County Council, 2027);
- Louth County Development Plan 2021 – 2027 (Louth County Council, 2021);
- Fingal Biodiversity Action Plan 2022 – 2030 (Fingal County Council, 2022);
- County Meath Biodiversity Action Plan 2015 – 2020[2] (Meath County Council, 2015);
- Dublin City Biodiversity Action Plan 2021 – 2025; and
- Louth Biodiversity Action Plan 2021 –2026.

[2] Whilst it is recognised that the Meath Biodiversity Action Plan is now out of date, the recommendations are still valid, and the consultation in respect of the pre-draft discussion paper for the Meath Biodiversity Action Plan 2025-20230 has been launched by Meath County Council.

8.2.3 Guidance

The process of identifying, quantifying and evaluating potential impacts of the Proposed Development on habitats, species and ecosystems was undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2022). In addition, reference to the following recognised guidance defined the scope and evaluation process:

- Collins (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) The Bat Conservation Trust;
- Collins (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition) The Bat Conservation Trust;
- European Commission (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report;
- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- ESB (2017) EMF & You. Information about Electric and Magnetic Fields and the Electricity Network in Ireland. Information booklet. April, 2017;
- Institute of Lighting Professionals (2021) Guidance Note 01/21: Guidance notes for the reduction of obtrusive light;
- Marnell, F. Kelleher, C & Mullen, E. (2022). Bat Mitigation Guidelines for Ireland v2. Irish Wildlife manuals, No. 134. National Parks & Wildlife Service, Department of Housing, Local Government and Heritage, Ireland;
- NBDC (2019) Pollinator-friendly management of: Transport Corridors. All-Ireland Pollinator Plan, Guidelines 9. National Biodiversity Data Centre Series No. 20, Waterford. Sept, 2019;
- NBDC (2021) All Ireland Pollinator Plan 2021-2025;
- TII (2005b) Guidelines for the Treatment of Bats during the Construction of National Road Schemes;
- TII (2005a) Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes;
- TII[3] (2006a) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes;
- TII (2006b) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes
- TII (2006c) Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post Construction of National Road Schemes;
- TII (2008a) Environmental Impact Assessment of National Road Schemes – A Practical Guide (Revision 1);
- TII (2008b) Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes;
- TII (2008c) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;

[3] Transport Infrastructure Ireland was established through a merger of the National Roads Authority and the Railway Procurement Agency under the Roads Act 2015, with effect from 01/08/15.

- TII (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes;
- TII (2020a) The Management of Invasive Alien Plant Species on National Roads – Standard; and
- TII (2020b) The Management of Invasive Alien Plant Species on National Roads – Technical Guidance.

8.3 Methodology

This section describes the approach, objectives, terminology and methodologies that were followed in collecting information, in describing the baseline ecological conditions and in assessing the likely effects of the Proposed Development.

8.3.1 Establishing a Zone of Influence

The Zone of Influence (ZoI), or distance over which potentially significant effects may occur, will differ across the Key Ecological Receptors (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, and in the vicinity of, the Proposed Development. The ZoI and study area was then informed and defined by the sensitivities of each of the KERs present, in conjunction with the nature and potential impacts associated with the Proposed Development. In some instances, the ZoI extends beyond the study area (e.g., surface water quality effects of a sufficient magnitude can extend, and affect, receptors at significant distances downstream).

The ZoI of the Proposed Development in relation to terrestrial habitats is generally limited to the footprint of the Proposed Development, 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.

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 and species are 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 Development, this includes; all estuarine habitats downstream of where the Proposed Development will drain to or cross water bodies listed in Section 8.4, and the marine environment of the eastern coastline between Dublin and Drogheda (see Figure 8.1 in Volume 3A of this EIAR).

The ZoI in relation to direct impacts to wintering birds could extend up to *c.* 300m from the Proposed Development for general construction activities, as many species (such as waterbirds) are highly susceptible to disturbance from loud and unpredictable noise during construction[4].

However, as many estuarine bird species use inland habitat areas at distances from the coast, the effect of *ex-situ* impacts could extend a considerable distance from the Proposed Development. In the case of the Proposed Development, impacts to wintering birds within this 300m band could affect the use of potential *ex-situ* sites for bird species listed as Special Conservation Interests (SCI) of the nearby European sites, including River Nanny Estuary and Shore Special Protection Area (SPA), Boyne Estuary SPA, River Boyne and River Blackwater SPA, South Dublin Bay and River Tolka Estuary SPA, Howth Head Coast SPA , North Bull Island SPA, Baldoyle Bay SPA, Dalkey Island SPA, Malahide Estuary SPA, Rogerstown Estuary SPA, Dundalk Bay SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA, Rockabill SPA, The Murrough SPA, Stabannan-Braganstown SPA, North-West Irish Sea SPA, Seas Off Wexford SPA, Saltee Islands SPA, and Wicklow Head SPA.

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

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

The ZoI for impacts to aquatic species, such as Atlantic salmon *Salmo salmar* and lamprey species *Lampetra* spp., is limited to those watercourses crossed by the Proposed Development or waterbodies to which runoff from the Proposed Development could drain during Construction or Operational Phases. However, impacts could occur at significant distances downstream depending on the magnitude and duration of any pollution event; potentially even affecting species in Malahide Bay, Rogerstown Estuary, River Boyne, River Nanny, Irish Sea and Dublin Bay.

The ZoI for aquatic plant and animal species includes all freshwater habitat downstream of the proposed watercourse crossings and the estuarine environment of the Broadmeadow Water, Mayne Estuary, North Bull Island, Tolka Estuary and Lower Liffey Estuary transitional waterbodies, and the marine environment of Malahide Bay, Rogerstown Estuary, River Nanny Estuary, Boyne Estuary, Northwestern Irish Sea and Dublin Bay. The disturbance ZoI in relation to small mammal species, such as the pygmy shrew, would be expected to be limited to no more than *c.* 100m from the Proposed Development due to their small territory sizes (e.g. *c*.530-1860m^2 for pygmy shrew) and sedentary lifecycle.

[4] 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 *c.* 300m, typical noise levels associated with construction activity (BS 5228) are generally below 60dB or, in most cases, are approaching the 50dB threshold.

The disturbance ZoI in relation to otters, badgers, stoat, and hedgehogs may extend over greater distances[5] than small mammal and bird species due to their ability to disperse many kilometres from their natal site; however, the ZoI of significant disturbance impacts to badger and otter breeding/resting places (including impacts associated with elevated noise levels) is likely to be no more than approximately 150m from the Proposed Development boundary[6].

The ZoI of potential impacts to bat roosts are dependent on many factors (such as species, roost type, surrounding habitat and commuting routes), 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[7], the effect of potential landscape scale impacts, such as habitat loss and severance, could extend for several kilometres from the Proposed Development but the most significant effects are likely to occur within a 3km core sustenance zone (BCT, 2020) associated with roosts of the following bat species which are known to occur in the area; Leisler's bat, Nathusius' pipistrelle, soprano pipistrelle and brown long-eared bat. As per the Bat Conservation Trusts' Guidelines (Collins *et al.,* 2016), core sustenance zones are defined as 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.

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

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

In relation to impacts on groundwater and groundwater dependent species and habitats, *Guidelines on Procedures for Assessment and Treatment of Geology and Hydrogeology for National Road Schemes* (TII, 2008) recommends that for National roads, the study area should be 250 m either side of the centreline and notes that professional judgement must be applied in assessing whether the study area needs to be extended. The underlying aquifers are either Locally Important Bedrock Aquifer or Poor Bedrock Aquifer in Zones A, B, and C (zones are as described in Chapter 4 Description of the Proposed Development). 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.

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[5] Otter territory size from Ó Néill L. (2008) Population dynamics of the Eurasian otter in Ireland. Integrating density and demography into conservation planning. PhD thesis. Trinity College, Dublin; Badger territory size from TII (2006a) Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes ; Irish stoat territory size from Sleeman, P.D (2016) Irish Stoat (*Mustela erminea hibernica*) Pp 102-103 In Lysaght, L. and Marnell, F. (Eds) (2016) Atlas of Mammals in Ireland 2010-2015, National Biodiversity Data Centre, Waterford; Pine marten territory size from O'Mahony, D. (2016) Pine marten (*Martes martes*) Pp. 100-101 In Lysaght, L. and Marnell, F. (Eds) (2016) Atlas of Mammals in Ireland 2010-2015, National Biodiversity Data Centre, Waterford and Hedgehog territory size from Haigh, A. (2011). The Ecology of the European hedgehog (*Erinaceus europaeus*) in rural Ireland. PhD Thesis, UCC.

[6] This ZoI (i.e. *c.* 150m from the Proposed Development boundary) for badgers and otters has been defined in accordance with TII guidelines i.e. Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (TII, 2005b), and Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (TII, 2006c), 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.

[7] Leisler's bats have been recorded foraging up to 13km from maternity roost sites (Shiel *et al.*, 1999)

In Zone D, the underlying aquifers are noted as Poor Bedrock aquifers, regionally important bedrock aquifer, and Locally Important Gravel aquifer. Zone C also has an area underlain by a karstified locally important aquifer at Skerries Station. Zone E is underlain by a locally important bedrock aquifer, and a regionally important karstified bedrock aquifer in the northern section. Groundwater flow in the Rkd[8] aquifer is influenced by karst features including swallow holes and karstified conduit flow in the bedrock. Regionally, groundwater flows towards the coast, although on a local scale, groundwater discharges to nearby watercourses. Therefore, any influence on the groundwater as a result of the Proposed Development will be localised and will not extend to any groundwater dependent habitats, which are all located over 1.5km from any of the proposed work. This ZoI is determined by the professional judgement of the hydrogeology specialists. This is further discussed with reference to specific construction activities in Chapter 9 (Land & Soils).

The unmitigated ZoI of air quality effects is generally local to the Proposed Development and not greater than a distance of 50m from the Proposed Development boundary, and 200m from a Construction Compound during the Construction Phase, and up to 200m from the Proposed Development boundary or local road networks experiencing a change in Annual Average Daily Traffic (AADT) flows greater than 1,000 during the Operational Phase (refer to Chapter 12 (Air Quality) for more detail).

8.3.2 Study Area

The Proposed Development comprises the extension of the existing electrified rail network over *c.* 37km from Malahide to Drogheda, with associated re-signalling and modification of some low clearance overbridges to accommodate the overhead line electrification system. There will also be modifications to existing depots at a number of locations to support the new DART+ Fleet. As a design principle, the project is seeking to contain works, insofar as possible, within the existing railway corridor; however, some infrastructure such as new traction power substations and utility diversions will need to be constructed outside of the railway corridor where space is not available within the existing boundary. The works information can be found on the Work Layout Plans within Book 1 of the Railway Order.

The study area is defined by the Zone of Influence of the Proposed Development with respect to the ecological receptors that could potentially be affected. The study area was defined by the findings of the desk study (presence/absence of protected habitats, flora or fauna within the Zone of Influence) and best practice methodology referenced above for assessing effects on those ecological features. In general, the study area includes the site of the Proposed Development and a 50 m buffer. Consideration is also given to species and habitats outside this area on a case-by-case basis. The study area/survey area for each Key Ecological Receptor (KER) is described under the subheadings in Section 8.4.

[8] Regionally Important Aquifer - Karstified (diffuse)

8.3.3 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 2024)[9];
- Online data records available on the National Biodiversity Data Centre Database (NBDC Online Database, Accessed 2024);
- Ordnance Survey Ireland (OSI) orthophotography (from 2013-2018) for the Proposed Development study area;
- Records of rare and / or protected species for the 10km (kilometre) grid squares O13, O23, O24, O25, O26, O16, O17, and O07 held by the NPWS and NBDC;
- Habitat and species Geographic Information System (GIS) datasets provided by the NPWS, including Article 12 and Article 17 data[11];
- 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 2024);
- Information on the status of European Union (EU) protected habitats and species in Ireland (NPWS 2019a, NPWS 2019b and NPWS 2019c);
- Information contained within the Environmental Impact Assessment Report (EIAR) prepared for the Proposed Development Railway Order application, including Chapter 2 (Policy Context and Need for the Project), Chapter 5 (Construction Strategy), Chapter 9 (Land and Soils), Chapter 10 (Water), Chapter 12 (Air Quality), Chapter 14 (Noise and Vibration) and Chapter 15 (Landscape and Visual).
- Information on light-bellied Brent goose inland feeding sites (Scott Cawley Ltd. 2017); and
- Macklin, R., Brazier, B. and Sleeman, P. (2022) Dublin City otter survey. Report prepared by Triturus Environmental Ltd. (2019), for Dublin City Council as an action of the Dublin City Biodiversity Action Plan 2015-2020 and updated in 2022.

[9] The following SAC and SPA GIS boundary datasets are the most recently available at the time of writing: SAC_ITM_2024_05 and SPA_ITM_2024_01

[11] Article 17 of the EU Directive on the Conservation of habitats, Floras and Fauna (Habitats Directive) requires that all member states report to the European Commission every six years on the status and on the implementation of the measures taken under the Habitats Directive. In a similar manner, there is an obligation to report on the status and trends of bird species required under Article 12 of the Bird's Directive.

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

A desk study was carried out to identify any potential suitable inland feeding, roosting sites, and/or crossing points for wintering birds located within or directly adjacent to the Proposed Development. 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 (Scott Cawley Ltd., 2017). The desk study identified sites for further wintering bird surveys.

A desk study was carried out to identify all hydrological crossing points within the footprint of the Proposed Development. Habitat suitability assessments for nesting birds, and otter surveys were undertaken at the proposed crossing points at which in-stream works, modifications to banks or significant disturbance (i.e., piling / rock breaking techniques) are proposed. Aquatic surveys were not undertaken in respect of the Proposed Development. Fish stock surveys were not conducted given that significant impacts on fisheries are not anticipated, owing to the nature of the Proposed Development. This follows best practice guidelines (TII, 2008b) which states that "*It will only be appropriate to undertake detailed surveys where significant impacts are anticipated on potentially valuable assemblages of fish, or important populations of a particular species*".

8.3.4 Overview of Ecological Surveys

The majority of field surveys for the Proposed Development were undertaken in 2021, 2022 and 2023 (see Table 8-1 for details). Additional wintering bird surveys were undertaken in 2023-2024 season in respect of the proposed Construction Compound locations, with breeding bird and habitat surveys at the Malahide compounds and proposed work areas along the Malahide Causeway also undertaken in 2024.[12] The surveys aimed to detect the presence, or likely presence, of rare/threatened, protected or invasive species, and to record the habitats present in the study area. The surveys provided baseline information regarding the existing ecology of the study area. Incidental records of plants, bird species and protected species were collected throughout the surveys in 2021, 2022 and 2023 as well as localised areas arising from design iterations, in 2024. Specific ecological surveys were carried out with respect to the following:

- Habitats (including Annex I habitats);
- Bats;
- Otter;
- Badger;
- Amphibian habitat suitability;
- Reptile habitat suitability;
- Birds (wintering and breeding); and,
- Invasive Species.

[12] Additional breeding bird and habitat surveys were undertaken in Malahide in 2024 due to changes in the design and Proposed Development boundary to address concerns raised and significant feedback received following public consultation no.2, in relation to the location of the proposed turnback.

Section 8.3.5 describes the various ecological survey methodologies used to collate baseline ecological information in the preparation of this Chapter. Results of these surveys are presented in Section 8.4. The ecological surveys carried out, dates and personnel involved are summarised in Table 8-1.

Table 8-1 Ecological Surveys carried out in 2021, 2022, 2023 and 2024for the Proposed Development.

Survey	Date	Surveyor
Habitats (including Annex I habitats and invasive species)	August 2021 June 2022 August – September 2023 (Construction Compounds and substation compounds) May 2024 (Malahide Causeway and Malahide Construction Compounds)	Scott Cawley Ltd.
Amphibian habitat suitability	August 2021	Scott Cawley Ltd.
Reptile habitat suitability	August 2021	Scott Cawley Ltd.
Otter	October 2022 November 2022 December 2022	Scott Cawley Ltd.
Badger	August 2021 November 2021 February 2022 April 2022	Scott Cawley Ltd.
Bats	Bridge Potential Roost Assessments (PRAs) July 2021 August 2021 January 2022 May 2022 Activity surveys August 2021 – September 2021 May – July 2022 Static detector deployments August – September 2021 October – November 2021 January – February 2022	Scott Cawley Ltd.
Breeding birds	April – June 2022 April – June 2023 May 2024 (Malahide Causeway and Malahide Construction Compounds)	Scott Cawley Ltd.
Wintering birds	September 2021 – March 2022 October 2022 – March 2023 September 2023 – March 2024 (Construction Compounds and substations)	Scott Cawley Ltd.

8.3.5 Survey Methodology

8.3.5.1 Habitats

Terrestrial and coastal habitat surveys were undertaken along the length of the Proposed Development by Shane Brien B.Sc. M.Sc. ACIEEM, Cathal O'Brien B.Sc. M.Sc., Wayne Daly B.Sc and Lorna Gill BA M.Sc. between August 2021 and June 2022. Shane, Cathal and Wayne conducted the primary surveys along the current rail line between Drogheda MacBride station and Malahide station between 9th and 12th August 2021 with IÉ track safety coordinators (TSC). Other offline habitats such as proposed substation locations, Construction Compound locations on lands adjacent to the line were recorded on multiple dates between August and September 2023. Methodology for recording habitats on the rail line followed the *Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011)*. Additional habitat surveys were undertaken at the Malahide Causeway and Malahide Construction Compounds on the 22nd May 2024 by Wayne Daly.

All habitat types were classified using the *Guide to Habitats in Ireland (Fossit, 2000)*, recording the indicator species and abundance using the DAFOR scale[13] and recording any species of conservation interest. Vascular and bryophyte plant nomenclature generally follow that of *The National Vegetation Database* (Weekes & Fitzpatrick, 2010) having regard to more recent taxonomic changes to species names after the *New Flora of the British Isles* (Stace, 2019) and the *British Bryological Society's Mosses and Liverworts of Britain and Ireland: A Field Guide* (Atherton et al., 2010). Non-native invasive plant species listed on the Third Schedule of the Birds and Habitats Regulations were also recorded. The habitat's extent was mapped onto a field tablet using proprietary QField software. Vascular plant nomenclature follows that of the *New Flora of the British Isles Fourth Edition* (Stace 2019).

Shane Brien B.Sc. M.Sc. ACIEEM and Tim Ryle BSc (Hons)., Ph.D., MIEnvSc conducted a survey for Annex I habitats on 22nd June 2022, which were classified after the *Interpretation Manual of European Union Habitats EUR28* (CEC, 2013) with reference to the corresponding national habitat survey reports and NPWS wildlife manuals, as applicable. The nomenclature for Annex I habitats follows that of *the Interpretation Manual of European Union Habitats EUR28* with abbreviated names after those used in The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview (NPWS, 2019). Relevés (*i.e.* sampling points of a defined size) were also taken within saltmarsh/estuary habitats i.e., Atlantic Salt Meadows [1330] in close proximity to the existing railway line in order to determine whether or not they conformed to Annex I habitats. The relevé size was $2m^2$ for the saltmarsh habitat, and information collected included the following:

- A list of all plant species present along with their associated percentage cover;
- A habitat condition assessment based on criteria which were drawn from the national surveys of this Annex I habitat conducted on behalf of NPWS (i.e. Long *et al*., 2018; Martin *et al*., 2018; O'Neill *et al.,* 2013; Perrin *et al.,* 2014; Wilson & Fernández, 2013); and,
- Notes on the threats and/or management of the overall surrounding area. Where applicable, the Annex I habitat was also assigned to a vegetation community.

[13] The DAFOR scale is an ordinal or semi-quantitative scale for recording the relative abundance of plant species. The name DAFOR is an acronym for the abundance levels recorded: Dominant, Abundant, Frequent, Occasional and Rare.

8.3.5.2 Mammals

8.3.5.2.1 Badger

As part of the online habitat and flora survey between 9th and 12th August 2021, the surveyors conducted a terrestrial fauna survey (excluding bats), noting any evidence or areas that required further investigation. The presence/absence of terrestrial fauna species were surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. These surveys mainly focused on evidence of badger *Meles, i.e*. setts, latrines, bedding, fur, soil heaps, trails, prints, feeding remains (e.g. wasp/bee nests) and claw marks, along the existing line. Infra-red motion-activated cameras were later deployed in areas noted as having potential setts alongside the current rail line to confirm badger or other mammal usage. These cameras were deployed at four locations between Malahide and Drogheda for a period of 21 nights between 26th November – 16th December 2021, and a period of between 12 and 22 nights between 18th January – 10th February 2022.

8.3.5.2.2 Otter

Surveys to check for the presence of otter *Lutra lutra* within the Proposed Development were undertaken between October – December 2022 at watercourses crossed by the railway line, where works are proposed and included suitable accessible habitat 150m upstream and downstream from the railway line. Locations surveyed were: the Tolka River by the R131 at Fairview Park, Mayne River south of the Moyne Road, Malahide Estuary, Rogerstown Estuary, River Matt at Balbriggan viaduct, River Delvin at Delvin Bridge, Mosney River at Mosney beach, and the River Nanny at Laytown. The survey involved a search for signs of otter activity (prints, spraints, trails, holts, couches, slides, feeding remains etc.). Drainage ditches and small streams were not surveyed due to inaccessibility and as no works are being undertaken within or at any drainage ditches/small streams.

Two infra-Red motion-activated cameras were deployed along the northern side of the Malahide Causeway, where a sluice gate is located under the railway line on the River Turvey/Pill, to determine the use of the railway line by commuting otters as movement is impeded by the sluice gate. Cameras were deployed for a period of 4 weeks between 16th of August 2023 and 13th September 2023 (inclusive).

8.3.5.2.3 Bats

The following sections describe the methodologies employed to carry out the various bat surveys undertaken in 2021 and 2022 to inform the EIAR. The bat surveys were carried out under the following licences issued by the NPWS to Scott Cawley Ltd.:

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

Bridge Potential Roost Assessments

There are 59 bridges (over and underbridges) between Malahide and Drogheda. 28 of these bridges were not surveyed as there will be no works associated with them and they will not be affected by the electrification works. A desktop review of the remining 31 bridges was undertaken in June 2021, based on images and information provided by IÉ/Arup on the structure of the bridges. Twenty one (21) bridges were deemed to have potential suitability for roosting bats based on current guidelines (see Table 8-2) in *Bat Surveys for Professional Ecologists: Good Practice Guidance* (Collins ed., 2016)[14]. Field surveys of these 21 bridges were then carried out on 7th July 2021 by Shane Brien and Wayne Daly to confirm the desk study assessment, and if any potential roost features (PRFs), and signs of bats (staining at roost entrances, droppings, carcasses, insect remains) were present. During these daytime assessments of suitable features (e.g. crevices, exposed mortar joints, narrow expansion joints), bridges were inspected from the ground using an endoscope or binoculars to cover higher areas inaccessible from the ground. Overbridges that were not viewable from above were assessed during the habitat walkover assessment of the railway line in August 2021 using the same methodology. Four bridges were identified where parapet modifications and/or clearance modifications are required, and that had potential roost features requiring further inspection at height. This was carried out in May 2022 whilst under railway possession (*i.e.*, trains were not running). Details of all bridges and whether they were assessed or not due to suitability criteria, are included in Appendix A8.4 in Volume 4 of this EIAR, with drawings included in Figure 8.6 in Volume 3A of this EIAR.

Table 8-2 Guidelines for assessing the potential suitability of Proposed Development sites for bats, based on the presence of habitat features within the landscape, applied according to professional judgement. (Collins (2016)

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to	Continuous habitat connected to the wider landscape that could be used by bats for

[14] Survey methodologies at the time when surveys were being carried out were as per the 2016 guidance but the assessment is still relevant for updated guidance from Collins (2023).

Suitability	Description Roosting habitats	Commuting and foraging habitats
	their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.

Bat Activity Surveys

Bat roost emergence/re-entry surveys were undertaken at 20 of the aforementioned 21 bridges by surveyors who are experienced in bat activity surveys. One of the bridges was not subject to an activity survey owing to access and health and safety reasons from working on a live railway, however this bridge was later endoscoped in full, at height during a railway possession in May 2022. The surveys were designed with reference to methodologies in *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) (Collins, 2016). Emergence surveys began 15-20 minutes before sunset and continued until *c.* 90 minutes after sunset, whilst re-entry surveys began 90 minutes before sunrise and continued until *c.* 15-20 minutes after sunrise. Observations of bat activity and any emergences/re-entry were recorded, with data generated from the surveys analysed using proprietary Elekon BatExplorer software, whereby calls were identified to species level (where this was possible), through professional judgement and with reference to *British Bat Calls: A Guide to Species Identification* (Russ, 2012). The metadata (i.e., timings, weather conditions etc.) of each survey are included in Appendix A8.5 of Volume 4 of this EIAR.

Bat Transect Surveys

One bat activity walked transect survey was carried out in two locations in Balbriggan; adjacent to Overbridge (OBB) 55 and along the public path beside the railway line, and Balbriggan FC football pitches (see Image 8-1 and Image 8-2) which follows treelines/hedgerows alongside the existing railway line. This survey was carried out to determine how bats use treelines/hedgerows in the Balbriggan area.

This transect was carried out in this location due to the public walkways present alongside the railway allowing surveyors closer access for picking up bat calls that may be using the railway line[15].

[15] It was not possible to walk the complete railway line due to access issues and safety concerns of walking an active railway at night. Static detectors were therefore used to supplement this data.

Direct observations of how bats use the landscape were recorded, and handheld ultrasound detectors (Elekon Batlogger M) were used to identify the bat species by their calls. Data generated from the transect surveys was analysed using Elekon BatExplorer software, whereby calls were identified to species level (where this was possible), through professional judgement and with reference to *British Bat Calls: A Guide to Species Identification* (Russ, 2012). The transect survey was conducted on 8th September 2021 (Table 8-3). One survey only was completed at this location due to low potential foraging and/or commuting habitat.

Table 8-3 Details of transect surveys undertaken

Date (Sunset/Sunrise)	Survey Time	Survey Type	Weather Conditions
08/09/2021 (19:57)	19:40 – 22:10	Dusk transect survey	No rain, overcast, light winds, 16°C.

Image 8-1 Balbriggan/Bremore transect routes followed (red dashed line)

Image 8-2 Balbriggan transect routes followed (red dashed line)

Automatic Detector Deployments

Online sections of the rail line with mature treelines adjacent were assessed by the use of automated static bat detectors (*i.e.* Song Meter SM4). This use of automated bat detectors at online sections was required due to health and safety concerns with surveyors accessing along trackside. This is not considered to be a limitation to the assessment as a number of other bat survey types were also undertaken across the length of the Proposed Development, and detectors were located in areas of likely high commuting potential (i.e. treelines, hedgerows). Locations of the deployed automated detectors can be found in Table 8-4. Once the detectors had been deployed for a minimum of 7 nights between August and February[16], they were collected, and the data was analysed using proprietary Kaleidoscope bat analysis software. This software identifies each individual bat call recorded by the detectors, which can then be used to identify the calls by species. The average number of calls recorded per night for each species was calculated for each individual automated detector.

[16] Automated detectors deployed in August – September 2021, October – November 2021, and January – February 2022 were used to determine bat activity during the mating period and when young are starting to fly. Bat detectors were deployed during October–February to determine activity during the hibernation period.

Table 8-4 Locations and details of automatic bat detector deployments undertaken

Location	Date deployed/collected
McGraths Lane (Drogheda) OBB80/80A/80B	16/08/2021 to 31/08/2021 & 1/09/2021 to 16/09/2021
Colp Bridge (Colp Road, Drogheda) OBB77	16/08/2021 to 31/08/2021 & 1/09/2021 to 16/09/2021
Pilltown (Mosney camp) UBB70	16/08/2021 to 31/08/2021 & 1/09/2021 to 16/09/2021 & 25/11/2021 to 16/12/2021 & 18/01/2022 to 10/02/2022
Skerries (Treeline behind Skerries Wastewater treatment plant) UBB52	16/08/2021 to 31/08/2021 & 1/09/2021 to 16/09/2021

8.3.5.2.4 Other mammals

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 search for activity signs such as searching soft muds for tracks, and to look for droppings. Potential presence of these species in suitable habitat was determined based on the habitat preferences described in *Exploring Irish Mammals* (Hayden and Harrington 2000).

8.3.5.3 Birds

8.3.5.3.1 Breeding birds

Breeding bird surveys were undertaken by Síofra Quigley B.Sc. MSc. MCIEEM, Sorcha Shanley B.Sc. M.Sc,, Shane Brien B.Sc. M.Sc. ACIEEM, Wayne Daly B.Sc, Cathal O'Brien B.Sc. M.Sc., and Lorna Gill BA M.Sc. using a methodology adapted from the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species* (Gilbert et. al., 1998) (see Table 8-5 for more details). The study area covered specific areas outside of the existing railway line where works are proposed (substations, proposed compounds locations), and where very suitable breeding bird habitat was identified i.e., dense scrub, mature hedgerows/treelines, reed habitats, scrub/wetland habitats, as shown in Figure 8.7 in Volume 3A of this EIAR. Whilst all of the Proposed Development was not surveyed, surveys covered a representative sample of all habitat types likely to be used by breeding birds. Birds were identified by sight and song, and general location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes.

Table 8-5 Breeding bird survey details

Date (Sunrise)	Survey Time	Weather Conditions
26/04/2022 (06:00)	06:15-11:50	Mild, partly sunny weather with temperatures around 4 to 10°C. (conducted by Shane Brien and Cathal O'Brien)
26/05/2022 (05:08)	06:00-12:00	Humid day, mist rain conditions with overcast clouds, with temperatures around 11 to 14°C and moderate south west breeze. (conducted by Cathal O'Brien and Lorna Gill)
22/06/2022 (04:55)	05:30-09:45	Humid day, mist rain conditions with overcast clouds, with temperatures around 15 to 16°C. (conducted by Shane Brien and Cathal O'Brien)
06/04/2023 (06:47)	06:50-11:00	Humid day, light drizzle conditions with overcast clouds, with temperatures around 5 to 8°C. (conducted by Shane Brien and Síofra Quigley)
04/05/2023 (05:45)	05:55-11:45	Mild day, few clouds and light breeze conditions, with temperatures around 9 to 10°C. (conducted by Síofra Quigley and Sorcha Shanley)
07/06/2023 (04:59)	05:15-09:15	Temperate day, few clouds in the sky and moderate wind conditions, with temperatures around 9-14°C. (conducted by Shane Brien and Síofra Quigley)
22/05/2024 (05:14)	05:30 – 09:30	Temperate day, overcast with a gentle breeze, temperatures around 12°C. (Conducted by Wayne Daly)
28/05/2024 (05:06)	06:00 – 09:00	Intermittent rain, overcast with a moderate breeze, temperatures around 13°C. (Conducted by Wayne Daly)

8.3.5.3.2 Wintering birds

A desk study was carried out to identify any potential suitable sites for wintering birds located within or directly adjacent to the Proposed Development. This included a review of recent aerial photography and known inland feeding sites for the SCI bird species light-bellied Brent goose *Branta bernicla hrota* (Scott Cawley Ltd., 2017). A habitat suitability assessment was carried out in August 2021 to verify the suitability of potential inland feeding / roosting sites identified during the desk study.

The desk study identified five sites along or adjacent to the Proposed Development with potential for wintering birds that will be subject to direct habitat loss or collision risk as a result of the new Over Head Line Equipment (OHLE) for the electrification of the line. Each site was surveyed twice a month over six months across October 2021 - March 2022, October 2022 - March 2023 using a methodology based on the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species* (Gilbert at al., 1998). The results of the desk study and field surveys have informed the assessment of potential impacts on wintering bird species arising from the Proposed Development. This included four locations, including Drogheda, Laytown, Gormanston and Skerries. The potential impact was determined to be greatest in the estuaries and areas of highly suitable habitat that are adjacent to the exposed railway, so other areas outside of the aforementioned localities were not surveyed due to health and safety concerns with working on a live railway, and the railway being screened in some areas by residential and urban habitats, and treelines.

Additional wintering bird surveys were undertaken in September 2023 – March 2024, at the proposed Construction Compound and substation locations with suitable wintering bird habitat (i.e., agricultural fields, grasslands), following the same methodology as described above and below.

Four Construction Compounds/Substation locations were determined to have potential wintering bird habitat, and included; Drogheda Substation/Construction Compound, Laytown Construction Compound, Skerries Substation/Construction Compound, and Gormanston Construction Compound. Two additional Construction Compounds at Malahide by Caves Strand and Bissett's Strand were added to accommodate a design change (movement in location of the proposed turnback from the east side to the west side of the existing railway), this design change being made in response to significant feedback received followingpublic consultation no. 2. . Due to the timing of this design change (and the addition of the associated Construction Compounds), it was not possible to complete wintering bird surveys in these locations. However, this is not considered to be a limitation to the assessment as a habitat survey was undertaken in these areas, and confirmed that the Construction Compounds at Caves Strand and Bisett's Strand are comprised of overgrown grassland and scrub, such that they were not suitable for foraging and/or roosting wintering birds.

The Proposed Development crosses five localities that are considered to harbour high numbers of wintering bird species and are likely to fly across the existing rail line to use habitats on either side of the line. Three of the localities (River Nanny Estuary, Rogerstown Estuary, Malahide Estuary) are currently exposed bridges, with the railway line traversing areas of high habitat suitability for wintering bird species (i.e., estuarine habitat). The other two localities (Gormanston and Balbriggan) are areas that contain short sward grassland, bordered by low hedgerows, with the existing railway traversing through the fields. Surveys were timed to cover a range of tidal conditions, using a binoculars/scope from vantage points at a suitable visual distance viewing the estuaries and current rail line. The survey time at these vantage points was determined around sunlight hours during low or high tide for 4 hours (1 hour before peak tide and 3 hours after). Surveys at the estuaries mentioned above, surveyed the 500m area either side of the existing railway line from vantage points. Each vantage point was covered once a month at high and low tide, as shown in Figure 8.8 in Volume 3A of this EIAR. Balbriggan was an exception with walkovers of green spaces adjacent to the current rail line undertaken as there were no suitable vantage points available that would allow surveyors to cover large areas from one location.

Any birds flying over or in close proximity to the rail line were recorded within height bands based on level with the current rail line e.g. band 0 was used when birds flew under the bridge & band 1 (and higher) was used when birds flew over the rail line at risk of colliding with the OHLE, as outlined in Table 8-6 below.

Table 8-6 Wintering bird survey height bands

Band number	Approximate height (m)	Possibility of colliding with OHLE
0	Under the bridge	None
1	0-10	High
2	10-20	Moderate
3	20-35	Low
4	35-50	Low
5	>50	Low

An additional approach was a "*look-see*" methodology i.e., whereby the surveyor scans the entirety of a predefined survey area and records all birds present (based on Bibby *et al.,* 2000) within proximity of the current rail line and in areas outside of the boundary of the railway line, i.e. Construction Compounds and substation compounds. All birds present within the sites were identified with reference to *Collins Bird Guide* (Svensson, 2010) to confirm identification (where necessary), and were recorded using the BTO species codes. The total flock size of birds present, their general location within the site and any activity exhibited were recorded. Evidence of bird droppings where noted were recorded.

8.3.5.4 Amphibians

An assessment of the suitability of surface water features, such as watercourses, drainage ditches and ponds intersected by or in close proximity of the rail corridor for amphibian species (common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris*) along the footprint of the Proposed Development, and suitable lands immediately adjacent, was carried out as part of the multidisciplinary walkover surveys undertaken in August 2021, and anecdotally during surveys for other receptors.

8.3.5.5 Reptiles

The suitability of habitats located within and immediately adjacent to the Proposed Development, were assessed for use by common lizard *Zootoca vivipara* including for breeding and / or hibernating, as part of the multidisciplinary walkover surveys undertaken in August 2021, and anecdotally during surveys for other receptors.

8.3.6 Assessment of Methodology

8.3.6.1 Ecological Evaluation

Ecological receptors (including identified sites of ecological importance) are valued with regard to the ecological valuation examples set out in *Guidelines for Assessment of Ecological Impacts of National Roads Schemes: Revision 2 (TII, 2009)* and the guidance provided in *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2022) – refer to Appendix 8.2 of Volume 4 of this EIAR for examples of how ecological importance is assigned.

In accordance with these guidelines, important ecological features within what is referred to as the Zone of Influence (ZoI) of the Proposed Development which are "*both of sufficient value to be material in decision making and likely to be affected significantly*" are deemed to be 'Key Ecological Receptors' (KERs). These are the ecological receptors which may be subject to significant effects from the Proposed Development, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of Local Importance (Higher Value) or greater.

8.3.6.2 Impact Assessment

Ecological impact assessment is conducted following a standard source-pathway-receptor model, where, in order for an impact to be established all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potentially significant effect would not occur.

- Source(s) – e.g. pollutant run-off from the Proposed Development;

- Pathway(s) – e.g. groundwater connecting to nearby qualifying wetland habitats; and,
- Receptor(s) – e.g. wetland habitats and the fauna and flora species they support.

Characterising and Describing the Impacts

The parameters considered in characterising and describing the potential impacts of the Proposed Development are per the EPA's *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)* and CIEEM's *Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2022)*: whether the effect is positive, neutral or negative; the significance of the effects; the extent and context of the effect; the probability, duration and frequency of effects; and, cumulative effects.

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. The following development types are included in considering cumulative effects:

- Existing projects (under construction or operational);
- Projects which have been granted consent but not yet started;
- Projects for which consent has been applied for which are awaiting a decision, including those under appeal; and
- Projects proposed at a plan level, if relevant (e.g. future strategic infrastructure such as roads or greenways).

The likelihood of an impact occurring, and the predicted effects, can also be an important consideration in characterising impacts. In some cases, it may not be possible to definitively conclude that an impact will not occur. In this regard, the evaluation of significant effects is based on the best available scientific evidence but where reasonable doubt still remains then the precautionary principle is applied and it is assumed that significant effects may occur. Professional judgement is also used in considering the contribution of all relevant criteria in determining the overall magnitude of an impact.

Significant Effects

In determining whether potential impacts will result in significant effects, the CIEEM (2022) guidelines were followed. The approach considers that significant effects will occur when there are impacts on either:

- the structure and function (or integrity) of defined sites, habitats or ecosystems; or
- the conservation status of habitats and species (including extent, abundance and distribution).

Integrity

The term "integrity" may 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 (TII, 2009).

The term 'integrity' is most often used when determining impact significance in relation to designated areas for nature conservation (e.g. Special Area of Conservation SAC), Special Protection Area (SPA) or proposed Natural Heritage Area (pNHA) /Natural Heritage Areas (NHA) but can also 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.

Conservation Status

Similar definitions for conservation status given in the Habitats Directive, in relation to habitats and species, are also used in the CIEEM (2022) and TII (2009) guidance which are summarised as follows:

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

An impact on the conservation status of a habitat or species is significant if it will result in a change in conservation status, having regard to the definitions of favourable conservation status provided in the Habitats Directive – i.e. into the future, the range, area and quality of habitats are likely to be maintained/increased and species populations are likely to be maintained/increased.

According to the CIEEM (2022) methodology, if it is determined that the integrity and/or conservation status of an ecological receptor 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 an international level.

8.3.7 Consultation

Consultation is important to ensure that a sufficiently robust environmental baseline is established for the Proposed Development and its surroundings with full details of the consultations detailed in Chapter 1 (Introduction) and Chapter 3 (Alternatives) in Volume 2 of this EIAR. Consultation helps to identify specific concerns and issues relating to air quality early in the process.

Two separate non-statutory public consultations (PC1 and PC2) were conducted as part of the early-stage design of the Proposed Development and the findings of these consultations are reported separately in Appendix A3.1 (PC1 Consultation Findings Report) and A3.2 (PC2 Consultation Findings Report) in Volume 4 of this EIAR. The following organisations were also consulted:

- Dublin County Council;
- Fingal County Council;
- Louth County Council;
- Meath County Council;
- Development Applications Unit (NPWS);
- Inland Fisheries Ireland (IFI); and
- Environmental Protection Agency (EPA).

Feedback relevant to the topic 'Biodiversity' has been reviewed and has influenced this chapter of the EIAR.

A summary of recommendations from NPWS, and the report section where they are dealt is provided in Table 8-7.

Table 8-7 Ecological observations/recommendations raised from consultations

Consultee	Recommendations/observations raised	Relevant section where this is addressed
NPWS - Department of Housing, Local Government and Heritage	Ensure possible effects on flora, fauna and habitats from works associated with the Proposed Development and which traverse European sites are evaluated	Section 8.8 addresses all potential impacts on the receiving environment
	Ensure to consider possible impacts on *ex-situ* sites for QI/SCI species during the construction phase of the development and ensure winter bird surveys cover areas of suitable habitat along the proposed route.	Section 8.3.5.3.2 of this Chapter discusses the wintering bird surveys undertaken, and Section 8.8.1.1.1 discusses the potential impact on SCI/QI species *ex-situ* sites. This is also discussed in the NIS accompanying this planning application.
	Ensure impacts on collision/direct injury risk to SCI and other wintering bird species is considered and provide appropriate mitigation to minimise this risk at sensitive areas for wintering bird species, i.e., Malahide Estuary, Rogerstown Estuary, Gormanston, Laytown, and Balbriggan.	Potential mortality/direct injury impacts are discussed in Section 8.8.1.1.1 of this report, and in more detail in Section 6.7 of the NIS. Mitigation for this potential impact is provided in Section 8.9.2.1.1 of this report, and in Section 7.5.22 of the NIS.
	Undertake habitat/plant surveys along the length of the Proposed Development, specifically in relation to calcareous plants that may occur in railway embankments and identify potential impacts and appropriate mitigation and monitoring methods for this.	Habitat surveys are described in Section 8.3.5.1, and potential impacts in Section 8.8.1.2.
	Ensure breeding bird surveys are undertaken at areas where vegetation will be cleared along the Proposed Development, and ensure clearance is undertaken outside of breeding season.	Details of breeding bird surveys are described in Section

Consultee	Recommendations/observations raised	Relevant section where this is addressed
NPWS - Department of Housing, Local Government and Heritage		8.3.5.3.1, and mitigation is described in Section 8.8.1.4.1.
	Ensure badger surveys are undertaken along the Proposed Development route.	Details of badger surveys undertaken are provided in Section 8.3.5.2.1
	Undertake otter surveys along the Proposed Development route and install an otter culvert and fencing in Malahide Estuary where otters may be at a greater risk due to the increase in train frequency, and as the sluice gate prevents otter passage through the Turvey/Pill watercourse.	Details of otter surveys, including deployment of cameras at the sluice gate location, is included in Section 8.3.5.2.2, and mitigation is provided in Section 8.9.2.3.3.
	Ensure bat surveys are undertaken at bridges or other structures along the route and obtain a derogation licence from NPWS should a roost be interfered or destroyed.	Details of bat surveys undertaken is provided in Section 8. 3.5.2.3, with subsequent results in Section 8.4.10.1.5. No known roosts were identified within the Proposed Development, however mitigation is provided in Section 8.9.1.3.1 to ensure bats will not be impacted by the proposed works, as PRFs were identified within structures and trees along the route.
	Ensure impacts from lighting is minimised, illumination of trees and waterbodies avoided, and lighting is turned off when not required, ideally by the use of motion activated lighting.	Details on the lighting design is provided Section 8.6.1.4, and impacts are described in Section 8.8.1.3 and 8.8.1.3 on bats and other mammals. Lighting in general across the scheme has been minimised with PIR lighting being used during operation, and mitigation relating to lighting is described in Section 8.9.1.3 and Section 8.9.2.3.

8.4 Receiving Environment

8.4.1 General Description and Context

The receiving environment is comprised of the existing railway corridor, between Dublin City Centre (north of Connolly Station) and Drogheda MacBride Station. For the purpose of describing the DART+ Coastal North project in this chapter and in the EIAR, the Proposed Development has been divided into five (5) geographical zones (A-E) from south to north. The EIAR zones are described using the local authority boundaries. As Fingal County Council covers a large area of the Proposed Development this has been spilt into two zones. The zones are described in Table 8-8 and illustrated in Image 8-3.

Table 8-8 DART+ Coastal North geographical zones

Zone	Location	Description	Local Authority
Zone A	North of Connolly Station to south of Howth Junction & Donaghmede Station	The area between north of Connolly Station to south of Howth Junction & Donaghmede Station, including Fairview Depot.	Dublin City Council
Zone B	South of Howth Junction & Donaghmede Station (Including Howth Branch) to Malahide Viaduct.	The area between Howth Junction & Donaghmede Station, and the Malahide Viaduct, plus the entire Howth Branch. Includes works within Howth Junction & Donaghmede Station, Clongriffin Station and the Malahide Viaduct.	Fingal County Council
Zone C	Malahide viaduct to south of Gormanston Station (Fingal boundary)	The area between Malahide Viaduct to south of Gormanston Station. Area includes Donabate, Rush & Lusk, Skerries and Balbriggan Stations.	Fingal County Council
Zone D	South of Gormanston Station (Fingal border) to Louth/Meath border	The area between Gormanston Station (Fingal border) and the Louth/Meath border (boundary of Louth approx. 1.5km southeast of Drogheda MacBride Station). Includes Gormanston and Laytown Stations.	Meath County Council
Zone E	Drogheda MacBride Station and surrounds	Drogheda MacBride Station and surrounds including the area between the Dublin Road Bridge (UBK01) to the Louth/Meath border	Louth County Council

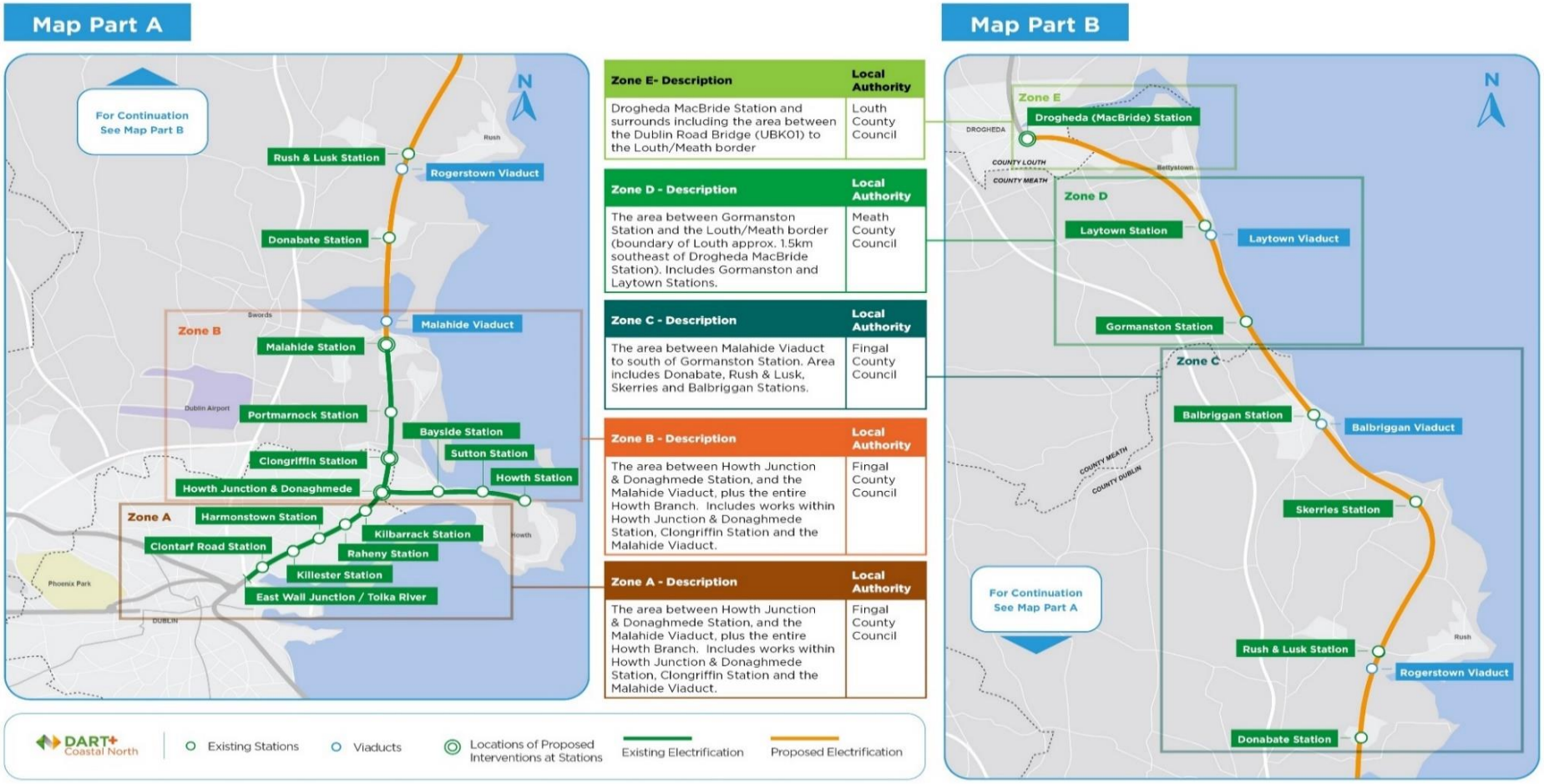

Image 8-3 DART+ Coastal North geographical zones

The railway line passes between a variety of habitats, including urban and rural areas. In general, the existing railway corridor is comprised of a mixture of semi-natural habitat, with ballast bordered by managed and unmanaged grassy verges, scrub, hedgerows and treelines. The railway line in Zone A is bordered by residential and urban areas, whilst Zone B is comprised of mainly urban habitats, with some agricultural fields, golf courses, and estate grounds also present. Zone B also includes Malahide Estuary and Causeway, and its associated wetland habitats. Zones C and D are very similar in composition, dominated by rural and agricultural habitats, with towns such as Balbriggan, Laytown, and Skerries present along this route. These zones also include coastal and intertidal habitats around Rogerstown Estuary, and Laytown. Zone E is comprised of Drogheda town and surrounds, and the River Boyne and River Boyne Viaduct in the northern most section of Zone E.

The Proposed Development crosses a number of watercourses, estuaries, and small streams, ditches and drains, including; the Tolka River, Malahide Estuary, Rogerstown Estuary, Laytown Estuary, Delvin River, and the River Boyne. A number of these water features are designated for nature conservation and are discussed further in the sections below.

8.4.2 Desk Study

The results of the desk study are provided in Appendix A8.1 in Volume 4 of this EIAR and are incorporated into the sections below under the various headings, as relevant.

8.4.3 Local Biodiversity Areas

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

8.4.3.1 Dublin City Biodiversity Action Plan

The Dublin City Biodiversity Action Plan 2021 – 2025 (DCC 2021) highlights a number of areas considered to be of biodiversity value present within the DCC administrative boundary. The areas that are located within the ZoI of the Proposed Development are listed below:

- North Bull Island, which is noted to support nine different Annex I habitats, a range of legally protected species under the EU Habitats Directive and six legally protected plant species under the Flora Protection Order. It is also located within the European sites of North Dublin Bay SAC and North Bull Island SPA and the UNESCO Dublin Bay Biosphere Reserve;
- Dublin City's Green Infrastructure Network. Habitats within the Proposed Development which are considered to contribute to the Green Infrastructure Network include semi-natural calcareous grassland, hedgerows, tree lines 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 St. Anne's Park, Tolka Valley Park, Fairview Park, and public gardens, support a variety of species and is considered to be a valuable biodiversity resource; and

- Dublin City's network of rivers, streams, and riparian zones. The Proposed Development is located in close proximity to the River Tolka, where minor works at Fairview Depot will occur. The River Tolka supports populations of brown trout *Salmo trutta*, Atlantic salmon *Salmo salar*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, and European eel *Anguilla anguilla*. The Proposed Development also traverses the Santry River and the River Mayne, the latter of which supports populations of white-clawed crayfish *Austropotamobius pallipes*. The Santry River is part of the Santry River Regeneration project and is a prioritised waterbody for restoration.

8.4.3.2 Fingal Biodiversity Action Plan

The Fingal Biodiversity Action Plan 2022 - 2030 highlights a number of areas considered to be of biodiversity value present within the boundaries of FCC. These areas that are located within the ZoI of the Proposed Development are provided below;

- The Malahide, Rogerstown and Baldoyle estuaries, which are located downstream of the Proposed Development and support a variety of waterbirds, waders and fish species, and the surrounding terrestrial grasslands;
- Sandy, shingle and gravel beaches, which are located downstream of the Proposed Development and support a variety of estuarine bird and plant species that are rare in Dublin such as yellow horned poppy *Glaucium flavum*, sea-holly *Eryngium maritimum* and sea-kale *Crambe maritima;*
- Sand dunes, which are located downstream of the Proposed Development and support a number of rare and protected species such as the legally protected hairy violet *Viola hirta* and red-listed species spring vetch *Vicia lathyroides*;
- Cliffs and rocky shores, which are located downstream of the Proposed Development and support a range of nesting bird species such as; kittiwakes *Rissa tridactyla,* fulmars *Fulmarus glacialis,* and guillemots *Uria aalge,* as well as a variety of marine flora and fauna in the intertidal zone;
- Inshore waters of the Irish Sea, which is located downstream of the Proposed Development. These areas are classified as important spawning and nursery grounds for several fish species such as cod, whiting, plaice, herring and mackerel, who spend their juvenile years in the calm waters of the estuaries and shore. Marine mammals such as harbour porpoise *Phocoena phocoena*, grey seal *Halichoerus grypus*, and harbour seal *Phoca vitulina also* utilise these waters for foraging, commuting and breeding within;
- Undesignated (i.e. outside EU sites) Annex I habitats, some of which are downstream of the Proposed Development, such as annual vegetation of drift lines [1210], perennial vegetation of stony banks [1220], vegetation sea cliffs [1230], and calcareous grassland [6210], containing species such as henbane *Hyoscyamus niger*, golden samphire *Limbarda crithmoides,* spring squill *Scilla verna* and strawberry clover *Trifolium fragiferum*;
- Habitats considered to be of importance and act as buffer zones, such as dry calcareous grassland, wet grassland, ponds, embryonic shifting dunes, marram dunes, fixed dunes, hedgerows, woodlands and scrub, which support a range of species and act as important ecological links/corridors across the wider landscape;
- Nature Development Areas (NDA), a number of which are adjacent and downstream of the Proposed Development, including areas of farmland, demesnes, quarries, parkland, golf courses, waterbodies, and new woodland, which all contain valuable wildlife habitats that support a wide range of flora and fauna.

- Network of rivers and streams, including the Broadmeadow River, River Pill, Turvey River, Sluice River, Palmerstown River, Balcunnin River, and Mayne River, all of which are crossed by the Proposed Development. These watercourses support a range of riverine bird species, such as kingfisher, and fish species; and
- European and National sites designated for conservation (i.e. SAC, SPA and pNHA) and the lands surrounding these sites that are of key importance as stepping stones in particular for birds as feeding or roosting grounds.

8.4.3.3 Meath Biodiversity Action Plan

The Meath Biodiversity Action Plan 2015 – 2020[17] highlights a number of areas considered to be of biodiversity value present within the boundaries of MCC. These areas that are located within the ZoI of the Proposed Development are provided below;

- European and national sites designated for conservation (i.e. SAC, SPA and pNHA) and the lands surrounding these sites that are of key importance as stepping stones in particular for birds as feeding or roosting grounds;
- The variety of landscape character areas in Co. Meath, some of which are downstream or in close proximity to the Proposed Development, consisting of River Corridors and Estuaries (i.e. Boyne Valley and Nanny Valley), and coastal areas/plains; and
- Habitats considered to be of importance due to intense deforestation and strong agricultural ties in the county, such as woodlands, hedgerows, watercourses, wetlands and coastal habitats, bogs and peatlands, canals, eskers, and urban habitats, all of which support a range of protected and/or rare species and act as important ecological links/corridors/refuges across the wider landscape.

8.4.3.4 Louth Biodiversity Action Plan

The Louth Biodiversity Action Plan 2021 – 2026 highlights a number of areas considered to be of biodiversity value present within the boundaries of LCC. These areas that are located within the ZoI of the Proposed Development are provided below;

- European and national sites designated for conservation (i.e. SAC, SPA and pNHA) and the lands surrounding these sites that are of key importance as stepping stones in particular for birds as feeding or roosting grounds; and
- Vitally important habitats such as wetlands (i.e. the Boyne Estuary), hedgerows and riparian and coastal habitats.

[17] This plan is still valid and there is no published update as checked February 2024

8.4.4 European Designated Sites

The Proposed Development overlaps in part with five European sites;

- Malahide Estuary SAC and Malahide Estuary SPA where the existing Malahide Viaduct traverses Malahide Estuary;
- Rogerstown Estuary SAC and Rogerstown Estuary SPA where the existing Rogerstown Viaduct traverses Rogerstown Estuary; and
- River Nanny Estuary and Shore SPA where the existing Laytown Viaduct traverses the River Nanny Estuary.

The Proposed Development does not traverse any other European sites, except those listed above, but does come close to several European sites. In Zone A, the Proposed Development is in close proximity to European sites in Dublin Bay, which is variously designated for a number of overlapping European sites. The nearest European site to the Proposed Development in Zone A is South Dublin Bay and River Tolka Estuary SPA, located *c.* 500m east from the Proposed Development boundary at its closest point. North Dublin Bay SAC and North Bull Island SPA are also in close proximity to the Proposed Development, located *c.* 800m, east.

The aforementioned European sites, i.e., South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC, and the North Bull Island SPA, are also hydrologically connected to the Proposed Development via the River Santry, which flows under the railway line in Raheny, and outfalls *c*. 1.3km downstream into Dublin Bay at the Bull Island Causeway. There are a number of other European sites that are within the ZoI but are not directly hydrologically linked to the Proposed Development or located offshore, namely; South Dublin Bay SAC, the North-West Irish Sea SPA, Rockabill to Dalkey Island SAC, Howth Head SAC, Howth Head Coast SPA, Lambay Island SAC, Irelands Eye SAC, Clogher Head SAC, Dalkey Island SPA.

There are three European sites containing marine mammals which are known to frequent Dublin Bay and the eastern coastline. These are Rockabill to Dalkey Island SAC, Lambay Island SAC and the Codling Fault Zone SAC.

In Zone B, whilst the Proposed Development boundary comes within metres of European sites in Baldoyle Estuary, i.e. Baldoyle Bay SAC and Baldoyle Bay SPA, no works are proposed along the Howth line, with works only proposed at Howth Junction and Donaghmede, Clongriffin, and Malahide Stations and at Malahide Viaduct. Therefore, Baldoyle Bay SAC which is located *c.* 250m east of the Proposed Development, and Baldoyle Bay SPA is located *c*. 600m east, are also hydrologically linked to the Proposed Development via the River Mayne, which flows under the existing railway line, and outfalls into Baldoyle Bay *c.* 950m downstream of the Proposed Development.

There are a number of European sites associated with the River Boyne. The Boyne Estuary SPA, Boyne Coast and Estuary SAC, and the River Boyne and River Blackwater SAC are all downstream and hydrologically linked to the Proposed Development. The River Boyne and River Blackwater SPA designated for kingfisher, is located *c.* 4km upstream of the Proposed Development, and therefore also within the ZoI of the Proposed Development.

There are 21 SPAs designated for SCI bird species that are known to forage and / or roost across Dublin City, and / or utilise Dublin Bay, and the eastern coastline and estuarine/wetland habitats within. These are Malahide Estuary SPA, Baldoyle Bay SPA, Rogerstown Estuary SPA, Skerries Islands SPA, North Bull Island SPA, South Dublin Bay and River Tolka SPA, North-West Irish Sea SPA, Ireland's Eye SPA, Lambay Island SPA, Rockabill SPA, Dalkey Islands SPA, River Nanny Estuary and Shore SPA, Boyne Estuary SPA, Stabannan-Braganstown SPA, Wicklow Mountains SPA, Howth Head Coast SPA, Dundalk Bay SPA, The Murrough SPA, Seas off Wexford SPA, Saltee Islands SPA, and Wicklow Head SPA.

There are 34 European sites (SACs and SPAs) located within the vicinity of the Proposed Development, listed in Table 8-9 and illustrated in Figure 8.1 in Volume 3A of this EIAR. There are 31 European sites within the ZoI of the Proposed Development, Table 8-9 lists these sites, their distance from the Proposed Development, and the sites Qualifying Interests (QIs) / Special Conservation Interests (SCIs).

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

Table 8-9 European sites (SACs and SPAs) located within the ZoI (highlighted in a grey background), and those in the wider area of the Proposed Development boundary.

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
Special Areas of Conservation (SACs)		
Malahide Estuary SAC [000205]	The Proposed Development lies within this European site boundary	1140 Mudflats and sandflats not covered by seawater at low tide 1310 *Salicornia* and other annuals colonising mud and sand 1330 Atlantic salt meadows *(Glauco-Puccinellietalia maritimae)* 1410 Mediterranean salt meadows *(Juncetalia maritimi)* 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* *S.I. No. 91/2019 - European Union Habitats (Malahide Estuary Special Area Of Conservation 000205) Regulations 2019* NPWS (2013) *Conservation Objectives: Malahide Estuary SAC 000205.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
Rogerstown Estuary SAC [000208]	The Proposed Development lies within this European site boundary	1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1310 *Salicornia* and other annuals colonising mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1410 Mediterranean salt meadows (*Juncetalia maritimi*) 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* *S.I. No. 286/2018 - European Union Habitats (Rogerstown Estuary Special Area of Conservation 000208) Regulations 2018*

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		NPWS (2013) *Conservation Objectives: Rogerstown Estuary SAC 000208*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
River Boyne and River Blackwater SAC [002299]	Located *c.* 130m north of the Proposed Development	7230 Alkaline fens 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* 1099 River Lamprey *Lampetra fluviatilis* 1106 Salmon *Salmo salar* 1355 Otter *Lutra lutra* NPWS (2021) *Conservation objectives for River Boyne and River Blackwater SAC [002299].* Version 1. Department of Housing, Local Government and Heritage.
Baldoyle Bay SAC [000199]	Located *c.* 250m east of the Proposed Development	1140 Mudflats and sandflats not covered by seawater at low tide 1310 *Salicornia* and other annuals colonizing mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1410 Mediterranean salt meadows (*Juncetalia maritimi*) *S.I. No. 472/2021 - European Union Habitats (Baldoyle Bay Special Area of Conservation 000199) Regulations 2021* NPWS (2012) *Conservation Objectives: Baldoyle Bay SAC 000199.* Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
North Dublin Bay SAC [000206]	Located *c.* 1km south east of the Proposed Development	1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 *Salicornia* and other annuals colonising mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1395 Petalwort *Petalophyllum ralfsii* 1410 Mediterranean salt meadows (*Juncetalia maritimi*) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* 2190 Humid dune slacks *S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019* NPWS (2013) *Conservation Objectives: North Dublin Bay SAC 000206.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
Boyne Coast and Estuary SAC [001957]	Located *c.* 1.2km north east of the Proposed Development	1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 *Salicornia* and other annuals colonising mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
Rockabill to Dalkey Island SAC [003000]	Located *c.* 3km east of the Proposed Development	1410 Mediterranean salt meadows (*Juncetalia maritimi*) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* S.I. No. 433/2021- European Union Habitats (Boyne coast and Estuary Special Area of Conservation 001957) Regulations 2021 NPWS (2012) *Conservation Objectives: Boyne Coast and Estuary SAC 001957.* Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. 1170 Reefs 1351 Harbour porpoise *Phocoena phocoena* *S.I. No. 94/2019 - European Union Habitats (Rockabill To Dalkey Island Special Area Of Conservation 003000) Regulations 2019* NPWS (2013) *Conservation Objectives: Rockabill to Dalkey Island SAC 003000.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
South Dublin Bay SAC [000210]	Located *c.* 3km south-east of the Proposed Development	1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 *Salicornia* and other annuals colonising mud and sand 2110 Embryonic shifting dunes *S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019* NPWS (2013) *Conservation Objectives: South Dublin Bay SAC 000210.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
Howth Head SAC [000202]	Located *c.* 4.6km south east of the Proposed Development	1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 4030 European dry heaths *S.I. No. 524/2021 - European Union Habitats (Howth Head Special Area of Conservation 000202) Regulations 2021* NPWS (2016) *Conservation Objectives: Howth Head SAC 000202.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
Ireland's Eye SAC [002193]	Located *c.* 5.3km east of the Proposed Development	1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts *S.I. No. 501/2017 - European Union Habitats (Ireland's Eye Special Area of Conservation 002193) Regulations 2017* NPWS (2017) *Conservation Objectives: Ireland's Eye SAC 002193.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
Lambay Island SAC [000204]	Located *c.* 7.5km east of the Proposed Development	1170 Reefs 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1364 Grey seal *Halichoerus grypus* 1365 Harbour seal *Phoca vitulina* 1351 Harbour Porpoise *Phocoena phocoena* *S.I. No. 294/2019 - European Union Habitats (Lambay Island Special Area Of Conservation 000204) Regulations 2019* NPWS (2013) *Conservation Objectives: Lambay Island SAC 000204. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht[18].
Clogher Head SAC [001459]	Located *c.* 10.7km north east of the Proposed Development	1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 4030 European dry heaths *S.I. No. 610/2019 - European Union Habitats (Clogher Head Special Area of Conservation 001459) Regulations 2019* NPWS (2017) Conservation Objectives: Clogher Head SAC 001459. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
Codling Fault Zone SAC [003015]	Located c. 36.6km east of the Proposed Development	1180 Submarine structures made by leaking gases 1351 Harbour Porpoise *Phocoena phocoena* NPWS (2023) Conservation Objectives: Codling Fault Zone SAC 003015. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.[19]
Special Protection Areas (SPAs)		
Malahide Estuary SPA [004025]	The Proposed Development lies within this European site boundary	A005 Great Crested Grebe *Podiceps cristatus* A046 Light-bellied Brent Goose *Branta bernicla hrota* A048 Shelduck *Tadorna tadorna* A054 Pintail *Anas acuta* A067 Goldeneye *Bucephala clangula* A069 Red-breasted Merganser *Mergus serrator* A130 Oystercatcher *Haematopus ostralegus* A140 Golden Plover *Pluvialis apricaria* A141 Grey Plover *Pluvialis squatarola* A143 Knot *Calidris canutus* A149 Dunlin *Calidris alpina* A156 Black-tailed Godwit *Limosa limosa*

[18] Harbour porpoise was added as a QI species to this European site in March 2024, however the Conservation Objectives document for the Lambay Island SAC has not been updated by NPWS since and is as advised in the Amendment Notification document.

[19] Harbour porpoise was added as a QI species to this European site in March 2024, however the Conservation Objectives document for the Codling Fault Zone SAC has not been updated by NPWS since and is as advised in the Amendment Notification document.

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		A157 Bar-tailed Godwit *Limosa lapponica* A162 Redshank *Tringa totanus* A999 Wetland and Waterbirds *S.I. No. 285/2011 - European Communities (Conservation of Wild Birds (Malahide Estuary Special Protection Area 004025)) Regulations 2011*. NPWS (2013) Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
Rogerstown Estuary SPA [004015]	The Proposed Development lies within this European site boundary	A043 Greylag Goose *Anser anser* A046 Light-bellied Brent Goose *Branta bernicla hrota* A048 Shelduck *Tadorna tadorna* A056 Shoveler *Anas clypeata* A130 Oystercatcher *Haematopus ostralegus* A137 Ringed Plover *Charadrius hiaticula* A141 Grey Plover *Pluvialis squatarola* A143 Knot *Calidris canutus* A149 Dunlin *Calidris alpina alpina* A156 Black-tailed Godwit *Limosa limosa* A162 Redshank *Tringa totanus* A999 Wetlands *S.I. No. 271/2010 - European Communities (Conservation of Wild Birds (Rogerstown Estuary Special Protection Area 004015)) Regulations 2010* NPWS (2013) *Conservation Objectives: Rogerstown Estuary SPA 004015*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
River Nanny Estuary and Shore SPA [004158]	The Proposed Development lies within this European site boundary	A130 Oystercatcher *Haematopus ostralegus* A137 Ringed Plover *Charadrius hiaticula* A140 Golden Plover *Pluvialis apricaria* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba* A184 Herring Gull *Larus argentatus* A999 Wetland *S.I. No. 140/2012 - European Communities (Conservation of Wild Birds (River Nanny Estuary and Shore SPA 004158)) Regulations 2012.* NPWS (2012) *Conservation Objectives: River Nanny Estuary and Shore SPA 004158*. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
North-West Irish Sea SPA [004236]	Located *c.* 10m east of the Proposed Development	[A065] Common Scoter *Melanitta nigra* [A001] Red-throated Diver *Gavia stellata* [A003] Great Northern Diver *Gavia immer* [A009] Fulmar *Fulmarus glacialis*

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		[A013] Manx Shearwater *Puffinus puffinus* [A018] Shag *Phalacrocorax aristotelis* [A017] Cormorant *Phalacrocorax carbo* [A177] Little Gull *Larus minutus* [A188] Kittiwake *Rissa tridactyla* [A179] Black-headed Gull *Chroicocephalus ridibundus* [A182] Common Gull *Larus canus* [A183] Lesser Black-backed Gull *Larus fuscus* [A184] Herring Gull *Larus argentatus* [A187] Great Black-backed Gull *Larus marinus* [A195] Little Tern *Sterna albifrons* [A192] Roseate Tern *Sterna dougallii* [A193] Common Tern *Sterna hirundo* [A194] Arctic Tern *Sterna paradisaea* [A204] Puffin *Fratercula arctica* [A200] Razorbill *Alca torda* [A199] Guillemot *Uria aalge* NPWS (2023) *Conservation Objectives: North-West Irish Sea SPA 004236.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
Boyne Estuary SPA [004080]	Located *c.* 400m north east of the Proposed Development	A048 Shelduck *Tadorna tadorna* A130 Oystercatcher *Haematopus ostralegus* A140 Golden Plover *Pluvialis apricaria* A141 Grey Plover *Pluvialis squatarola* A142 Lapwing *Vanellus vanellus* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba* A156 Black-tailed Godwit *Limosa limosa* A162 Redshank *Tringa totanus* A169 Turnstone *Arenaria interpres* A195 Little Tern *Sterna albifrons* A999 Wetland *S.I. No. 626/2011 - European Communities (Conservation of Wild Birds (Boyne Estuary Special Protection Area 004080)) Regulations 2011.* NPWS (2013) *Conservation Objectives: Boyne Estuary SPA 004080. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
South Dublin Bay and River Tolka Estuary SPA [004024]	Located *c.* 500m south east of the Proposed Development	A046 Light-bellied Brent Goose *Branta bernicla hrota* A130 Oystercatcher *Haematopus ostralegus* A137 Ringed Plover *Charadrius hiaticula* A141 Grey Plover *Pluvialis squatarola* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba*

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		A149 Dunlin *Calidris alpina* A157 Bar-tailed Godwit *Limosa lapponica* A162 Redshank *Tringa totanus* A179 Black-headed Gull *Chroicocephalus ridibundus* A192 Roseate Tern *Sterna dougallii* A193 Common Tern *Sterna hirundo* A194 Arctic Tern *Sterna paradisaea* A999 Wetland *S.I. No. 212/2010 - European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024)) Regulations 2010.* NPWS (2015) *Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
Baldoyle Bay SPA [004016]	Located *c.* 600m east of the Proposed Development	A046 Light-bellied Brent Goose *Branta bernicla hrota* A048 Shelduck *Tadorna tadorna* A137 Ringed Plover *Charadrius hiaticula* A140 Golden Plover *Pluvialis apricaria* A141 Grey Plover *Pluvialis squatarola* A157 Bar-tailed Godwit *Limosa lapponica* A999 Wetlands *S.I. No. 275/2010 - European Communities (Conservation of Wild Birds (Baldoyle Bay Special Protection Area 004016)) Regulations 2010* NPWS (2013) *Conservation Objectives: Baldoyle Bay SPA 004016. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
North Bull Island SPA [004006]	Located *c.* 1km east of the Proposed Development	A046 Light-bellied Brent Goose *Branta bernicla hrota* A048 Shelduck *Tadorna tadorna* A052 Teal *Anas crecca* A054 Pintail *Anas acuta* A056 Shoveler *Anas clypeata* A130 Oystercatcher *Haematopus ostralegus* A140 Golden Plover *Pluvialis apricaria* A141 Grey Plover *Pluvialis squatarola* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba* A149 Dunlin *Calidris alpina* A156 Black-tailed Godwit *Limosa limosa* A157 Bar-tailed Godwit *Limosa lapponica* A160 Curlew *Numenius arquata* A162 Redshank *Tringa totanus* A169 Turnstone *Arenaria interpres*

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		A179 Black-headed Gull *Chroicocephalus ridibundus* A999 Wetlands *S.I. No. 211/2010 - European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006)) Regulations 2010.* NPWS (2015) *Conservation Objectives: North Bull Island SPA 004006.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
Skerries Islands SPA [004006]	Located *c.* 1.4km east of the Proposed Development	A017 Cormorant *Phalacrocorax carbo* A018 Shag *Phalacrocorax aristotelis* A046 Light-bellied Brent Goose *Branta bernicla hrota* A148 Purple Sandpiper *Calidris maritima* A169 Turnstone *Arenaria interpres* A184 Herring Gull *Larus argentatus* *S.I. No. 245/2010 - European Communities (Conservation of Wild Birds (Skerries Islands Special Protection Area 004122)) Regulations 2010.* NPWS (2022) Conservation Objectives for Skerries Islands SPA [004122]. First Order site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.
Rockabill SPA [004014]	Located *c.* 3.5km east of the Proposed Development	A148 Purple Sandpiper *Calidris maritima* A192 Roseate Tern *Sterna dougallii* A193 Common Tern *Sterna hirundo* A194 Arctic Tern *Sterna paradisaea* *S.I. No. 94/2012 - European Communities (Conservation of Wild Birds (Rockabill Special Protection Area 004014)) Regulations 2012*. NPWS (2013) *Conservation Objectives: Rockabill SPA [004122].* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
River Boyne and River Blackwater SPA [004232]	Located *c.* 3.7km north west of the Proposed Development	A229 Kingfisher *Alcedo atthis* *S.I. No. 462/2012 - European Communities (Conservation of Wild Birds (River Boyne and River Blackwater Special Protection Area 004232)) Regulations 2012.* NPWS (2022) *Conservation objectives for River Boyne and River Blackwater SPA [004232].* First Order site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.
Ireland's Eye SPA [004117]	Located *c.* 5.4km east of the Proposed Development	A017 Cormorant *Phalacrocorax carbo* A184 Herring Gull *Larus argentatus* A188 Kittiwake *Rissa tridactyla* A199 Guillemot *Uria aalge* A200 Razorbill *Alca torda*

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		S.I. No. 240/2010 - European Communities (Conservation of Wild Birds (Ireland's Eye Special Protection Area 004117)) Regulations 2010. NPWS (2022) *Conservation objectives for Ireland's Eye SPA [004117].* First Order site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage
Howth Head Coast SPA [004113]	Located *c.*6.5km east of the Proposed Development	A188 Kittiwake *Rissa tridactyla* *S.I. No. 185/2012 - European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012.* NPWS (2022) *Conservation objectives for Howth Head Coast SPA [004113].* First Order site Specific Conservation Objectives Version 1.0.. Department of Housing, Local Government and Heritage.
Lambay Island SPA [004069]	Located *c.* 7.5km east of the Proposed Development	A009 Fulmar Fulmarus glacialis A017 Cormorant *Phalacrocorax carbo* A018 Shag *Phalacrocorax aristotelis* A043 Greylag Goose *Anser anser* A183 Lesser Black-backed Gull *Larus fuscus* A184 Herring Gull *Larus argentatus* A188 Kittiwake *Rissa tridactyla* A199 Guillemot *Uria aalge* A200 Razorbill *Alca torda* A204 Puffin *Fratercula arctica* *S.I. No. 242/2010 - European Communities (Conservation of Wild Birds (Lambay Island Special Protection Area 004069)) Regulations 2010.* NPWS (2022) *Conservation objectives for Lambay Island SPA [004069].* First Order site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.
Dalkey Islands SPA [004172]	Located *c.*12.8km south east of the Proposed Development	A192 Roseate Tern *Sterna dougallii* A193 Common Tern *Sterna hirundo* A194 Arctic Tern *Sterna paradisaea* NPWS (2022) Conservation objectives for Dalkey Islands SPA [004172]. First Order Site specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage. *S.I. No. 238/2010 - European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172)) Regulations 2010.*
Wicklow Mountains SPA [004040]	Located *c.* 14km south west of the Proposed Development	A098 Merlin *Falco columbarius* A103 Peregrine *Falco peregrinus* *S.I. No. 586/2012 - European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040)) Regulations 2012* NPWS (2022) *Conservation Objectives for Wicklow Mountain SPA 004040*. First Order site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
Dundalk Bay SPA [004026]	Located *c.* 17.5km north of the Proposed Development	A005 Great Crested Grebe *Podiceps cristatus* A043 Greylag Goose *Anser anser* A046 Light-bellied Brent Goose *Branta bernicla hrota* A048 Shelduck *Tadorna tadorna* A052 Teal *Anas crecca* A053 Mallard *Anas platyrhynchos* A054 Pintail *Anas acuta* A065 Common Scoter *Melanitta nigra* A069 Red-breasted Merganser *Mergus serrator* A130 Oystercatcher *Haematopus ostralegus* A137 Ringed Plover *Charadrius hiaticula* A140 Golden Plover *Pluvialis apricaria* A141 Grey Plover *Pluvialis squatarola* A142 Lapwing *Vanellus vanellus* A143 Knot *Calidris canutus* A149 Dunlin *Calidris alpina* A156 Black-tailed Godwit *Limosa limosa* A157 Bar-tailed Godwit *Limosa lapponica* A160 Curlew *Numenius arquata* A162 Redshank *Tringa totanus* A179 Black-headed Gull *Chroicocephalus ridibundus* A182 Common Gull *Larus canus* A184 Herring Gull *Larus argentatus* A999 Wetlands & Waterbirds S.I. No. 310/2012 - European Communities (Conservation of Wild Birds (Dundalk Bay Special Protection Area 004026)) Regulations 2012. NPWS (2011) Conservation Objectives: Dundalk Bay SAC 000455 and Dundalk Bay SPA 004026. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
Stabannan-Braganstown SPA [004091]	Located *c.* 19.2km north of the Proposed Development	A043 Greylag Goose *Anser anser* S.I. No. 546/2011 - European Communities (Conservation of Wild Birds (Stabannan-Braganstown Special Protection Area 004091)) Regulations 2011 NPWS (2022) Conservation Objectives: Stabannan-Braganstown SPA 004091. First Order site Specific Conservation Objectives Version 1.0 National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
The Murrough SPA [004186]	Located *c.* 30km from the Proposed Development	A001 Red-throated Diver *Gavia stellata* A043 Greylag Goose *Anser anser* A046 Light-bellied Brent Goose *Branta bernicla hrota* A050 Wigeon *Anas penelope* A052 Teal *Anas crecca*

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		A179 Black-headed Gull *Chroicocephalus ridibundus* A184 Herring Gull L*arus argentatus* A195 Little Tern *Sterna albifrons* *S.I. No. 298/2011 - European Communities (Conservation of Wild Birds (The Murrough Special Protection Area 004186)) Regulations 2011* NPWS (2022) Conservation objectives for The Murrough SPA [004186]. First Order Site specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage
Wicklow Head SPA [004127]	Located c. 42km south of the Proposed Development	A188 Kittiwake *Rissa tridactyla* NPWS (2022) Conservation objectives for Wicklow Head SPA [004127]. First Order Site specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.
The Seas Off Wexford SPA [004237]	Located *c.* 90km south of the Proposed Development	A001 Red-throated Diver *Gavia stellata* A009 Fulmar *Fulmarus glacialis* A013 Manx Shearwater *Puffinus puffinus* A016 Gannet *Morus bassanus* A017 Cormorant *Phalacrocorax carbo* A018 Shag *Phalacrocorax aristotelis* A065 Common Scoter *Melanitta nigra* A176 Mediterranean Gull *Larus melanocephalus* A179 Black-headed Gull *Chroicocephalus ridibundus* A183 Lesser Black-backed Gull *Larus fuscus* A184 Herring Gull *Larus argentatus* A188 Kittiwake *Rissa tridactyla* A191 Sandwich Tern *Sterna sandvicensis* A192 Roseate Tern *Sterna dougallii* A193 Common Tern *Sterna hirundo* A194 Arctic Tern *Sterna paradisaea* A195 Little Tern *Sterna albifrons* A199 Guillemot *Uria aalge* A200 Razorbill *Alca torda* A204 Puffin *Fratercula arctica* NPWS (2024) Conservation Objectives: *Seas off Wexford SPA 004237.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
Saltee Islands SPA [004002]	Located *c.* 137km south of the Proposed Development	A009 Fulmar *Fulmarus glacialis* A016 Gannet *Morus bassanus* A018 Shag *Phalacrocorax aristotelis* A188 Kittiwake *Rissa tridactyla* A199 Guillemot *Uria aalge* A200 Razorbill *Alca torda*

Site Name	Distance	Reasons for Designation – QIs or SCIs (*=priority Annex I Habitat)
		A204 Puffin *Fratercula arctica* NPWS (2011) Conservation Objectives: Saltee Islands SAC 000707 and Saltee Islands SPA 004002. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

A number of other SPA, some that are similar to the Saltee Islands SPA provide breeding territory for SCI species associated with the Seas Off Wexford SPA, have been assessed and are described in Table 8-10.

Table 8-10 Assessment of other SPA sites (Conservation Objectives for each are listed in table)

European site (Conservation Objective Version)	Special Conservation Interests	Approximate Distance from Proposed Development	Reasoning
Cahore marshes SPA 004113 (NPWS 2022h Conservation objectives for Cahore Marshes SPA [004143]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.)	A050] Wigeon *Anas penelope* [A140] Golden Plover *Pluvialis apricaria* [A142] Lapwing *Vanellus vanellus* [A395] Greenland White-fronted Goose *Anser albifrons flavirostris* [A999] Wetlands	85km	No impact pathway to Proposed Development as SCI species are typically coastal birds with limited foraging range. No impact supporting habitat given its distance from the Proposed Development, tidal current flowing in opposite direction and dispersion in coastal waters.
Lady's Island Lake SPA 004009 (NPWS 2022i Conservation objectives for Lady's Island Lake SPA [004009]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage).	[A051] Gadwall *Anas strepera* [A179] Black-headed Gull *Chroicocephalus ridibundus* [A191] Sandwich Tern *Sterna sandvicensis* [A192] Roseate Tern *Sterna dougallii* [A193] Common Tern *Sterna hirundo* [A194] Arctic Tern *Sterna paradisaea* [A999] Wetlands	125km	Although sharing some SCI species with Seas of Wexford SPA, no impact pathway to Proposed Development as SCI species are typically coastal birds with limited foraging range. No impact supporting habitat given its distance from the Proposed Development, tidal current flowing in opposite direction and dispersion in coastal waters.
Tacumshin Lake SPA 004092 (NPWS 2022j Conservation objectives for Tacumshin Lake SPA [004092]. First Order Site-specific Conservation Objectives Version 1.0. Department of	[A004] Little Grebe *Tachybaptus ruficollis* [A037] Bewick's Swan *Cygnus columbianus bewickii* [A038] Whooper Swan *Cygnus cygnus* [A050] Wigeon *Anas penelope* [A051] Gadwall *Anas strepera*	125km	Although sharing some SCI species with Seas off Wexford SPA, no impact pathway to Proposed Development as SCI species are typically coastal birds with limited foraging range.

European site (Conservation Objective Version)	Special Conservation Interests	Approximate Distance from Proposed Development	Reasoning
Housing, Local Government and Heritage).	[A052] Teal *Anas crecca* [A054] Pintail *Anas acuta* [A056] Shoveler *Anas clypeata* [A061] Tufted Duck *Aythya fuligula* [A125] Coot Fulica atra A140 Golden Plover *Pluvialis apricaria* [A141] Grey Plover *Pluvialis squatarola* [A142] Lapwing *Vanellus vanellus* [A156] Black-tailed Godwit *Limosa limosa* [A999] Wetlands		No impact supporting habitat given its distance from the Proposed Development, tidal current flowing in opposite direction and dispersion in coastal waters.
Ballyteigue Burrow SPA 004020 (NPWS 2014b Conservation Objectives: Ballyteige Burrow SPA 004020. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht).	[A046] Brent Goose *Branta bernicla hrota* [A048] Shelduck *Tadorna tadorna* [A140] Golden Plover *Pluvialis apricaria* [A141] Grey Plover *Pluvialis squatarola* [A142] Lapwing *Vanellus vanellus* [A156] Black-tailed Godwit *Limosa limosa* [A157] Bar-tailed Godwit *Limosa lapponica* [A999] Wetlands	126 km	No impact pathway to Proposed Development as SCI species are typically coastal birds with limited foraging range. No impact supporting habitat given its distance from the Proposed Development, tidal current flowing in opposite direction and dispersion in coastal waters.
Bannow Bay SPA 004033 (NPWS 2012 Conservation Objectives: Bannow Bay SPA 004033. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht).	[A046] Light-bellied Brent Goose *Branta bernicla hrota* wintering [A048] Shelduck*Tadorna tadorna* wintering [A054] Pintail *Anas acuta* wintering [A130] Oystercatcher *Haematopus ostralegus* wintering [A140] Golden Plover *Pluvialis apricaria* wintering [A141] Grey Plover *Pluvialis squatarola* wintering [A142] Lapwing *Vanellus vanellus* wintering	124km	No impact pathway to Proposed Development as SCI species are typically coastal birds with limited foraging range. No impact supporting habitat given its distance from the Proposed Development, tidal current flowing in opposite direction and dispersion in coastal waters.

European site (Conservation Objective Version)	Special Conservation Interests	Approximate Distance from Proposed Development	Reasoning
	[A143] Knot *Calidris canutus* wintering [A149] Dunlin *Calidris alpina* wintering [A156] Black-tailed Godwit *Limosa limosa* wintering [A157] Bar-tailed Godwit *Limosa lapponica* wintering [A160] Curlew *Numenius arquata* wintering [A162] Redshank *Tringa tetanus* wintering [A999] Wetlands		
Keeragh Island SPA 004118 (NPWS 2022k Conservation objectives for Keeragh Islands SPA [004118]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage).	[A017] Cormorant *Phalacrocorax carbo*	130 km	There is no potential for impacts to occur to these SCI species by virtue of their being beyond the foraging distance of the Proposed Development.

8.4.5 Nationally Designated Sites

Natural Heritage Area (NHAs)s are designations under Section 18 of the Wildlife Acts to protect habitats, species or geology of national importance.

In addition to NHAs, proposed Natural Heritage Areas (pNHAs) are sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. pNHAs are offered protection in the interim period under the development plans in circumstances where planning authorities must give due regard to their protection in planning policies and decisions. The Proposed Development lies within the administrative boundary of Dublin City Development Plan 2022 – 2028 (Dublin City Council, 2022), Fingal Development Plan 2023 – 2029 (Fingal County Council, 2023), Meath County Development Plan 2021 – 2027 (Meath County Council, 2021), and Louth County Development Plan 2021 – 2027 (Louth County Council, 2021).

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

The Proposed Development overlaps with three national sites:

- Malahide Estuary pNHA where the existing Malahide Viaduct traverses Malahide Estuary;

- Rogerstown Estuary pNHA where the existing Rogerstown Viaduct traverses Rogerstown Estuary; and
- Laytown Dunes/Nanny Estuary pNHA, which includes the existing railway line and where the Laytown Viaduct crosses the Nanny Estuary.

The Proposed Development does not traverse or overlap any other national sites but does come near to several other national sites. In Zone A, the Proposed Development is in close proximity to national sites in Dublin Bay, which is variously designated for a number of national sites that overlap with European sites. In Zone A, North Dublin Bay pNHA is the closest national site to the Proposed Development, located *c.* 70m from the development boundary. The Royal Canal pNHA is also located nearby, *c*. 600m south-west of the Proposed Development.

North Dublin Bay pNHA is also hydrologically linked to the Proposed Development via the River Santry which flows under the railway line in Raheny, and outfalls *c.* 1.3km downstream into Dublin Bay at the Bull Island Causeway. There are a number of other national sites that are within the ZoI but are not directly hydrologically linked to the Proposed Development, or located offshore, namely; South Dublin Bay pNHA, Dolphins, Dublin Docks pNHa, Grand Canal pNHA, Sluice River Marsh pNHA[20], Howth Head pNHA, Booterstown Marsh pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA, Lambay Island pNHA, Portraine Shore pNHA, Loughshinny Coast pNHA, Skerries Islands NHA, and Rockabill Island pNHA.

In Zone B, whilst the Proposed Development boundary comes within metres of national sites in Baldoyle Estuary, i.e. Baldoyle Bay pNHA, no works are proposed along the Howth line, with works only proposed at Howth Junction and Donaghmede, Clongriffin, and Malahide Stations and at Malahide Viaduct. Therefore, Baldoyle Bay pNHA is located *c.* 250m east of the Proposed Development and is also hydrologically connected to the Proposed Development via the River Mayne, which flows under the existing railway line, and outfalls into Baldoyle Bay *c.* 950m downstream of the Proposed Development.

In Zone E, the existing railway crosses over the River Boyne. The Proposed Development is located *c.* 150m south of the River Boyne. There are a number of national sites associated with the River Boyne. The Boyne Coast and Estuary pNHA is *c.* 2km downstream and hydrologically linked to the Proposed Development. There are a number of national sites upstream of the Proposed Development in or associated with the River Boyne, including; Boyne River Islands pNHA, King William's Glen pNHA, and Dowth Wetland pNHA.

There is one NHA and 20 pNHAs designated for bird species that are known to forage / loaf and / or roost in suitable habitat across Dublin City and / or Dublin Bay, and the eastern coastline and estuarine/wetland habitats within.

[20] Sluice River Marsh pNHA is directly adjacent to the existing railway line in Portmarnock, however no works are planned in this location and therefore is not directly hydrologically linked to the Proposed Development.

These are Rockabill pNHA, Knocklake pNHA, Skerries Islands NHA, Malahide Estuary pNHA, Baldoyle Bay pNHA, Rogerstown pNHA, Portrane Shore pNHA, North Dublin Bay pNHA, Boyne Coast and Estuary pNHA, Loughshinny Coast pNHA, Dundalk Bay pNHA, Laytown Dunes/Nanny Estuary pNHA, Howth Head pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA, Lambay Island pNHA, Stabannan-Braganstown SPA, and The Murrough pNHA. There are three pNHAs containing marine mammals which are known to frequent Dublin Bay and the eastern coastline. These are Dolphins, Dublin Docks pNHA, Dalkey Coastal Zone and Killiney Hill pNHA and Lambay Island pNHA.

There is one NHA and 27 pNHAs located in the wider area of the Proposed Development. These are listed in Table 8-11 and illustrated in Figure 8.2 in Volume 3A of this EIAR. Table 8-11 lists these sites, their distance from the Proposed Development, and the ecological features for which the sites are designated / proposed to be designated. Twenty three (23) of these are located within the ZoI of the Proposed Development (see Table 8-11). These pNHAs are valued as being of National Importance. National sites not listed below or not considered to be within the ZoI of the Proposed Development are either designated for terrestrial habitats and located upstream or are a significant distance away from the works.

Table 8-11 NHAs and pNHAs located within the ZoI of the Proposed Development (background in light grey), and those in the wider area of the Proposed Development

Site Name	Distance	Reasons for Designation
Natural Heritage Areas (NHAs)		
Skerries Islands NHA [000204]	Located *c.* 1.4km east of the Proposed Development	See Table 8-9 under Skerries Islands SPA
Proposed Natural Heritage Areas (pNHAs)		
Malahide Estuary pNHA [000205]	The Proposed Development lies within this National site boundary	See Table 8-9 under Malahide Estuary SAC and SPA
Rogerstown Estuary pNHA [000208]	The Proposed Development lies within this National site boundary	See Table 8-9 under Rogerstown Estuary SAC and SPA
Laytown Dunes/Nanny Estuary pNHA [000554]	The Proposed Development lies within this National site boundary	A diversity of habitats make this site of particular value to wildlife, these include a muddy estuary, salt-marsh, sandy beach, woodland, freshwater marsh, wet and dry 34 grasslands and sand dunes. It is an important area for wintering birds such as brent geese and oystercatcher.
North Dublin Bay pNHA [000206]	Located *c.* 70m from the Proposed Development	See Table 8-9 under North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA.

Site Name	Distance	Reasons for Designation
Baldoyle Bay pNHA [000199]	Located *c.* 250m east of the Proposed Development	See Table 8-9 under Baldoyle Bay SAC and SPA.
Royal Canal pNHA [002103]	Located *c*. 600m south west of the Proposed Development	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
Sluice River Marsh [001763]	Located *c.* 1.3km north of the Proposed Development	Freshwater marsh
Boyne Coast and Estuary pNHA [001957]	Located *c.* 1.5km north east of the Proposed Development	See Table 8-9 under Boyne Coast and Estuary SAC and Boyne Estuary SPA
Loughshinny Coast pNHA [002000]	Located *c.* 1.6km east of the Proposed Development	The foreshore and cliff sections along the Rush-Loughshinny-Skerries area represents one of the best continuous successions of Lower Carboniferous rocks in Ireland and Britain, illustrating many sedimentary structures, tectonic structures and fauna.
Grand Canal pNHA [002104]	Located *c*. 1.7km south of the Proposed Development	Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
Feltrim Hill pNHA [001208]	Located *c*. 2km south west of the Proposed Development	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*
Portraine Shore pNHA [001215]	Located *c*. 2.4km east of the Proposed Development	The section at Portrane is one of the finest in Ireland and has interest under several different geological themes. See also Table 8-9 under Rogerstown Estuary SPA
Knock Lake pNHA [001203]	Located *c*.2.7km west of the Proposed Development	Important site for wintering bird species.
South Dublin Bay pNHA [000210]	Located *c.* 2.9km south of the Proposed Development.	See Table 8-9 under South Dublin Bay and River Tolka Estuary SPA
Dolphins, Dublin Docks [000201]	Located *c.* 3.1km south east of the Proposed Development	See Table 8-9 under South Dublin Bay and River Tolka Estuary SPA
Boyne River Islands [001862]	Located *c*. 3.4km west of the Proposed Development	A small chain of three islands covered by dense thickets of wet, Willow woodland. There are few similar examples of this type of alluvial wet woodland remaining in the country.

Site Name	Distance	Reasons for Designation
		The woodland is noted for its diversity of Willow species and for the fact that it conforms well to a type listed on Annex 1 of the EU Habitats Directive. See also Table 8-9 under River Boyne and River Blackwater SAC
Howth Head pNHA [000202]	Located *c.* 4.6km south east of the Proposed Development	See Table 8-9 under Howth Head SAC and Howth Head Coast SPA
Ireland's Eye pNHA [000203]	Located *c*. 5.3km east of the Proposed Development	See Table 8-9 under Ireland's Eye SAC and SPA
King Williams Glen pNHA [001804]	Located *c*. 5.3km west of the Proposed Development	Steep valley side woodland overlooking the River Boyne. Dominated by a mixture of ash, pedunculate oak, beech, and sycamore, with holly, elder, hazel and hawthorn beneath. This is a well-used amenity area and there are many broad paths through this area and suffers erosion.
Dowth Wetland pNHA [001861]	Located *c*. 5.5km west of the Proposed Development	Wetland area along the northern bank of the River Boyne. The whole site is not heavily grazed by domestic stock and is in very good condition. A small herd of Red Deer graze within the site. This site is the best remaining example of a floodplain marsh on the River Boyne.
Booterstown Marsh pNHA [000201]	Located *c.* 5.6km south east of the Proposed Development	See Table 8-9 under South Dublin Bay and River Tolka Estuary SPA
Lambay Island pNHA [000204]	Located *c.* 7.5km east of the Proposed Development	See Table 8-9 under Lambay Island SAC and Lambay Island SPA
Rockabill Island pNHA [000207]	Located *c.* 7.9km east of the Proposed Development	See Table 8-9 under Rockabill to Dalkey Island SAC and Rockabill SPA
Clogher Head pNHA [001459]	Located *c*. 10.3km north east of the Proposed Development	See Table 8-9 under Clogher Head SAC
Dalkey Coastal Zone and Killiney Hill [001206]	Located *c.*10.2km south east of the Proposed Development	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 Table 8-9 under Rockabill to Dalkey Island SAC and Dalkey Islands SPA
Dundalk Bay pNHA [004026]	Located *c*. 17.5km north of the Proposed Development	See Table 8-9 under Dundalk Bay SPA

Site Name	Distance	Reasons for Designation
Stabannan-Braganstown pNHA [00456]	Located *c.* 19.2km north of the Proposed Development	See Table 8-9 under Stabannan-Braganstown SPA
The Murrough pNHA [000730]	Located *c.* 30km from the Proposed Development	See Table 8-9 under The Murrough SPA and the Murrough Wetlands SAC

8.4.6 Other Designated Sites

Other designations recognised in the Greater Dublin Area and along the eastern coastline, include Ramsar wetland sites, the UNESCO Dublin Bay Biosphere and three Special Amenity Area Orders. Biodiversity receptors in these other designated sites are assessed with the European sites where they overlap, and the other individual impact assessment headings, as relevant.

8.4.6.1 Ramsar Sites

The Convention on Wetlands is an intergovernmental treaty adopted on 2nd February 1971 in the Iranian city of Ramsar. The official name of the treaty is '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 Development, namely:

- Rogerstown Estuary (Site code 412);
- Broadmeadow Estuary (Site code 833);
- Dundalk Bay (Site code 834);
- Baldoyle Bay (Site code 413);
- North Bull Island (Site code 406); and
- Sandymount Strand / Tolka Estuary (Site code 832).

The assessment of these Ramsar sites, which are encompassed within European sites and / or NHAs / pNHAs, is captured in full under the assessment of European sites, NHAs and pNHAs in Section 8.8; therefore, no further discussion is provided.

8.4.6.2 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. The North Bull Island supports a variety of plants and wildlife including an internationally significant population of light bellied Brent goose 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. The Dublin Bay Biosphere 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 are estimated to live within the newly enlarged Biosphere.

While the Biosphere designation does not strictly add any specific new legal protection to Dublin Bay, it does contribute to improving the co-ordination and management of its functions in a holistic and integrated way. The assessment of the UNESCO Dublin Bay Biosphere, which overlaps with European sites and / or NHAs / pNHAs, is captured in full under the assessment of European sites, NHAs and pNHAs in Section 8.8.

8.4.6.3 Special Amenity Area Order

The objective of the Special Amenity Area Order is primarily to protect outstanding landscapes, nature and amenities and were originally placed on a statutory footing under the Local Government (Planning and Development) Act 1963, as amended, and re-enacted under section 202 of the Planning and Development Act 2000. The three areas that have been designated are owing to the outstanding beauty needing nature conservation.

Three such SAAO areas have been recognised in the Greater Dublin Coastal Area. They include:

- North Bull Island;
- Bray Head; and
- Howth Head.

The designations reinforce 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 by virtue of overlapping nature designations.

8.4.7 Habitats

8.4.7.1 Overview

The results of the habitat surveys along the alignment of the Proposed Development are described below by habitat type, after Fossitt (2000), and where relevant, include a description of any corresponding Annex I habitat types. The habitats described below relate to habitat areas within or adjacent to the Proposed Development, as shown on Figure 8.3 in Volume 3A of this EIAR along with the full habitat survey results.

Each habitat identified within the Proposed Development site was classified according to Fossitt (2000) and their corresponding level of ecological importance was determined in accordance with CIEEM (2022) and NRA (2009) guidelines. A detailed description of each habitat is provided below. Habitats valued as being of Local Importance (Higher Value) or higher include the following:

- Other Artificial Lakes and Ponds (FL8);
- Reed and large sedge swamps (FS1);
- Tall-herb swamps (FS2);
- Depositing/Lowland Rivers (FW2);
- Dry calcareous and neutral grassland (GS1);
- Dry meadows and grassy verges (GS2);
- Dry-humid acid grassland (GS3);
- Wet grassland (GS4);
- Hedgerows (WL1);
- Treelines (WL2);

- (Mixed) broadleaved woodland (WD1);
- Mixed broadleaved/conifer woodland (WD2);
- (Mixed) conifer woodland (WD3);
- Scattered trees and parkland (WD5);
- Scrub (WS1);
- Ornamental/non-native shrub (WS3);
- Spoil and bare ground (ED2);
- Recolonising vegetation (ED3);
- Shingle and gravel banks (CB1) including the Annex I habitat Perennial vegetation of stony banks [1220];
- Lower salt marsh (CM1) including the Annex I habitats *Salicornia* and other annuals colonizing mud and sand [1310] and Atlantic Salt meadows (*Glauco-Puccinellietalia maritimae*) [1330];
- Upper salt marsh (CM2) including Annex I habitats Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]' and 'Mediterranean salt meadows (*Juncetalia maritimi*) [1410]';
- Tidal rivers (CW2);
- Embryonic dunes (CD1) including Annex I habitats 'embryonic shifting dunes [2110];
- Fixed dunes (CD3) including the priority Annex I habitats '*fixed coastal dunes with herbaceous vegetation ("grey dunes") [2130]';
- Sea walls, piers and jetties (CC1);
- Shingle and gravel shores (LS1) including Annex I habitat 'annual vegetation of drift lines [1210]';
- Sand shores (LS2) including Annex I habitats 'mudflats and sandflats not covered by sea water at low tide [1140]'; and
- Estuaries (MW4) including Annex I habitats 'Estuaries [1130]' and 'Mudflats and sandflats not covered by seawater at low tide [1140]'.

Several areas of some of these habitats (*i.e.* dry calcareous and neutral grassland, wet grassland, and hedgerows) were valued as being of Local Importance (Lower Value) due to being less species diverse, improved in nature, and in poor quality due to cattle poaching.

Other Artificial Lakes and Ponds (FL8)

This habitat includes standing water that would either have small amounts of vegetation or cleared of vegetation. This habitat type was identified in two locations adjacent to the Proposed Development, the largest area of this habitat type is located east of Boyne Bridge next to Marsh Road at Drogheda. Additional areas of this habitat were recorded at Beaverstown Golf Course Donabate as part of golf course features. This habitat type was also found in mosaics with the following habitats; amenity grassland (improved) (GA2) and buildings and artificial surfaces (BL3).

This habitat type is of Local Importance (Lower Value) due to its low species diversity. There were no areas of this habitat type of Annex I quality habitat based on the description and characterisation in the EU Interpretation Manual.

Reed and large sedge swamps (FS1)

Reed and large sedge swamps is present at one location adjacent to the Proposed Development. This is located between Laytown and Mosney accommodation centre, at the stream crossing of UBB70, and partly along ditches and the sand dune system of Mosney beach both sides of the rail line.

The dominant vegetation is common reed *Phragmites australis* and other vegetation was mixed in with mosaic habitats of sand dunes and agricultural habitats. There are no areas of this habitat type considered being of Annex I quality habitat.

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

Tall-herb swamps (FS2)

This habitat is present at two locations adjacent to the Proposed Development. This was located between Laytown and Mosney accommodation centre, on the east side of the rail line; and at the Delvin River at Gormanston.

The dominant vegetation is common reed *Phragmites australis* and other vegetation was mixed in with mosaic habitats of sand dunes and riverine habitats.

This habitat type is of Local Importance (Higher Value) as it is not common in the surrounding landscape and is considered important for riverine bank floral diversity. There were no areas of this habitat type considered being of Annex I quality habitat due to a lack of indicator species for the corresponding Annex I habitat.

Depositing/Lowland Rivers (FW2)

This habitat type refers to the Boyne River, River Nanny, Delvin River, Bracken River, and Palmerstown River. These habitats are present at multiple locations across the Proposed Development and are discussed individually below.

The Boyne River at Drogheda is part of the Boyne Estuary and crosses under the Boyne Viaduct (UBB82) . The River Nanny flows under Rogerstown Viaduct (UBB72) and is largely influenced by tidal conditions at Laytown beach. The Delvin River located at Gormanston and under UBB65 flows into the Irish Sea. The Bracken River located at Balbriggan at UBB56 has been heavily modified and is culverted before flowing into Balbriggan harbour ultimately ending in the Irish Sea. The Palmerstown River is located north of Rush/Lusk Station, flows eastward into Rogerstown Estuary SAC/SPA, and is covered by mature treeline habitat.

No associated relevés were collected from this habitat, so information collected was desk based or information on other habitat types that coincided with this habitat e.g. salt marsh or riparian vegetation.

This habitat type is of Local Importance (Higher Value) and the River Boyne and River Nanny are of National Ecological Importance due to their conservation value as key habitats for SCI species within designated areas.

This habitat does not correspond with Annex I habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] due to a lack of indicator species for this habitat.

Dry calcareous and neutral grassland (GS1)

This habitat type is comprised of unmanaged grassland and is dominated by a greater coverage of floral diversity than grass species. There are four localities of this type of habitat: west side embankment of the rail line and field margin located north of Laytown; a small area west of the rail line opposite Mosney beach; west embankment of the rail line at Baldongan; and a large grassland area east of the rail line included within Malahide Estuary SAC/SPA.

The grassland species are associated with neutral grassland species. The grass species were dominated by false-oat grass *Arrhenatherum elatius* and sweet vernal grass *Anthoxanthum odoratum*, while forb species present included ladies bedstraw *Galium verum*, wild carrot *Daucus carota,* ox-eye daisy *Leucanthmum vulgare*, field scabious *Knautia arvense,* and restharrow *Ononis repens*.

This habitat type also occurred in mosaics with scrub, agricultural grassland, and adjacent to sand dune habitat.

This habitat type is generally of Local Importance (Lower Value) due to low species diversity, restricted habitat extent and high coverage of grass species. The Laytown and Malahide localities would be of Local Importance (Higher Value) due to habitat extent and moderate coverage of grass species. There were no areas of this habitat type considered as being of Annex I quality habitat due to lack of indicator species for the Annex I habitats semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) [6210]', and 'Juniperus communis formations on heaths or calcareous grasslands [5130]'.

Dry meadows and grassy verges (GS2)

This habitat type is comprised of partly managed and unmanaged grassland and is dominated by a high coverage of grass species other than forb species. This was the most common habitat type along the rail line embankments from Malahide to Drogheda.

The grass species are dominated by false-oat grass, perennial rye grass *Lolium perenne,* Yorkshire fog *Holcus lanatus* and cock's foot *Dactylus glomerata* that had a tall (>20cm) sward height overshadowing forb species. Forb species present included ribwort plantain *Plantago lanceolata*, red clover *Trifolium pratense*, creeping thistle *Cirsium arvense*, common hogweed *Heracleum sphondylium*, spear thistle *Cirsium vulgaris*, common knapweed *Centaurea nigra*, vetches *Vicia sp.,* and creeping buttercup *Ranunculus repens* to name commonly occurring species. Forb species that had high coverage similar to the grass species, included; coltsfoot *Tussilago farfara*, winter heliotropes *Petasites* sp., bindweed species *Calystigia* spp., common nettle *Urtica dioica*, Rosebay willowherb *Chamaenerion angustifolium*, and ivy *Hedera helix* agg. This habitat type also occurred in mosaics with scrub, agricultural grassland, adjacent to coastal areas.

This habitat type is generally of Local Importance (Lower Value) due to low species diversity and high coverage of fast-growing grass species.

A number of localities are considered to be of Local Importance (Higher Value) due to moderate coverage of grass species and maintained sward height with more forb species present i.e. in Ardgillen Castle Demesne, south of Donabate Station, south west of Laytown Station, north of Malahide Estuary, and adjacent to Rush and Lusk Station. There were no areas of this habitat type considered as being of Annex I quality habitat due to a lack of indicator species present that correspond to the annexed habitat, 'lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510]'.

Dry-humid acid grassland (GS3)

This habitat type is comprised of managed grassland that is grazed by livestock and kept to a short sward height, potentially overgrazed.

This habitat type is not in the immediate scheme, only adjacent to both sides of the rail line between Laytown and Gormanston, which had sheep or cattle present. This habitat type also occurs in mosaics with agricultural grassland.

The habitat type is of Local Importance (Lower Value) due to low species diversity and livestock keeping a neat short sward height. There are no areas of this habitat type considered being of Annex I quality habitat due to lack of species corresponding to the Annex I habitat '*species-rich Nardus grasslands on siliceous substrates in mountain areas [6230]'.

Wet grassland (GS4)

This habitat type is comprised of unmanaged grassland that is influenced by wet conditions. The areas identified are influenced by either freshwater rivers or coastal rivers. The location of this habitat type is northside of a stream south of Laytown and the River Pill at Malahide.

This habitat type is not in the immediate scheme, only adjacent of the rail line. No vegetation was collected from this habitat, it was only identified from the rail line during online habitat surveys from a distance and identified by a dominance of rushes *Juncus* spp. This habitat type also occurs in mosaics with agricultural grassland.

The habitat type is of Local Importance (Lower Value) due to low species diversity. There were no areas of this habitat type considered being of Annex I quality habitat due to a lack of species that correspond to 'the Annex I habitat, 'Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]'.

Hedgerows (WL1)

Hedgerows are common throughout the surrounding landscape as agricultural field boundaries and are within the scheme boundary. This habitat type is located at the top of embankments if elevated or separated by ditches on field margins.

The species of this habitat type are dominated by hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa* and elder *Sambucus nigra*. Other species would be frequent or sporadic within the hedgerows depending on management or other adjacent habitats but not limited to, these include tree species (ash *Fraxinus excelsior,* alder *Alnus glutinosa*, sycamore *Acer pseudoplatanus*), snowberry *Symphoricarpos albus*, rose species *Rosa* spp., ivy and honeysuckle *Lonicera periclymenum*.

This habitat type is of Local Importance (Higher Value) due to minimum management and size of the hedgerows.

Treelines (WL2)

Treelines are common throughout the surrounding landscape as agricultural field boundaries and are within the scheme boundary. This habitat type is located at the top of embankments if elevated or separated by ditches on field margins.

The species of this habitat type are dominated by tree species which included oak *Quercus* spp*.,* ash, sycamore, alder, beech *Fagus sylvatica*, elm *Ulmus glabra*, wild cherry *Prunus avium*, pine trees and willow trees *Salix* spp*.*

This habitat type is of Local Importance (Higher Value) due to minimum management and mature trees present.

(Mixed) broadleaved woodland (WD1)

This habitat type is located within small pockets adjacent to the rail line and can be part of larger woodland complexes that were not investigated as the areas were outside the scheme. The habitat was identified from a distance and based on a mix of broadleaved and pine trees. One of the larger woodland areas is located at Ardgillan Castle at Skerries.

The species of this habitat type are dominated by tree species which included beach, ash, sycamore, oak and other pine tree species.

This habitat type is of Local Importance (Higher Value) due to minimum management and mature trees present.

Mixed broadleaved/conifer woodland (WD2)

This habitat type was identified at Beaverstown golf course Donabate and could be part of larger woodland complexes that were not investigated as the areas were outside the scheme. The habitat was identified from a distance and based on a mix of broadleaved and pine trees, with coverage of both tree types being more or less 50%.

The species of this habitat type are dominated by tree species which included beach, ash, sycamore, oak and other pine tree species.

This habitat type is of Local Importance (Higher Value) due to minimum management and mature trees present.

(Mixed) conifer woodland (WD3)

This habitat type was identified near OBB68 by the Mosney accommodation centre, at OBB68 Gormanston and north of Ardgillan castle Skerries dominated by a mix of pine tree species. These localities were not investigated as the areas are outside the Proposed Development area but observed from a distance to be dominated by pine tree species.

This habitat type is of Local Importance (Lower Value) due to the low species diversity and lack of ground flora.

Scattered trees and parkland (WD5)

This habitat type was identified within urban areas such as Drogheda and Balbriggan or planted trees near stations. These localities were not investigated as the areas were outside the scheme but observed from a distance dominated by tree species spaced apart, usually with mosaic amenity grassland.

This habitat type is generally of Local Importance (Higher Value) due to native mature broadleaved tree species.

Scrub (WS1)

This habitat type is located at the top of embankments if elevated or separated by ditches on field margins or areas not frequently managed by IÉ staff that are encroached by shrub vegetation.

The species of this habitat type are dominated by low shrub species such as bramble *Rubus fruticosus* agg*.,* gorse *Ulex europaeus,* blackthorn and/or butterfly bush *Buddleja davidii*. Other species would be mosaic of other habitats such as GS2.

The majority of this habitat type is of Local Importance (Higher Value) due to minimum management and extent of the habitat (refer to Habitat Map as shown on Figure 8.3 in Volume 3A of this EIAR). Some areas of this habitat type are Local Importance (Lower Value) due to low encroaching height and lack of other ground flora diversity.

Ornamental/non-native shrub (WS3)

This habitat type is located at the top of embankments if elevated or separated by ditches on field margins or at the boundary of residential areas.

The species of this habitat type are dominated by ornamental shrubs, a number of garden boundaries are dominated by cherry laurel *Prunus laurocerasus,* which lacked a ground flora diversity.

This habitat type is of Local l Importance (Lower Value) due to lack of species diversity and high maintenance.

Spoil and bare ground (ED2)

This habitat type is the most dominant within the scheme as it is the rocky substrate surrounding the rails, railway sleepers and ballast areas. Some embankments can be like this where vegetation has been treated due to safe access by IÉ staff to the rail line.

Vegetation within the habitat is limited given the frequent disturbances of the train and various ongoing rail safety works. Field horsetail *Equisetum arvense* can colonise the bare areas but is not dominant. This habitat can have mosaic habitat of recolonising vegetation (ED3) in areas that are not regularly disturbed.

This habitat type is of Local Importance (Lower Value) due to lack of species diversity and high disturbance.

Recolonising vegetation (ED3)

This habitat type is frequent within the scheme and can be a mosaic with GS2 habitat when vegetation is managed. This can be on embankments or standalone bare areas left unmanaged when more colonising vegetation is becoming more dominant.

Species include field horsetail, *Sisymbrium offincinalis*, false oat grass, Rosebay willowherb, *Stachys palustre*, common hogweed, American willowherb *Epilobium ciliatum*, spear thistle, nipplewort *Lapsana communis*, to name the more common occurrences. This habitat can have mosaic habitat of recolonising vegetation (GS2) in areas that are not regularly disturbed, and vegetation is allowed to flourish.

This habitat type is of Local Importance (Lower Value) due to lack of species diversity and dominance of one species in a number of areas.

Shingle and gravel banks (CB1)

This habitat type was not located within the scheme but further investigated due to being adjacent and connected to Annex I habitats. The habitat was identified due to the coastal location and mixture of vegetation present or not present. The areas are located under the Laytown viaduct, adjacent to UBB65 at the River Delvin, adjacent to Ladies Stairs at OBB54, and at Malahide Estuary.

The conditions of the habitat can change due to natural processes with fluctuating tides, which limits the vegetation present. Floral species present included common salt marsh grass *Puccinellia maritima*, annual sea blite *Suaeda maritima*, sea mayweed *Tripleurospermum maritimum,* curled dock *Rumex crispus,* sow thistle *Sonchus* spp*.,* sea plantain *Plantago maritima,* sea sandwort *Honckenya peploides* and sea beet *Beta maritima* being present but only in small occurrences.

This habitat type is of National Importance as the habitat corresponds to Annex I 'Perennial vegetation of stony banks (1220)' as a number of indicator species were present.

Lower salt marsh (CM1)

This habitat type is not located within the Proposed Development but further investigated due to being adjacent and connected to Annex I habitats. The habitat was identified due to the coastal location and mixture of vegetation present or not present. The areas are located under the Laytown viaduct, adjacent to UBB65 at the River Nanny, adjacent to Beaverstown golf club at OBB35, and at Malahide Estuary.

The Laytown community, adjacent to UBB65 at the River Nanny, noted a small area of colonising *Salicornia* mudflats and Atlantic Salt Meadow dominated by sea-purslane *Atriplex portulcoides* along with common saltmarsh grass *Puccinellia maritima* and includes small strands of common cordgrass *Spartina anglica*.

The Rogerstown community, adjacent to Beaverstown golf club, is low-lying ground behind the course which had variously sea beet and couch grass *Elymus repens*. There were small areas of Atlantic Salt Meadow 1310 dominated by sea-purslane *Atriplex portulacoides,* but with minor contributions from sea arrowgrass *Triglochin maritimus,* and common salt marsh grass.

Other species interspersed in places include: thrift *Armeria maritima, Beta maritima,* red fescue grass *Festuca rubra*, with minor rock sea-lavender *Limonium binervosusm* and a sea-spurrey species *Spergularia* sp.

The Malahide estuary community is a middle marsh floral community which was dominated by sea plantain *Plantago maritima* and included other floral species as thrift *Armeria maritima*, rock sea-lavender, common salt marsh grass, sea arrowgrass *Triglochin maritium*, rock sea-spurrey *Spergularia rupicola* and common centaury *Centaurium erythraea*.

Areas corresponding to Atlantic saltmarsh [1330] in Malahide Estuary were assessed using a relevé. Results of this are included in Appendix A8.9 in Volume 4 of this EIAR.

This habitat type is of International Importance due the areas being of Annex I quality of '*Salicornia* and other annuals colonizing mud and sand (1310)' and 'Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)'.

Upper salt marsh (CM2)

This habitat type is not located within the Proposed Development but further investigated due to being adjacent and connected to Annex I habitats. The habitat was identified due to the coastal location and mixture of vegetation present or not present. The areas are located east of the rail line at Malahide estuary and east of the rail line at Rogerstown estuary.

The Malahide estuary community is a mix of *Spartina* dominated community within the estuary and Atlantic Salt Meadow dominated community between the *Spartina* salt marsh and the embankment of the rail line. The flora of the Atlantic Salt Meadow is sea purslane but has patches of Borrer's saltmarsh grass *Puccinellia fasciculata* with lesser contributions from sea plantain and sea arrowgrass. Minor amounts of sea spurrey species were noted but not common. Sea beet and couch grass transition with pebble conditions is between the embankment and the *Spartina* swards. Areas corresponding to Atlantic saltmarsh [1330] in Malahide Estuary were assessed using a relevé. Results of this are included in Appendix A8.9 in Volume 4 of this EIAR.

The Rogerstown community is dominated by Mediterranean salt marsh dominated habitat further westwards towards the railway embankment and inside the paladin fence. The dominant flora is largely sea rush *Juncus maritimus* that transitions into a non-Annex CM2 transitional grassland habitat to the hedgeline.

This habitat type is of International Importance due the areas being of Annex I quality of 'Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)' and 'Mediterranean salt meadows (*Juncetalia maritimi*) (1410)'.

Tidal rivers (CW2)

This habitat type is not located within the Proposed Development but was identified where the River Nanny flows under the Laytown Viaduct, and north of Balbriggan viaduct where the Bracken River flows into the harbour. No flora was recorded within this habitat as it is dominated by muddy and sandy conditions. The current management of this habitat is focused on docking small fishing and recreational vessels, resulting in no suitable Annex I quality habitat of 'estuaries (1130)'.

This habitat type is of County Ecological Importance due the tidal river flowing into the Irish Sea and Balbriggan beach, which contains Annex I habitats.

Embryonic dunes (CD1)

This habitat type is not located within the Proposed Development but was further investigated due to being adjacent and connected to Annex I habitats. The habitat was identified due to the coastal location and mixture of vegetation present or not present. The areas are located at the eastern side of the Laytown viaduct and eastern part of Balbriggan Station at Balbriggan beach.

The Laytown viaduct community has a presence of Lyme-grass *Leymus arenarius* and marram grass *Ammophila arenaria*, but has been heavily managed due to the proximity to Laytown carpark and playground. This habitat area is of Local Importance (Higher Value) due to the connection to the dune habitat further west outside the scheme.

The Balbriggan beach community is intermediate between embryonic dunes and amenity grassland. Flora present included sea beet, Crucifers, Poppies as well as species such as dandelion *Taraxacum officinale* agg., common ragwort *Jacobea vulgaris,* sea plantain, and minor sea sandwort *Honckenya peploides*, and can include patches of red valerian *Centranthus ruber*.

This habitat type is of International Importance, especially at Balbriggan beach, due the area being of Annex I quality of 'embryonic shifting dunes (2110)'. It occurs with 'Annual vegetation of drift lines (1210)' which is more closely located to the seaward side of the embryonic dune habitat.

Fixed dunes (CD3)

This habitat type is not located within the Proposed Development but further investigated due to being adjacent and connected to priority Annex I habitats. The habitat was identified due to the coastal location and mixture of vegetation present or not present. The areas are located at the eastern part of Balbriggan station at Balbriggan beach and between the lands of Laytown and Mosney on the eastern side of the rail line.

The Balbriggan beach community corresponds to amenity grassland rather than a fixed dune system. Flora present were linked to maintained grassland (similar to GA2 grassland) and vegetation height kept to a low sward height.

The Laytown to Mosney community is largely covered in gorse scrub and maintained/disturbed areas of recreational trails and pitch and putt managed grassland. Flora present included *Ammophila arenaria*, patches of red fescue *Festuca rubra* agg., with dune species such as kidney vetch *Anythllis vulneraria*, bird's foot trefoil and dune pansy *Viola tricolour* ssp. *curtisii*. The condition of the fixed dunes is subject to encroachment of scrub, occasional burning, trails from pedestrians and accumulation of longshore drift sand.

This habitat type is of International Importance, especially at Balbriggan beach, due the area being adjacent to Annex I quality of 'embryonic shifting dunes (2110)'. The Laytown to Mosney area fixed dunes covered in scrub is of International Importance as it is adjacent and connected to higher conditioned fixed dunes with priority Annex I quality of 'fixed coastal dunes with herbaceous vegetation ("grey dunes") (2130)'.

Sea walls, piers and jetties (CC1)

This habitat type is not located within the Proposed Development but further investigated due to being adjacent and connected to Annex I habitats. The habitat was identified due to the coastal location and mixture of vegetation present or not present. The areas are located adjacent to Laytown viaduct and Malahide viaduct.

Vegetation along this habitat is scare in terms of coverage but had a few colonising species including Alexanders *Smyrnium olusatrum*, sea beet, wild teasel *Dipsacus fullonum*, sea radish and sea mayweed.

Both areas are an artificial habitat that are sea walls built in with works previously conducted when installing the viaducts. This habitat type is of Local Importance (Lower Value) due the built artificial nature of the habitat and lack of diversity in flora present.

Shingle and gravel shores (LS1)

This habitat type is not located within the Proposed Development corridor, but further investigated due to being adjacent and connected to Annex I habitats. The habitat was identified based on its coastal location and confirmation of a mixture of characteristic vegetation present. The areas are located adjacent to Laytown viaduct, the eastern part of Balbriggan station at Balbriggan beach, and adjacent to Rogerstown viaduct.

The areas at Laytown and Rogerstown viaducts are narrow linear features that are mixed in with other habitat categories. They have changed due to natural processes and are devoid of floral diversity. Laytown is influenced by the conditions of the River Nanny, while Rogerstown is influenced by estuarine conditions and they both have saltmarsh habitats present with scrub like conditions on the back boulders to the rail line. Balbriggan area has patches characterised by the presence of prickly saltwort *Salsola kali* and mixed in with the embryonic dune habitat CD1.

The areas of Laytown and Rogerstown viaducts are considered of National Importance as they are linked to other Annex I habitats of International Importance. The area at Balbriggan is considered of International Importance as it corresponds to Annex I habitat ‘annual vegetation of drift lines (1210)’ and is connected to other Annex I habitats.

Sand shores (LS2)

This habitat type is not located within the Proposed Development corridor but further investigated due to it being adjacent to Annex I habitats. The habitat was identified owing to its coastal location and mixture of characteristic vegetation present i.e., Saltwort *Salsola kali* and Sea Mayweed *Tripleurospermum maritimum*. The areas are located at the Devlin River on both sides of the rail line and at Malahide Estuary on the northwest side of the viaduct. Both areas are characterised by being adjacent to estuarine or brackish water conditions at the edge of tidelines.

Both areas are considered of International Importance due to the presence of the Annex I habitat of ‘mudflats and sandflats not covered by sea water at low tide (1140)’ and/or being adjacent to areas of other Annex I habitats within Special Areas of Conservation (SACs).

Estuaries (MW4)

This habitat type is located within the Proposed Development corridor and was investigated owing to its connection to Annex I habitat. The habitat was identified due to the coastal location, correspondence with the environmental conditions and NPWS confirmation of Annex I status. The areas are located are at Rogerstown and Malahide, both of which are protected under SAC status for these habitats characterised by being coastal inlets and combined water movement by tidal and freshwater influences.

Both areas are considered of International Importance as they correspond to the Annex I habitat of 'Estuaries (1130)' with a mix of various other Annex I habitats of 'Mudflats and sandflats not covered by seawater at low tide (1140)' and are the Qualifying Interests of the SACs.

8.4.8 Rare and Protected Plant Species

There were no protected plant species listed on the Flora (Protection) Order, 2022 (S.I. No. 235 of 2022) identified within the Proposed Development during habitat surveys undertaken.

The desk study returned records of a total of five species listed on the Flora Protection Order across the wider study area (i.e., Grid Squares O23, O17) and are listed in Appendix A8.1 in Volume 4 of this EIAR. All of these species are bryophytes. Records within close proximity of the Proposed Development (i.e., within *c.* 2km of the boundary) include *Cercuous thread-moss Bryum uliginosum* in Malahide, and many-seasoned thread-moss *Bryum intermedium,* Petalwort *Petalophyllum ralfsii,* and Warne's thread-moss *Bryum warneum* all recorded on Bull Island. These plant species are unlikely to be present within the Proposed Development as they are typically found in dune slack habitats. Plant species listed on the Flora Protection Order are considered to be of Local Importance (Higher Value) due to not being present within the ZoI of the Proposed Development.

There were no species listed on *Ireland Red List No. 8: Bryophytes* (Lockhart *et al.*, 2012) recorded within the Proposed Development.

8.4.9 Non-Native Invasive Plant Species

There were six species of non-native, invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) recorded within the Proposed Development in 2021 and 2022. The locations of these non-native invasive plant species are summarised below in Table 8-12 and shown on Figure 8.5 in Volume 3A of this EIAR. Some of these stands were located within the existing railway corridor (on the edges rather than the tracks itself), or in lands adjacent to the railway line.

The desk study returned records of 22 species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), across the wider study area (i.e., Grid Squares O13, O14, O07, O08, O23) and are listed in Appendix A8.1 in Volume 4 of this EIAR. Records within close proximity to the Proposed Development include; common cord-grass *Spartina anglica*, giant hogweed *Heracleum mantegazzianum,* Indian balsam *Impatiens glandulifera*, Japanese knotweed *Reynoutria japonica*, Rhododendron *Rhododendron ponticum*, sea-buckthorn *Hippophae rhamnoides*, Spanish bluebell *Hyacinthoides hispanica*, and three-cornered garlic *Allium triquetrum*.

Table 8-12 Summary of non-native invasive plant species listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 recorded along or adjacent to the Proposed Development

Zone/Location	Species	Description
Zone B/Malahide Estuary	Common cord-grass *Spartina anglica*	Extensive stands of *Spartina* in the salt-marsh habitat of Malahide Estuary
Zone C/Donabate	Japanese knotweed *Reynoutria japonica*	In fenced off section of Donabate station
Zone C/Skerries	Himalayan balsam *Impatiens glandulifera*	On banks of stream adjacent to the railway line
Zone C/Ardgillan Demesne	Rhododendron *Rhododendron ponticum*	In understory of woodland adjacent to railway line
Zone C/Ardgillan Demesne	Himalayan balsam *Impatiens glandulifera*	Stand in woodland adjacent to railway line
Zone C/Ardgillan Demesne	Japanese knotweed *Reynoutria japonica*	Stands in woodland adjacent to railway line
Zone C/Skerries	Himalayan balsam *Impatiens glandulifera*	Stand located in a bank adjacent to the Mill Stream
Zone C/Delvin Bridge	Himalayan balsam *Impatiens glandulifera*	Three stands covering the bank east and west of the railway line
Zone D/Gormanston	Spanish bluebell *Hyacinthoides hispanica*	In a planted area adjacent to Gormanston railway station
Zone D/Laytown	Common cord-grass *Spartina anglica*	Present in River Nanny Estuary
Zone E/Drogheda	Japanese knotweed *Reynoutria japonica*	In area adjacent to Drogheda MacBride train station car park

8.4.10 Fauna

8.4.10.1 Mammals

8.4.10.1.1 Badger

Badger, and their breeding and resting places, are legally protected under the Wildlife Acts. The desk study returned a number of records (>300) of badgers in the wider study area (i.e., Grid Squares O06, O07, O08, O14, O15, O16, O17, O18, O23, O24, O26 on NBDC mapping tool), which are listed in Appendix A8.1 of Volume 4 of this EIAR.

Several areas along the existing railway line had evidence of badger usage, and three setts were identified within the ZoI of the Proposed Development. Details of each of these setts are provided below in Table 8-13. In addition, IÉ provided data records for four setts along the railway line between Connolly and Drogheda. All of these locations were checked during the walkover surveys, and only one location of these four was found to be an active badger sett at the time of survey. Two additional locations were identified by Scott Cawley Ltd., surveyors. A number of mammal trails were also noted along the railway corridor, indicating that mammals, including badgers, regularly use the railway line for commuting and potentially foraging within the verges.

This was confirmed by the camera deployments that were undertaken at the three setts, with a high level of badger activity at all of the locations. The habitats adjacent to the railway line and the Proposed Development (i.e. grassland, scrub, woodlands, hedgerows), and the railway corridor itself, provide suitable foraging and commuting habitat for badger.

Due to their stable Irish populations, badger are considered to be of "Least concern" in terms of their conservation status (Nelson *et al.*, 2019). The local badger populations are valued to be of Local Importance (Higher Value), as there is an abundance of suitable habitat within the Proposed Development site and its vicinity, which has been confirmed by the presence of a number of active badger setts, and from the NBDC desk study search with over 300 records in the wider study area.

Table 8-13 Details of badger setts identified within the ZoI of the Proposed Development

Zone/Location	Camera deployments	Description
Zone C/ Beaverstown	25/11/2021 - 06/01/2022 06/02/2022 – 19/03/2022	Two hole sett, likely subsidiary or outlier setts, and not used at all times. Not located on railway verge. Mammal paths evident leading to/from sett, latrines identified within golf course. Badger observed on several videos during both deployments utilising the holes.
Zone C/ Skerries	26/11/2021 – 16/12/2021 18/01/2022 – 31/01/2022	One large hole with fresh digging evident when surveyed. Likely outlier sett and used sporadically. Mammal track present leading from railway line to sett. Badger observed on four different nights but not observed using the sett.
Zone C/ Colp	26/11/2021 – 16/12/2021 18/01/2021 – 31/01/2022	One hole identified along the railway verge, likely part of an annexe or subsidiary sett. Fresh digging observed by surveyors during walkover survey. Mammal paths evident along railway verge. Badgers were observed using the sett on several occasions on both deployments, with two badgers observed in January, and mating calls heard on multiple recordings. Preening and mating behaviour was also observed during the second deployment in January.

8.4.10.1.2 Otter

Otter *Lutra lutra*, and their breeding and resting places, are protected under the Wildlife Acts. Otter is also listed on Annex II and Annex IV of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011) (as amended). The desk study returned 76 records for otter in the wider study area (i.e. Grid Squares O06, O07, O08, O14, O15, O16, O17, O18, O23, O24, and O26 from the NBDC mapping tool) which are listed in Appendix A8.1 of Volume 4 of this EIAR. All of these records are located along watercourses within the area, including: the River Boyne, the River Nanny, the River Matt, Inner Rogerstown Estuary, Broadmeadow River and the inner Malahide Estuary, Baldoyle, the Tolka River and Dublin Bay, all of which have hydrological connections to the Proposed Development. Other waterbodies the Proposed Development has hydrological connections with and are likely used by otters include; Stagrennan River, Betaghstown River, River Delvin, Mill Stream, Balcunnin River, Palmerstown River, Ballyboghil River, Turvey River, Sluice River, River Mayne, and the Santry River.

Otter surveys were carried out along accessible areas of watercourses that the existing railway line crosses over, with suitable accessible habitat 150m upstream and downstream from the railway line also surveyed. No holts were identified at any of the surveyed locations. An otter couch was identified *c.* 75m upstream of the railway line at Laytown Estuary along the transitional body of the River Nanny. A potential otter print was identified in Mosney, on the southern bank of the Mosney River, located *c.* 77m downstream of the railway line, and a potential slide was identified in Rogerstown Estuary *c.* 20m east of the railway line, where a drainage ditch outflows into the north of the estuary. No other signs of otter were identified within the ZoI of the Proposed Development.

Otter are known to utilise the watercourses within the vicinity of the Proposed Development corridor, including; the Liffey Estuary Upper, the Tolka River, Grand Canal, Dublin Port (Scott Cawley Ltd., 2022), Malahide Estuary (Broadmeadow Way Project, An Bord Pleanála Reference number: 304624), River Nanny and the River Boyne (Bailey & Rochford, 2006)). It is considered likely that otter continue to utilise these watercourses and their tributaries, and other watercourses including those listed above, within the catchment for breeding, foraging and commuting activities.

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, as per the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Roos *et al,.* 2021).

The River Boyne and River Blackwater SAC is the closest European site designated for otter, located *c.* 150m north of the Proposed Development. The Proposed Development is located upstream and within the ZoI of this European site. The otter population associated with the River Boyne and River Blackwater SAC is valued as being of International Importance as it is listed on Annex II of the Habitats Directive, all other otter populations within the ZoI of the Proposed Development are valued as being of County Importance.

Consultation with NPWS during EIA scoping identified an area of interest at the Malahide Estuary for otter. As a result, two trail cameras were deployed for a period of four weeks between August and September 2023 on either side of the railway by the sluice river gate on the River Turvey/Pill in the Malahide Estuary, to determine if the local otter population were crossing over the railway line to travel between the River and the Estuary. Analysis of the cameras determined that otters were not using the railway to cross over at the time of deployment.

8.4.10.1.3 Other Mammals

No other protected mammal species were recorded during any of the surveys undertaken for the Proposed Development. The desk study returned the following terrestrial mammal species protected under the Wildlife Acts within the wider study area (see Appendix A8.1 in Volume 4 of this EIAR for further details):

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

The habitats adjacent to and within the Proposed Development potentially provide good habitat for these species. Red squirrels are more commonly found within mixed woodlands and/or coniferous woodlands in the western half of Ireland due to a steadier food source year-round (Lawton *et al.*, 2020); however, they can also be found within deciduous woodlands, specifically where oak *Quercus* sp. and/or hazel *Corylus avellana* tree species are present as red squirrel are known to forage acorns and hazelnuts. Pygmy shrews, hedgehogs and Irish stoat are found in a range of habitats; however, they are predominantly present in habitats with a rich ground cover, and as such the woodland and scrub habitats adjoining the Proposed Development are considered suitable for these species. In addition, the dense hedgerows and scrub present would also provide cover and commuting corridors for these species. Irish hare is also found in a range of habitats, from coastal dunes to mountain tops, and densities vary from year to year and habitat to habitat[21]. The adjoining agricultural fields are likely suitable for foraging and/or commuting hares.

The local population 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 Development, which are valued as being of Local Importance as they are a protected species under the Wildlife Act.

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.

8.4.10.1.4 Marine Mammals

There were no dedicated marine mammal surveys carried out as part of the assessment as the Proposed Development is largely located inland (with the exception of some railway crossings on existing bridges). However, a watching brief was maintained during all vantage point wintering bird surveys. The desk study returned a number of records for marine mammals in the vicinity of the Proposed Development, all of which are included in Appendix A8.1 of Volume 4 of this EIAR. All of these records were located offshore or within the estuaries along the eastern coastline.

Harbour seal, grey seal, and harbour porpoise are known to be present in Dublin Bay, and along the eastern coastline, and these species are all protected under the Wildlife Acts. Both seal species and the harbour porpoise are also listed on Annex II of the Habitats Directive while all cetacean species are also listed on Annex IV of the Habitats Directive.

Harbour seal, grey seal and harbour porpoise are therefore valued as being of International Importance.

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

- Common Dolphin *Delphinus delphis*;
- Minke Whale *Balaenoptera acutorostrata*;
- Fin whale *Balaenoptera physalus;*

[21] *Species Profile: Irish Hare, Vincent Wildlife Trust Ireland*. Accessed here: https://www.vincentwildlife.ie/species/irish-hare

- White-beaked Dolphin *Lagenorhynchus albirostris*;
- Bottlenose Dolphin *Tursiops truncatus*;
- Humpback Whale *Megaptera novaeangliae*;
- Striped Dolphin *Stenella coeruleoalba*; and
- Risso's Dolphin *Grampus griseus*.

These cetacean species are all protected under the Wildlife Acts and Habitats Directive (see Appendix A8.1 in Volume 4 of this EIAR). Bottle-nosed dolphin is common to Irish coastlines, particularly the west coast, throughout the year and are infrequently recorded within Dublin Bay.

Common dolphin and Risso's dolphin, found both in inshore and offshore coastal waters are occasionally sighted in Dublin Bay and along the eastern coastline. Minke whales, and humpback whale species are migratory and frequent Irish coastlines each year. White-beaked dolphin and striped dolphin are pelagic species and are rarely sighted on the east coast, favouring the offshore waters of the continental shelf. These species are protected under Annex IV of the Habitats Directive and the Wildlife Acts and as such are valued as Nationally Important.

8.4.10.1.5 Bats

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

Bat surveys were carried out across two seasons; 2021 and 2022, in the preparation of this EIAR. Two transects were surveyed within the vicinity of the Proposed Development along suitable habitats adjacent to the railway line in Balbriggan. The results of these surveys are described in the Sections below.

The results of these surveys are also presented in Figure 8.6.1 in Volume 3A 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 Development.

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

No roosts were identified across the Proposed Development; however a number of bridges were identified with bat roosting potential throughout the route, by virtue of having suitable bat roosting features, such as cracks and crevices in mortar or as part of the structure of the bridge, gaps between the concrete slabs of the bridge, or within dense ivy growing on the pier walls. This includes the following bridges: OBB33, OBB39, OBB41, OBB44, OBB46, OBB47, OBB49, OBB54, UBB56, UBB65, OBB68, UBB72, OBB78, OBB80/80A/80B, UBB82.

Leisler's Bat Nyctalus leisleri

No roost sites for Leisler's bat were recorded during any of the surveys for the Proposed Development. Activity levels for this species was high overall across all of the surveys undertaken. Full details of each survey are described in Appendix A8.5 of Volume 4 of this EIAR. Out of the twenty (20) bridges that had roost presence/absence surveys, 18 bridges had Leisler's bat passes, commuting and/or foraging in the wider environment. OBB49 and OBB54 had the highest number of bat passes, with 64 Leisler's bat recorded at both locations in 2021. OBB77, OBB62 and OBB56 also had high levels of Leisler's bat during the surveys undertaken there. OBB39 and OBB33 were the only locations where no Leisler's bat activity was recorded. Leisler's bat was not recorded on the transect survey undertaken in Balbriggan. A summary of Leisler's bat activity recorded at the four automated detector locations is provided below in Table 8-14.

Table 8-14 Summary of Leisler's bat activity recorded on automateddetectors

Location	Deployment 1 Summary	Deployment 2 Summary
McGrath's Lane (Drogheda) OBB80/80A/80B	1 Leisler's bat call recorded during this deployment	2 Leisler's bat calls recorded during this deployment
Colp Bridge (Colp Road, Drogheda) OBB77	1 Leisler's bat call recorded during this deployment	11 Leisler's bat calls recorded during this deployment
Pilltown (Mosney camp) UBB70	5 Leisler's bat calls recorded during this deployment	7 Leisler's bat calls recorded during this deployment
Skerries (Treeline behind Skerries Wastewater treatment plant) UBB56	52 Leisler bat calls identified in this period	3 Leisler's bat calls recorded during this period

The desk study found that Leisler's bat is known to occur across the Proposed Development (see Appendix A8.1 in Volume 4 of this EIAR for further details). A review of records held by Bat Conservation Ireland (BCI) returned two records for a Leisler's bat roost within 3km of the Proposed Development, located in; Grand Canal Dock and Portrane. The lands across the Proposed Development site are generally quite open with large fields bordering the existing railway corridor. This provides ideal foraging habitat for Leisler's bat as it is an exclusively aerial-hawking species[22], foraging up to heights of 30m. They are known to have a widespread distribution across the region, and in Ireland (Roche *et al.*, 2014), however Leisler's bats tend to show a southern bias in their distribution, with greater numbers occurring in the south-west and east of the country than in the north. Populations of this species have shown to be increasing in recent years (Aughney *et al.,* 2018). Given the high suitability of the habitat bordering the Proposed Development and its environs for this species, and the increasing population trends, particularly in the south-west and east of the country, the local population of Leisler's bat is valued as being of Local Importance (Higher Value).

[22] Vincent Wildlife Trust, Ireland. Species profile – Leisler's bat. Accessed here: https://www.vincentwildlife.ie/species/leislers-bat

Soprano pipistrelle bat Pipistrellus pygmaeus

No soprano pipistrelle roosts were identified during the roost presence/absence surveys at any of the bridges surveyed. Activity levels were low overall for this species. Full details of each survey are described in Appendix 8.5 of Volume 4 of this EIAR. Out of the 20 bridges surveyed, 16 of these had soprano pipistrelle bat passes, foraging and/or commuting in the wider environment. OBB47 and OBB77 had the highest level of activity recorded, with 29 and 18 bat passes each, respectively, during surveys in 2021. OBB46, OBB56, OBB41, and UBB72 were the only bridges with no soprano pipistrelle activity recorded in 2021 or 2022. Soprano pipistrelle was not recorded during the transect surveys carried out in Balbriggan. A summary of the soprano pipistrelle bat activity recorded at the four automated detector locations is provided below in Table 8-15.

Table 8-15 Summary of soprano pipistrelle bat activity recorded on automated detectors

Location	Deployment 1 Summary	Deployment 2 Summary
McGrath's Lane (Drogheda) OBB80/80A/80B	No soprano pipistrelle calls were picked up during this deployment	1 soprano pipistrelle was recorded during this deployment
Colp Bridge (Colp Road, Drogheda) OBB77	11 soprano pipistrelle calls were picked up during this deployment	9 soprano pipistrelle calls were recorded during this deployment
Pilltown (Mosney camp) UBB70	56 soprano pipistrelle calls were recorded during this deployment	115 soprano pipistrelle calls were recorded during this deployment
Skerries (Treeline behind Skerries Wastewater treatment plant) UBB56	3 soprano pipistrelle calls were recorded during this deployment	2 soprano pipistrelle calls were recorded during this deployment

The desk study found that soprano pipistrelle bat is known to occur across the Proposed Development (see Appendix A8.1 in Volume 4 of this EIAR for further details). A review of records held by BCI returned four records for a soprano pipistrelle roost within 3km of the Proposed Development, located in; Drogheda, Portrane, Portmarnock, and Portobello. Despite soprano pipistrelle being one of the most common bat species found in Ireland, surveys did not identify high levels of activity across the Proposed Development corridor. This may be as soprano pipistrelle bats are a specialist species and tend to favour riparian habitats more than other pipistrelle species (Rachwald *et al.*, 2016). They generally prefer edge habitats such as woodland edges, or treelines/hedgerows, or gardens and parks (BCT, 2010). This could have been a factor in the low numbers of soprano pipistrelle calls recorded across the Proposed Development, due to the lack of woodlands and treelines/hedgerows (particularly in urban areas) within the railway corridor.

Soprano pipistrelle bats are known to have a widespread distribution across the region, and in Ireland (Roche *et al.*, 2014). Soprano pipistrelle populations vary in abundance across the country (Aughney *et al.*, 2018), with population trends steadily increasing. Taking this into account, as well as the availability of suitable roosting, commuting and foraging habitat in the immediate surrounding environment, and the low activity levels recorded along the line, the local population of soprano pipistrelle bat is valued as being of Local Importance (Higher Value).

Common pipistrelle Pipistrellus pipistrellus

No roost sites for common pipistrelle bat were recorded during any of the surveys for the Proposed Development. Activity levels for this species was the highest of all of the species recorded within the Proposed Development site. Full details of each survey are described in Appendix A8.5 of Volume 4 of this EIAR. Out of the 20 bridges that had roost presence/absence surveys, 19 of these recorded calls from common pipistrelle, commuting and/or foraging in the area. OBB49, OBB78 both had over 100 calls recorded during surveys in 2021, with UBB56, OBB62, OBB54 and OBB35 all also having very high levels of activity recorded. OBB39 was the only bridge that did not have any common pipistrelle calls recorded. Common pipistrelle was the only bat recorded during the Balbriggan transect survey. A summary of common pipistrelle bat activity recorded at the four automated detector locations is provided below in Table 8-16.

Table 8-16 Summary of common pipistrelle bat activity recorded in automated detectors

Location	Deployment 1 Summary	Deployment 2 Summary
McGrath's Lane (Drogheda) OBB80/80A/80B	2 common pipistrelle calls recorded during this deployment	2 common pipistrelle calls recorded during this deployment
Colp Bridge (Colp Road, Drogheda) OBB77	11 common pipistrelle calls recorded during this deployment	16 common pipistrelle calls recorded during this deployment
Pilltown (Mosney camp) UBB70	115 common pipistrelle calls recorded during this deployment	39 common pipistrelle calls recorded during this deployment
Skerries (Treeline behind Skerries Wastewater treatment plant) UBB56	12 common pipistrelle calls recorded during this deployment	9 common pipistrelle calls recorded during this deployment

The desk study found that common pipistrelle bat is known to occur across the Proposed Development (see Appendix A8.1 in Volume 4 of this EIAR for further details). A review of records held by Bat Conservation Ireland (BCI) returned records for six common pipistrelle roosts within 3km of the Proposed Development, located in; Drogheda, Lusk, Portrane, Malahide and Portobello. The high levels of activity of this species suggests the Proposed Development provides good foraging and/or commuting habitat, and as they generally do not travel far from their roost sites (BCT, 2021), common pipistrelles may be roosting in buildings, trees and structures adjacent to the Proposed Development.

Common pipistrelle bats are widespread in Ireland; however, they tend to show a southern bias in their distribution, with greater numbers occurring in the south-west and east of the country than in the north (Roche *et al.,* 2014). This species has also shown increasing population trends in recent years. Taking this into account, as well as the availability of suitable roosting, commuting and foraging habitat in the immediate surrounding environment, the local common pipistrelle population within the study area are of Local Importance (Higher Value).

Brown long-eared bat Plecotus auritus

No roost sites for brown long-eared bat were recorded during any of the surveys for the Proposed Development. Activity levels for this species was low overall across all of the surveys undertaken. Full details of each survey are described in Appendix A8.5 of Volume 4 of this EIAR. Out of the 20 suitable bridges that had roost presence/absence surveys, two bridges had brown long-eared bat passes, likely commuting and/or foraging in the wider environment. OBB62 and OBB54 were the only bridges that had brown long-eared bat activity. Brown long-eared bat was not recorded on the transect survey undertaken in Balbriggan. A summary of brown long-eared bat activity recorded at the four automated detector locations is provided below in Table 8-17.

Table 8-17 Summary of brown long-eared bat activity recorded on automated detectors

Location	Deployment 1 Summary	Deployment 2 Summary
McGraths Lane (Drogheda) OBB80/80A/80B	No brown long-eared bat calls were recorded during this deployment	No brown long-eared bat calls were recorded during this deployment
Colp Bridge (Colp Road, Drogheda) OBB77	3 brown long-eared bat calls were recorded during this deployment	No brown long-eared bat calls were recorded during this deployment
Pilltown (Mosney camp) UBB70	2 brown long-eared bat calls were recorded during this deployment	No brown long-eared bat calls were recorded during this deployment
Skerries (Treeline behind Skerries Wastewater treatment plant) UBB56	4 brown long-eared bat calls were recorded during this deployment	No brown long-eared bat calls were recorded during this deployment

The desk study found that brown long-eared bat is known to occur across the wider study area from the Proposed Development (see Appendix A8.1 in Volume 4 of this EIAR for further details). A review of records held by BCI returned nine records for long-eared bat roosts within 3km of the Proposed Development, located in: Kinsealy, Malahide, Portrane, Skerries, Stamullen, and Drogheda. Brown long-eared bats have very quiet, short echolocation calls, forage in cluttered habitats and therefore are less likely to be recorded by handheld bat detectors (Aughney *et al.*, 2011). This species also emerges from roosts later than other bat species, as their typical prey (moths) tend to be available later in the night. In general, the habitats along the railway corridor and adjacent are open habitats, bordered by treelines and hedgerows in some places. It is likely that the railway corridor is too open for this species, and they are less likely to use the Proposed Development and the habitats adjacent for foraging and/or commuting to/from roost sites.

It is possible that brown long-eared bats were under-recorded within the Proposed Development site, due to their short, quiet echolocation calls which can go undetected by bat detectors (Aughney et al., 2011). Static bat detectors would be more likely to record the calls as they are deployed all night and brown long-eared bats typically emerge an hour after sunset, however, the bats would have to be flying relatively close to the detectors to be picked up as the detection of these calls by bat detectors is limited to a distance of approximately 0.7m (Aughney and Roche, 2008).

On this basis, a precautionary principle has been applied, and it has been assumed that most hedgerows, treelines adjacent and within the Proposed Development (i.e. on the verges of the railway) and woodland habitats adjacent are important for foraging and commuting brown long-eared bats.

As brown long-eared bats are widely distributed across the country and have also shown a stable increasing population trend, due to the presence of calls within the Proposed Development site despite limitations, and the widespread distribution of this species across the site, this local population of brown long-eared bat is of Local Importance (Higher Value).

Myotis bat species[23]

No roost sites for *Myotis* spp. bat were recorded during any of the surveys for the Proposed Development. Activity levels were low overall across all of the surveys undertaken. Full details of each survey are described in Appendix A8.5 of Volume 4 of this EIAR. Out of the 20 bridges that had roost presence/absence surveys, six bridges had Myotis sp. bat passes, commuting and foraging in the wider environment. OBB35 had the highest number of calls, with 11 recorded. All other bridges had less than 10 calls recorded. *Myotis* sp. bat was not recorded during the Balbriggan transect. A summary of *Myotis* spp. bat activity recorded at the four automated detector locations is provided below in Table 8-18.

Table 8-18 Summary of Myotis spp. bat activity recorded on automated detectors

Location	Deployment 1 Summary	Deployment 2 Summary
McGrath's Lane (Drogheda) OBB80/80A/80B	No *Myotis* spp. calls were recorded during this deployment	No *Myotis* spp. calls were recorded during this deployment
Colp Bridge (Colp Road, Drogheda) OBB77	No *Myotis* spp. calls were recorded during this deployment	No *Myotis* spp. calls were recorded during this deployment
Pilltown (Mosney camp) UBB70	1 *Myotis* spp. call was recorded during this deployment	No *Myotis* spp. calls were recorded during this deployment
Skerries (Treeline behind Skerries Wastewater treatment plant) UBB56	No *Myotis* spp. calls were recorded during this deployment	No *Myotis* spp. calls were recorded during this deployment

The desk study found that *Myotis* spp. bats are known to occur across the wider study area from the Proposed Development (see Appendix 8.1 in Volume 4 of this EIAR for further details). A review of records held by BCI returned no roost records within 3km of the Proposed Development.

[23] Calls identified as belonging to species of the genus *Myotis* were recorded on automated detectors and handheld detectors. Species of the genus *Myotis* which have been recorded in Ireland comprise Daubenton's bat *Myotis daubentonii*, whiskered bat *Myotis mystacinus*, Brandt's bat *Myotis brandtii* (vagrant), and Natterer's bat *Myotis nattereri*. These species tend to exhibit similar call sonograms, which are often very difficult to differentiate with any accuracy. For this reason, these species have been assigned to genus level only.

The nearest record to the Proposed Development was located in Phoenix Park, *c.* 4km from the Proposed Development.

Daubenton's bat, a *Myotis* spp. bat that typically feeds above water by gleaning insects from the surface[24], was likely to use areas such as the Boyne River, the River Nanny, the Broadmeadow River, and the River Liffey. Whilst estuaries are large expanses of water, there is little evidence to suggest that they will forage on estuaries, likely as they are too exposed to predators in these habitats.

Generally, *Myotis* species will forage and commute close to hedgerows and treelines, which are important corridors for these species for avoiding predation (Jones *et al.,* 1994). *Myotis* species, including Daubenton's bat, whiskered bat and Natterer's bat have a relatively wide but dispersed distribution throughout Ireland. Given this widespread distribution of bats of the genus *Myotis* and the availability of good habitat (woodland and waterbodies) within the surrounding environment, the local population of *Myotis* spp. is of Local Importance (Higher Value).

8.4.10.2 Birds

8.4.10.2.1 Breeding birds

Desk study

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 of conservation concern, are presented in Appendix A8.1 in Volume 4 of this EIAR. These species are considered to be KERs of the Proposed Development and include the following:

- SCIs for a breeding population of SPAs (as discussed under Section 8.4.4);
- 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, Stanbury and Lewis, 2021).

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

The desk study returned records of a total of 137 breeding bird species across the study area (i.e., Grid Squares O06, O07, O08, O13, O14, O15, O16, O17, O18, O23, O24, O25, O26 from the NBDC mapping tool). Records included 30 species listed under Annex I of the Birds Directive, 63 SCI species, and an additional 23 Amber-listed and 21 Red-listed species. This includes 23 species with breeding and wintering populations. These species are grouped into habitat preferences and are discussed below in relation to their presence within the Proposed Development boundary.

[24] *Daubenton's bat, Woodland Trust.* Accessed here: https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/animals/mammals/daubentons-bat/

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, Dublin Bay, Baldoyle Bay, Malahide Estuary, Rogerstown Estuary, the Nanny Estuary, and Boyne Estuary. Many gull[25], auk, shearwater and tern species breed in steep inaccessible cliffs (i.e. Howth Head), offshore islands, and Dublin Port. Seabirds such as terns, guillemots and kittiwakes nest on the cliffs and crevices of Howth Head, Rockabill Island, Ireland's Eye, and Lambay Island. Fulmar, shag, razorbill and gannets also nest in the cliffs of Ireland's Eye and Lambay Island, which also has numbers of large gulls, cormorant and puffin (Merne and Madden 2000). Gulls favour nesting along coasts on shingle and cliffs but may utilise inland public areas for scavenging and buildings for roof nesting as per habitat preferences associated with the species as listed on BirdWatch Ireland (BirdWatch Ireland 2023). As such, some gull species may utilise the buildings adjacent to the Proposed Development for nesting. This is only relevant for areas where the railway line goes through residential/urban habitats, such as between Connolly and Malahide, Donabate, Skerries, Balbriggan, and Drogheda. However, the majority of other species are not deemed likely to breed within the Proposed Development. The majority of records along the Proposed Development comprise bird species common to suburban habitats (including residential and parkland areas), such as gull and garden bird species. Residential habitats were identified in several locations across the wider study area, as listed above. These species are therefore likely to use lands adjacent to or within the Proposed Development for breeding.

Breeding species which are associated with buildings were returned from the desk study including house martins and barn swallow (BirdWatch Ireland, 2023). House martins and swallows occurred across the wider study area, and therefore likely utilise buildings outside the Proposed Development. Several species of warblers and raptors which favour woodlands, agricultural lands and upland heathland areas were identified during the desk study. Agricultural lands and open areas are located across the Proposed Development adjacent to the railway line. As such, these areas are suitable for use by breeding raptors and warblers such as kestrel, buzzard, and sedge warbler.

Species that are known to utilise freshwater lakes, ponds, canals, and rivers in urban habitats include wagtails, coots, swans, ducks and kingfisher. Suitable habitats located within close proximity to the Proposed Development include: the River Tolka with known populations of mute swan *Cygnus olor*, wagtails and kingfisher, the River Boyne with populations of kingfisher *Alcedo atthis* (also a SCI species of the River Boyne and River Blackwater SPA), and the River Nanny with populations of mallard *Anas platyrhynchos* and coot *Fulica atra* to name a few.

Survey results

The following birds were observed within or in the vicinity of the Proposed Development site during breeding bird surveys undertaken in 2022:

[25] Full scientific names are provided below under respective headings

- Green listed species (i.e. of low conservation concern): Blackbird *Tardus merula*, blackcap *Sylvia atricapilla*, blue tit *Cyanistes caeruleus*, bullfinch *Pyrrhula pyrrhula*, chaffinch *Fringilla coelebs*, chiffchaff *Phylloscopus collybita*, coal tit *Periparus ater*, collared dove *Streptopelia decaocto*, dunnock *Prunella modularis*, feral pigeon *Columba livia f. domestica*, garden warbler *Sylvia borin*, goldfinch *Carduelis carduelis*, great tit *Parus major*, hooded crow *Corvus cornix*, , jackdaw *Corvus monedula,* long-tailed tit *Aegithalos caudatus*, magpie *Pica pica*, mistle thrush *Turdus viscivorus*, pheasant *Phasianus colchicus*, pied wagtail *Motacilla alba yarrellii*, reed bunting *Emberiza schoeniclus,* reed warbler *Acrocephalus scirpaceus*, robin *Erithacus rubecula*, rook *Corvus frugilegus*, sedge warbler *Acrocephalus schoenobaenus*, song thrush *Turdus philomelos*, sparrowhawk *Accipiter nisus*, stonechat *Saxicola torquatus*, whitethroat *Sylvia communis,* wood pigeon *Columba palumbus*, and wren *Troglodytes troglodytes*.
- Amber list species (i.e. of medium conservation concern): goldcrest *Regulus regulus*, greenfinch *Chloris chloris*, herring gull *Larus argentatus*, house martin *Delichon urbicum*, house sparrow *Passer domesticus*, lesser black-backed gull *Larus fuscus*, linnet *Carduelis cannabina*, mallard *Anas platyrhynochus*, sand martin *Riparia riparia*, skylark *Alauda arvensis*, starling *Sturnus vulgaris*, swallow *Hirundo rustica*, kingfisher *Alcedo atthis*, whooper swan *Cygnus cygnus*, and willow warbler *Phylloscopus trochilus*
- Red list species (i.e. of high conservation concern): curlew *Numenius arquata*, kestrel *Falco tinnunculus*, meadow pipit *Anthus pratensis*, swift *Apus apus*, wood warbler *Phylloscopus sibilatrix* and yellowhammer *Emberiza citrinella*.

There are a number of habitats within the study area that are suitable for breeding birds to nest in, including trees, concrete structures, hedgerows and scrub. The study area is likely to encompass and/or form part of the breeding territories of a number of bird species recorded during the surveys. Breeding behaviour of the majority of species was observed within the Proposed Development site, predominately along or close to hedgerows, scrub and concrete structures such as Balbriggan and Drogheda viaducts. House sparrows were observed entering gaps of the disused boat underneath the northern part of the Balbriggan viaduct. Swifts were observed flying around Drogheda viaduct, with courtship display observed. Although swifts were not identified nesting in the Viaduct at the time of survey, it is likely they breed in the Drogheda viaduct due to the height of the viaduct over the ground. Gull species are known to breed within the vicinity of Balbriggan atop residential homes[26] but no nesting behaviour or evidence of nesting was found to be in the study area, only observed as flyovers. Curlew and kestrel were also observed as flyovers during surveys. Ireland's breeding curlew are currently on the decline with less than 150 pairs in Ireland[27], however the birds observed were flyovers following the River Boyne, and likely traveling to foraging sites. There is no suitable breeding habitat or known breeding sites within the study area for curlew. Breeding habitats for ground nesting birds such as meadow pipit and skylark were not identified within the Proposed Development, with the exception of the Construction Compound locations where agricultural fields are being utilised.

[26]Birdwatch Ireland website (2021) https://birdwatchireland.ie/urban-gulls-birdwatch-irelands-view-from-the-roof-tops/ (visited January 2024)

[27] Birdwatch Ireland website (2023) https://birdwatchireland.ie/87196 2/#:~:text=Curlew%20Ecology,unimproved%2Fsemi%2Dimproved%20pasture (visited January 2024)

Yellowhammer breeds in late summer/early autumn within hedgerows along field boundaries, which are located throughout the Proposed Development boundaries and surrounding areas.

Confirmed breeding birds were observed as providing material to nests and/or had nests nearby. House martins were observed nesting at the house along Golf Links Road, east of the rail line. A song thrush was observed entering a tree, next to Rusk & Lusk carpark west of the rail line, with noise of chicks being heard. Other confirmed breeding birds (blackbird, blackcap, blue tit, chaffinch, goldcrest, great tit, hooded crow, robin, rook, stonechat and wren) were observed either carrying food or feeding young fledglings.

Due to the presence of suitable breeding and / or foraging habitat within and directly adjacent to the Proposed Development, the local breeding bird populations are of International Importance where they belong to SPA populations and / or are listed on Annex I of the Birds Directive. All other Red and Amber listed bird species (non-SCI breeding populations) are of County Importance, All other breeding bird populations are of Local Importance (Higher Value).

8.4.10.2.2 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.

Desk Study

The full results of the desk study, including records of wintering bird species of conservation concern, are presented in Appendix A8.1 in Volume 4 of this EIAR. These species are considered to be KERs of the Proposed Development and include the following:

- SCIs for a wintering population of SPAs (as discussed under respective SPAs in Section 8.4.4);
- 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.

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

The desk study returned records of a total of 147 wintering bird species across the wider study area. Records included 24 species listed under Annex I of the Birds Directive, 57 SCI species, 51 Amber-listed, and 38 red-listed species. Of the 147 species recorded, 113 species were both wintering and breeding species.

The majority of wintering birds identified in the desk study are typically found in coastal, estuarine and intertidal habitats including the Liffey Estuary Lower, Dublin Bay, Baldoyle Bay, Malahide Estuary, Rogerstown Estuary, the Nanny Estuary, and Boyne Estuary. The wider study area of Dublin Bay is considered of significant ornithological importance as it supports an internationally important population of light-bellied Brent goose, the SCI species may use open parkland and grassland adjacent to the study area for foraging purposes.

A review of a study into light-bellied brent goose inland feeding sites (Scott Cawley Ltd., 2017) has identified nine known inland wintering bird feeding sites within approximately 300m of the Proposed Development and these are listed below. The importance of a feeding site has been categorised as follows:

- A site is considered to be of major importance if a peak count of over 400 geese has been previously recorded at that site;
- A site is considered to be of high importance if a peak count of between 51 to 400 geese has been previously recorded at that site; and
- A site is considered to be of moderate importance if a peak count of between 1 to 50 geese has been previously recorded at that site (Benson 2009).

Known inland feeding sites within 300m of the Proposed Development include:

- Dublin Harbour/Fairview Park (Major importance), approximately 5m from the Proposed Development;
- Dublin Harbour/East Point Park (Major importance), approximately 50m from the Proposed Development;
- Alfie Byrne/Clontarf Road-East Point (High importance), approximately 250m from the Proposed Development;
- Clontarf Golf Club (High importance), approximately 5m from the Proposed Development;
- Santry River/Lein Park Lower (Major importance), approximately 5m from the Proposed Development;
- Donaghmede/Donaghmede Park (Major importance), approximately 40m from the Proposed Development;
- Malahide Golf Club (Major importance), approximately 5m from the Proposed Development;
- Malahide Castle (Major Importance), approximately 80m from the Proposed Development; and
- Beaverstown Golf Club (High importance), approximately 5m from the Proposed Development.

Whilst this study covers suitable feeding sites in Dublin, there are a number of other areas with potential suitable feeding habitat for Brent Geese north of Dublin. Potential suitable habitat sites in close proximity to the Proposed Development area include; Skerries Golf Club, GAA pitches in Balbriggan, Gormanston Camp, McBride Pitch and Putt in Drogheda, and Caves Strand in Malahide (adjacent to the proposed Construction Compound location in Caves Strand).

Survey results

Wintering bird vantage point surveys were carried out at five separate locations along or adjacent to the Proposed Development, focusing on the estuaries close to the Proposed Development, and other areas of suitable habitat (described in Section 8.3.5.3 and shown in Figure 8.8 of Volume 3A of this EIAR), across two seasons (2021 – 2022, and 2022 – 2023). Additional surveys at Construction Compounds and substation compounds were undertaken in September 2023 – March 2024. Two additional Construction Compounds at Malahide by Caves Strand and Bissett's Strand were added following a design change to the Malahide turnback in response to stakeholder feedback in public consultation no.2.

Given the timing of this design change (and the addition of the two associated Construction Compounds) were, it was not possible to complete wintering bird surveys in these locations. However, this is not considered to be a limitation to the assessment as a habitat survey was undertaken in these areas, and the proposed Construction Compound locations at Caves Strand and Bissett's Strand are not suitable for foraging and/or roosting wintering birds, due to being comprised of overgrown grassland and scrub.

A full table of the results and summaries of activities is detailed in Appendix A8.6 of Volume 4 of this EIAR. A detailed description of results for SCI species is provided in Section 5.3.5.2 of the NIS associated with this Railway Order application. All other bird species are described below.

Buzzard Buteo buteo

Buzzard was identified foraging, soaring or perched in Laytown, Gormanston, Malahide and Rogerstown locations, on multiple survey dates throughout the two seasons. A peak count of 3 foraging individuals was recorded in October 2021. Out of the 27 flight lines recorded, 12 (44%) were within the 0-10m flight zone. Buzzard is a green listed species on the most recent BoCCI, i.e., of low conservation concern.

Grey heron Ardea cinerea

Grey heron was recorded either foraging in the estuaries, or perched in saltmarsh habitats, with a peak count of 16 birds recorded in Malahide Estuary in November 2021. Out of the 16 flight lines recorded, 9 (69%) were within the 0-10m flight zone. Grey heron is a green listed species on the most recent BoCCI, i.e., of low conservation concern.

Kestrel Falco tinnunculus

Kestrel was only observed flying over the railway line or associated habitats during surveys across both seasons. Out of the 5 flight lines recorded, 2 (40)% were within the 0-10m flight zone. Kestrel is a red listed species on the most recent BoCCI, i.e., of high conservation concern.

Little egret Egretta garzetta

Little egret was observed foraging and or perched in the estuaries on multiple occasions across the two seasons, with a peak count of 11 recorded in Malahide Estuary in October 2021. Out of the 73 flight lines observed, 40 (54%) were within the 0-10m flight zone. Little egret is a green listed species on the BoCCI.

Mute swan Cygnus olor

Mute swan was only observed in Malahide and Rogerstown Estuaries, either swimming or foraging, with a peak count of 5 observed in December 2022. Out of the 6 flight lines observed, 4 (66%) were within the 0-10m flight zone. Mute swan is an amber listed species, i.e. of medium conservation concern.

Peregrine falcon Falco peregrinus

Peregrine falcon was only recorded in Malahide and Rogerstown Estuaries, generally flying at height hunting, with a peak count of 2 observed in October 2022. Out of the 6 flight lines observed, 1 (16%) was within the 0-10m flight zone. Peregrine falcon is a green listed species.

Sparrowhawk Accipter nisus

Sparrowhawk was observed hunting in Gormanston during every survey carried out in 2021-2022 season, but was not observed in the 2022-2023 period in the same location. Sparrowhawk was only recorded 2 other times, in Rogerstown and Malahide Estuaries. Out of the 10 flight lines recorded, 6 were within the 0-10m flight zone. Sparrowhawk is a green listed species.

Whooper swan Cygnus cyanus

Whooper swan was observed on three separate occasions in Laytown, Rogerstown and Gormanston, with a peak count of 6 observed during two of these occasions. Whooper swan was only recorded flying over the line once and was not within the 0-10m flight zone. Whooper swan is an amber listed species.

Non-SCI Annex I bird species are of National Importance. All other non-SCI wintering bird populations (including Green, Amber, and Red-listed species) are of Local Importance (Higher Value).

Construction Compounds/Substations

Full results and survey details can be found in Appendix A A8.6 of Volume 4 of this EIAR, with a brief summary for each location described under their respective headings below.

Drogheda Compound/Substation

During all of the wintering bird surveys between September 2023 – March 2024, the only bird species identified landing within this site, was a buzzard, perched on a tree on one occasion. No other bird species were identified landing within the site. There were however a number of wintering bird species noted to be flying over the site. The vast majority of these recordings were gull species, namely; herring gull, black-headed gull and lesser black-backed gull, flying between 20 -150m high over the site, but never landing within.

Other birds identified flying over the site in low numbers (i.e. one or two individuals max) included; common gull, cormorant, and mallard. These birds were likely commuting from roosting and foraging grounds within the Boyne Estuary.

Laytown Compound

During the wintering bird surveys undertaken in Laytown, birds were not identified landing or foraging within the proposed Construction Compound location to the north of the River Nanny. A number of bird species were identified flying over the site from the adjacent wetland habitats. The species identified can be found in Appendix A8.6 of Volume 4 of this EIAR.

The proposed Construction Compound to the south of the River Nanny, is characterised by short sward grassland and is very suitable for wintering bird species. Wintering bird species were recorded foraging in the compound location east of the railway line and included; black-headed gull, oystercatcher, common gull, and curlew in small flocks. No birds were noted in the compound west of the railway line. A range of species were also identified flying over the Construction Compound location, as described in Appendix A8.6 of Volume 4 of this EIAR.

Gormanston Compound

The surveys within this location did not identify any bird species utilising the lands for foraging or roosting. All these recordings were for overflying gull species, namely; herring gull, and black-headed gull, flying between 20 -150m high over the site, but never landing within. No other birds were recorded flying over or landing within the site.

Skerries Substation/Compound

The surveys within this location did not identify any bird species utilising the lands for foraging or roosting. The vast majority of recordings were for overflying gull species, namely; herring gull, lesser black-headed gull and black-headed gull, flying between 20 -150m high over the site, but never landing within. No other birds were recorded flying over or landing within the site. Other birds identified flying over the site included a flock of 20 Brent goose and a flock of 15 curlew. Neither species landed within the site.

8.4.10.3 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 Development during any of the surveys undertaken.

The desk study returned records for common frog and smooth newt within the wider study area. There was no suitable habitat for amphibians within the Proposed Development boundary. There is a pond/lake present in Mosney Accommodation Centre, however this was not accessible at the time of survey. Drainage ditches were not present within the Proposed Development, however, are present in the wider environs, and likely to be suitable for breeding amphibians.

Due to the presence of a number of records of amphibians in the ZoI of the Proposed Development, the local amphibian population is of Local Importance (Higher Value).

8.4.10.4 Reptiles

Common lizards are legally protected under the Wildlife Acts. No common lizards were encountered during the multidisciplinary surveys undertaken along the Proposed Development. Some suitable breeding and hibernating habitat for this species was identified within the study area of the Proposed Development (i.e., grassland, railway ballast, scrub, hedgerows, and areas of spoil and bare ground / recolonising bare ground, which may provide suitable basking habitat).

The desk study return records of common lizard within the wider study area (i.e. NBDC Grid Square O07, O08, O13, O17, O18, O23, O24, O25, O26 from the NBDC mapping tool). This species is strongly associated with heathland and coastal dune habitats (Marnell 2002; Farren *et al.* 2010), the latter of which is present in the wider environs of the Proposed Development in Laytown and Gormanston, and downstream of the Proposed Development in Rogerstown, Malahide, Baldoyle Bay, and Dublin Bay.

Common lizards are deemed to be of Local Importance (Higher Value) due to the suitable habitat present within the Proposed Development.

8.4.10.5 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 Habitats Directive. Electro-fishing surveys and aquatic surveys were not carried out as part of the application for the Proposed Development, for reasons described in Section 8.3.3.

The Proposed Development lies within seven sub catchment areas. Their ecological fish status at each is described below:

- Tolka _SC_020: Monitored by Inland Fisheries Ireland (IFI) in 2017 at Drumcondra Road *c*. 1.6km upstream of the Proposed Development, and was assigned an Ecological Fish Status of 'Poor'
- Mayne_SC_010: Monitored at a number of locations upstream of the Proposed Development by IFI between 2016-2021, and was assigned an Ecological Fish Status of 'Poor' at all monitoring stations;
- Ballough (Stream)_SC_010: Monitored where the Turvey River outfalls to sea below the existing railway line in Malahide, assigned an Ecological Fish Status of 'Poor';
- Palmerstown_SC_010: Monitored at a number of locations upstream of the Proposed Development by IFI, assigned an Ecological Fish Status of 'Poor' at all monitoring station:
- Delvin_SC_010: Monitored at Knocknagin Bridge by IFI, assigned an Ecological Fish Status of 'Moderate' with the following species noted: Brown trout; European eel; Flounder; Sea trout;
- Nanny [Meath]_SC_050: Monitored at Julianstown by IFI, assigned an Ecological Fish Status of 'Moderate', with the following species present: brown trout; European eel; flounder; minnow; salmon; stone loach; three-spined stickleback and
- Boyne_SC_180: Monitored along the Boyne River, at OldBridge west of Drogheda by IFI with an Ecological Fish Status of 'Moderate'.

The desk study returned records for Allis shad *Alosa alosa,* a species also listed on Annex II of the Habitats Directive, from 1973 in Clogherhead. This species generally occurs in coastal waters and estuaries in the southeast of the country, with no records of this species spawning in Ireland[28]. The desk study also returned records of European eel *Anguilla anguilla* all located upstream of the Proposed Development on the River Turvey, the Broadmeadow River, and the River Boyne. This species is the most threatened fish in Irish freshwaters (King *et al*., 2011) and the alarming decline of the species in recent decades has resulted in a classification of 'Critically Endangered' (Jacoby and Gollock 2014). Twelve European eels were recorded during a fish stock survey carried out in the Tolka estuary in 2008 (The Central and Regional Fisheries Board 2008). European eel populations are valued as being of National Importance (Kelly *et al*., 2010).

There are two Annex II fish species within the River Boyne, *i.e*., river lamprey *Lampetra fluviatilis* and Atlantic salmon *Salmo salar.* The desk study did not return any records for this species in the vicinity of the Proposed Development.

[28] Accessed in January 2024: https://www.fisheriesireland.ie/species/allis-shad-alosa-alosa

Salmon and lamprey populations are of International Importance for populations within the SAC and its tributaries. Salmon is of International Importance outside of the SAC due to its vulnerable status, whilst lamprey is National Importance.

No other records of fish species were returned from the desk study, however as the Proposed Development is located along the coast, and downstream of most freshwater bodies, impacts from the Proposed Development will be limited on freshwater fish. All other fish species are of Local Importance (Higher Value).

8.4.10.6 Invertebrates

White-Clawed Crayfish Austropotamobius pallipes

White-clawed crayfish are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive. Ireland remains the only part of the EU with no introduced species of crayfish, as such it is of key conservation concern (NPWS 2021). The desk study did not return any records of White-clawed crayfish within the Proposed Development or the wider area. As such, White-clawed crayfish are not considered further in the assessment.

Freshwater Molluscs

Desmoulin's whorl snail *Vertigo moulinsiana* is protected through its inclusion on Annex II of the Habitats Directive. The NBDC database search of the 10km grid squares returned records for this species from 1972 in the O07 10km Grid Square, which covers an area on the outskirts of the existing railway line in Drogheda. However; the site name is labelled as the Royal Canal in Clondalkin, so it is assumed the record location is incorrect on the NBDC records. The closest European site for which Desmoulin's whorl snail is a QI species is the Rye Water Valley/Carton SAC, located *c.* 16.8km west of the Proposed Development, and which is not hydrologically connected to the Proposed Development.

The desk study found that glutinous snail *Myxas glutinosa* are known to occur along the Royal Canal. Records were also returned for moss chrysalis snail *Pupilla muscorum* in Bull Island and Portmarnock Strand. These species are listed as 'Endangered' on the Ireland Red List No. 2: Non-Marine Molluscs (Byrne *et al.,* 2009). The desk study (see Appendix A8.1 in Volume 4 of this EIAR) did not return records for freshwater molluscs within close proximity of the Proposed Development.

Due to the lack of records in the vicinity of the Proposed Development, as there is a lack of suitable habitat for rare molluscs within the Proposed Development boundary, and a lack of pathway between the Proposed Development and both mollusc populations; freshwater molluscs are not considered further.

Marsh Fritillary Euphydras aurina

Marsh fritillary are legally protected under Annex II of the Habitats Directive. Surveys for marsh fritillary were not carried out as part of this assessment, due to absence of suitable habitat and its main food source devil's-bit scabious *Succisa pratensis* within or near the Proposed Development. 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 A8.1 in Volume 4 of this EIAR) did not return records for marsh fritillary within the Proposed Development. Desk study records in the wider area were largely historical (pre-1980s). Recent records for marsh fritillary were identified approximately 2km south-east of the Proposed Development at North Bull Island in 2020. Marsh fritillary are restricted to habitats containing a low, open sward with abundant devil's-bit scabious, including sand dunes, calcareous grassland, fens, raised and blanket bogs, upland heaths and grasslands. These habitats were not recorded within the footprint of the Proposed Development. As such, marsh fritillary is not considered further in the assessment.

8.5 Key Ecological Receptors

Table 8-19 summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance. Key ecological receptors (KERs) are highlighted in grey in Table 8-19. 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 2022) 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 Development 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 Development. Those designated areas for nature conservation that lie beyond the ZoI of the Proposed Development 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 Development in that sense are captured and assessed under the relevant species' headings in Section 8.8. 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. It is in that context that they are included within the impact assessment.

Table 8-19 Summary of Ecological Valuation and Identification of KERs

Ecological Receptor	Ecological Valuation	KER?
Designated sites		
Malahide Estuary SAC [000205]	International Importance	Yes
Rogerstown Estuary SAC [000208]	International Importance	Yes
River Boyne and River Blackwater SAC [002299]	International Importance	Yes
Baldoyle Bay SAC [000199]	International Importance	Yes
Boyne Coast and Estuary SAC [001957]	International Importance	Yes
Rockabill to Dalkey Island SAC [003000]	International Importance	Yes
Lambay Island SAC [000204]	International Importance	Yes
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
Wicklow Mountains SAC [002122]	International Importance	Yes
Lambay Island SAC [000204]	International Importance	Yes
Codling Fault Zone SAC [003015]	International Importance	Yes
River Nanny Estuary and Shore SPA [004158]	International Importance	Yes
Boyne Estuary SPA [004080]	International Importance	Yes
River Boyne and River Blackwater SPA [004232]	International Importance	Yes
South Dublin Bay and River Tolka Estuary SPA [004024]	International Importance	Yes
Howth Head Coast SPA [004113]	International Importance	Yes
North Bull Island SPA [004006]	International Importance	Yes
Baldoyle Bay SPA [004016]	International Importance	Yes
Dalkey Island SPA [004172]	International Importance	Yes
Malahide Estuary SPA [004025]	International Importance	Yes
Rogerstown Estuary SPA [004015]	International Importance	Yes
Dundalk Bay SPA [004026]	International Importance	Yes
Skerries Islands SPA [004122]	International Importance	Yes
Ireland's Eye SPA [004117]	International Importance	Yes
Lambay Island SPA [004069]	International Importance	Yes
Rockabill SPA [004014]	International Importance	Yes

Ecological Receptor	Ecological Valuation	KER?
The Murrough SPA [004186]	International Importance	Yes
Wicklow Mountains SPA [004040]	International Importance	Yes
North West Irish Sea SPA	International Importance	Yes
Seas Off Wexford SPA	International Importance	Yes
Saltee Islands SPA	International Importance	Yes
Wicklow Head SPA	International Importance	Yes
All other SAC or SPA sites	International Importance	No – beyond ZoI
Skerries Island NHA [001218]	National Importance	Yes
Royal Canal pNHA [002103]	National Importance	Yes
Grand Canal pNHA [002104]	National Importance	Yes
North Dublin Bay pNHA [000206]	National Importance	Yes
South Dublin Bay pNHA [000210]	National Importance	Yes
Dolphins, Dublin Docks pNHA [000201]	National Importance	Yes
Booterstown Marsh pNHA [001205]	National Importance	Yes
Baldoyle Bay pNHA [000199]	National Importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA [001206]	National Importance	Yes
Howth Head pNHA [000202]	National Importance	Yes
Malahide Estuary pNHA [000205]	National Importance	Yes
Ireland's Eye pNHA [000203]	National Importance	Yes
Rogerstown Estuary pNHA [000208]	National Importance	Yes
Portraine Shore pNHA [001215]	National Importance	Yes
Lambay Island pNHA [000204]	National Importance	Yes
The Murrough pNHA [004186]	National Importance	Yes
Sluice River Marsh [001763]	National Importance	Yes
Boyne Coast and Estuary pNHA [001957]	National Importance	Yes
Loughshinny Coast pNHA [002000]	National Importance	Yes
Knock Lake pNHA [001203]	National Importance	Yes
Boyne River Islands pNHA [001862]	National Importance	Yes
Rockabill Island pNHA [000207]	National Importance	Yes
Dundalk Bay pNHA [004026]	National Importance	Yes
Laytown Dunes/Nanny Estuary pNHA [000554]	National Importance	Yes
All other NHA/pNHA sites	National Importance	No – beyond ZoI

Ecological Receptor	Ecological Valuation	KER?
Habitats		
Other Artificial Lakes and Ponds (FL8)	Local Importance (Lower Value)	No
Reed and large sedge swamps (FS1)	Local Importance (Higher Value)	Yes
Tall-herb swamps (FS2)	Local Importance (Higher Value)	Yes
Depositing/Lowland Rivers (FW2)	Local Importance (Higher Value)	Yes
Dry calcareous and neutral grassland (GS1)	Local Importance (Higher Value)	Yes
Dry meadows and grassy verges (GS2)	Local Importance (Lower Value)	No
Dry-humid acid grassland (GS3)	Local Importance (Lower Value)	No
Wet grassland (GS4)	Local Importance (Lower Value)	No
Hedgerows (WL1)	Local Importance (Higher Value)	Yes
Treelines (WL2)	Local Importance (Higher Value)	Yes
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Yes
Mixed broadleaved/conifer woodland (WD2)	Local Importance (Higher Value)	Yes
(Mixed) conifer woodland (WD3)	Local Importance (Lower Value)	No
Scattered trees and parkland (WD5)	Local Importance (Higher Value)	No
Scrub (WS1)	Local Importance (Higher Value	Yes
Ornamental/non-native shrub (WS3)	Local Importance (Lower Value)	No
Spoil and bare ground (ED2)	Local Importance (Lower Value)	No
Recolonising vegetation (ED3)	Local Importance (Lower Value)	No
Shingle and gravel banks (CB1)	National Importance	Yes
Lower salt marsh (CM1)	International Importance	Yes
Upper salt marsh (CM2)	International Importance	Yes
Tidal rivers (CW2)	County Importance	Yes
Embryonic dunes (CD1)	International Importance	Yes
Fixed dunes (CD3)	International Importance	Yes
Sea walls, piers and jetties (CC1)	Local Importance (Lower Value)	Yes
Shingle and gravel shores (LS1)	International Importance	Yes
Sand shores (LS2)	International Importance	Yes
Estuaries (MW4)	International Importance	Yes
Flora Species		
Flora Species listed on the Flora Protection Order	Local Importance (Higher Value)	Yes

Ecological Receptor	Ecological Valuation	KER?
Flora Species on Irelands Red Lists (Least concern)	Local Importance (Higher Value)	No
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 (non-SAC populations)	County Importance	Yes
Marine Mammals (Non-SAC population species)	County Importance	Yes
Other mammal species protected under the Wildlife Acts	Local Importance (Higher Value)	Yes
All other Red listed bird species (non-SCI breeding populations)	County Importance	Yes
All other Amber listed bird species (non-SCI breeding populations)	County Importance	Yes
Any other Green listed bird species (non-SCI breeding populations)	Local Importance (Higher Value)	Yes
All other wintering bird species (non-SCI)	Local Importance (Higher Value)	Yes
Reptiles	Local Importance (Higher Value)	Yes
Amphibians	Local Importance (Higher Value)	Yes
Atlantic salmon (non-SAC population)	International Importance	Yes
Lamprey species (non-SAC population)	National Importance	Yes
All other fish species	Local Importance (Higher Value)	Yes

8.6 Characteristics of the Proposed Development

A detailed description of the Proposed Development and construction activities are provided in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction Strategy) of this EIAR. The main characteristics of the Proposed Development of relevance to the ecological assessment are outlined under the Construction and Operational Phases in sections below.

8.6.1.1 Construction Phase

The majority of the Proposed Development and interventions are expected to be carried out within the existing railway corridor boundary. Some works and interventions, however, will be required outside of the existing railway boundary for project elements such as:

- Bridge modifications/improvements to facilitate extended electrification;
- Construction of substations (to facilitate the provision of power to the line); and
- Use of land for temporary construction/storage compounds.

The key infrastructural components of the DART+ Coastal North Project include:

- Extension of existing 1500V DC electrification, which currently terminates at Malahide, as far as Drogheda MacBride Station (approximately 37km). This includes;
    - The installation of foundations, masts, and overhead wires to supply power to the railway;
    - Undertaking upgrades to existing signalling, telecoms, and power supplies to support the planned increase in train services, including the introduction of new electrical substations at key locations alongside the railway line:
        - Drogheda;
        - Bettystown;
        - Gormanston;
        - Balbriggan;
        - Skerries North;
        - Skerries South;
        - Rush & Lusk (this location also incorporates an overhead line equipment (OHLE) maintenance compound); and
        - Donabate.
    - Undertaking improvements / modifications to bridges spanning the railway arising from track reconfigurations and / or meeting required electrical clearances;
    - Undertaking localised bridge modifications to enable OHLE to be fixed to bridges carrying the railway;
    - Canopy modifications at Drogheda MacBride Station to accommodate OHLE clearances; and
    - Modified railway boundary fences to protect the public from contacting the overhead line.
- Infrastructure works to facilitate the increase in service frequency and capacity, in specific areas of intervention as outlined below.
    - works around Howth Junction & Donaghmede Station;
    - works around Clongriffin Station;
    - works around Malahide Station & Viaduct;
    - works to the existing user worked level crossing (XB001) south of Donabate; and
    - works around Drogheda MacBride Station.
- Modifications to existing depots at Drogheda and Fairview to support the new train fleet, including the provision of additional train stabling at Drogheda;
- Ancillary civils, utility diversions, drainage, and power work to cater for the changes.

For the purposes of describing the DART+ Coastal North project in this Railway Order application the Proposed Development has been divided into 5 geographical zones (A-E) from south to north.

The five geographical zones are described using the local authority boundaries. As Fingal County Council covers a large area of the Proposed Development this has been spilt into two zones. The zones are described in Chapter 4 (Description of the Proposed Development) in Volume 2 of this EIAR. Below is a detailed description of key interventions which are of particular importance from a biodiversity perspective.

8.6.1.2 Structural Works

Works are proposed at 21 overbridges (OBB) across the Proposed Development. Overbridge modifications fall into two categories:

- Major: for example, demolition and reconstruction, or deck replacement; and
- Minor: for example, minimal parapet modifications.

Only four overbridges require major work, with three of these effectively forming one elongated bridge OBB80/80A/80B (at Railway Terrace/McGrath's Lane, just south of Drogheda) and the other also in Drogheda, OBB81, the pedestrian footbridge within Drogheda MacBride Station. Minor works are proposed at 16 overbridges, involving parapet modification works. It is also proposed to locally lower the track at four locations, namely; OBB39, OBB44, OBB55 and OBB78.OBB44 is the only track lowering location that does not also require parapet modification.

Most of the underbridges along the route of the Proposed Development remain unaffected by the proposed works. However, there are several viaducts whose length is such that the OHLE cannot cross them unsupported. These viaducts must be modified to provide supports for new OHLE gantries. In addition to these viaducts, the underbridge that carries the Navan branch line over the Dublin Road at Drogheda (UBK01) must be widened to create an additional platform in this location. The works at the Viaducts across the Proposed Development are included below in more detail due to the constraints on biodiversity that works in these locations could potentially impact.

8.6.1.2.1 Malahide Viaduct

The recently reconstructed (2009) superstructure at Spans 4 and 5 comprises prestressed concrete beams with a cast *in-situ* deck slab and reinforced concrete edge beams supporting the bridge parapet. It is proposed to utilise the existing parapet connection at the location of Pier 3 to support the OHLE masts. Additional anchor bolts will be installed in the edge beam to support the OHLE post and transfer the load into the supporting deck slab and beams.

The OHLE post will align with the centre of the existing parapets. Hence, it is proposed to modify the existing parapet at the location of the OHLE post by stopping it short to align with the post either side.

The proposed construction sequence for either side of the pier is:

1. Cut back the existing pedestrian guardrail and finish off with new vertical;
2. Cut back the existing hold-down bolts and make good;
3. Drill and grout in new anchor bars;
4. Install OHLE post.

It is planned that these works will be undertaken over the course of a weekend possession, for each gantry. The gantries would then be erected during non-disruptive possessions as part of the wider OHLE gantry erection works.

8.6.1.2.2 Rogerstown Viaduct

The existing masonry wingwalls will be demolished down to slab formation level and rebuilt with reinforced concrete walls which will be connected to the existing wingwall substructure using dowel bars drilled to a depth of 2 m vertically into the wingwalls below and grouted in place. An exposed concrete corbel will support the post locally with the remainder of the proposed reinforced concrete wall clad with stone to match the existing structure.

A review of records from IÉ and utility providers identifies that several power and communications services are carried by the bridge. It is proposed to temporarily move the services (given sufficient slack) and then reposition them adjacent to the reconstructed wingwall.

The construction sequence for each support will be as follows:

1. Existing wingwall stone parapet demolished and ballast excavated locally to facilitate access.
2. Existing services temporarily diverted to facilitate construction.
3. Existing wingwall substructure demolished to slab formation level.
4. Vertical anchor bars drilled and grouted into existing wingwall substructure.
5. Proposed RC OHLE support wall poured with drilled bars anchored within proposed RC slab.
6. Waterproofing applied to substructure and ballast reinstated.
7. Install OHLE post.
8. Existing services reinstated following works.

It is planned that these works will be undertaken over the course of one weekend possession for each gantry foundation. The gantries would then be erected during non-disruptive possessions as part of the wider OHLE gantry erection works.

8.6.1.2.3 Balbriggan Viaduct

Balbriggan Viaduct is an eleven-span masonry arch viaduct over the River Bracken and several roads in the town of Balbriggan. The spans are of equal length (~11m) with a total bridge span of approximately 125m. The bridge was originally constructed in 1843-1844 as an arch limestone viaduct with timber walkways for pedestrians. The bridge was renovated in *c*.1990 and again in 2002 with the pedestrian walkways replaced by precast concrete spans with steel pedestrian guardrails.

Due to the length of the bridge, at least two masts are required to be supported on the viaduct. The proposal considers placing the masts at the 3rd and 8th pier locations, resulting in a 55m span between masts when viewed in elevation. The proposed design involves siting the OHLE posts on a replacement wider section of the pedestrian walkways to either side of the tracks on the viaduct outside the existing fence line.

The proposed solution involves attaching the OHLE posts to the pedestrian walkway outside the existing railway fence line. This requires the pedestrian walkway to be locally widened to provide adequate passage around the OHLE masts at the location of Piers 3 and 8. It is proposed to replace the existing pedestrian walkway spans at these locations with a new precast concrete section, similar to the existing.

8.6.1.2.4 Laytown Viaduct.

Laytown Viaduct is a 74m long viaduct over the River Nanny. The structure comprises five spans, with side spans measuring 9.5m long and central spans at 18.3m long. A separate pedestrian footbridge runs parallel to the viaduct.

The viaduct has four piers along its length with two new OHLE proposed gantries being installed on piers A and D. The piers comprise wrought iron cylinders filled with concrete and braced with plate girders. The existing beams are wrought iron girders with some elements replaced by steel elements in recent years.

New structural steel supports for the OHLE gantries will be fixed onto the existing piers.

The following construction sequence is envisaged:

1. Scaffolding is installed at both pier locations to facilitate the works.
2. The existing guardrail and end plate supports would be removed from the refuge area.
3. New connection plates added to existing transverse beams and piers.
4. The proposed OHLE structure will be assembled in parts (brought in by road or lowered from the track above).
5. Reinstate parapets (modified to suit).
6. Dismantle access scaffold.

Full details of the main structural works that form the Proposed Development can be found in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction Strategy) of this EIAR.

8.6.1.2.5 Malahide Station area proposed track works (Malahide Turnback)

Malahide Station is located on the Dublin to Belfast Line at approximate mileage 9 miles from Dublin Connolly (approximate chainage 15+650 to 15+880). The station consists of two platforms: Platform 1 on the Up Main line and Platform 2 on the Down Main line. North of Malahide Station is the Malahide Estuary which includes European sites with protections for biodiversity. The railway crosses the estuary by way of a southern and northern causeway, connected by Malahide Viaduct (UBB30) which is a protected structure.

The proposal is for construction of a new turnback facility north of the station, required to improve operational flexibility and support an increase in the frequency of train services.

The works will introduce a new pocket track between the Up and Down Line located along the southern causeway, in the area between the Strand Road underbridge (UBB29) and the Malahide Viaduct (UBB30). To facilitate the new turnback line the existing corridor needs to be widened to the west above the existing embankment. The works will include the construction of a new modular reinforced earth wall, and a modified earthworks embankment alongside the proposed Broadmeadow Way greenway. The existing OHLE and signalling systems will be modified with the installation of new OHLE and signalling assets beginning just south of the viaduct.

Construction plant for these operations will include excavators, dump trucks, rollers (compactors) and a variety of heavy goods vehicles (HGVs) including tipper trucks, low loaders, and concrete wagons. Additionally, there is the potential for soil nailing equipment, drilling rig, grout pump and mixers if further stabilisation measures are identified.

The construction works will impact on the Broadmeadow Way greenway (if in place prior to the commencement of construction) with the full width of the greenway being reduced for the duration of construction.

Working space will vary along the wall but will be kept to the minimum to ensure a minimum 3m width of greenway is maintained to reduce the impact on the newly constructed greenway. Phasing of the work in small sections will also be used to limit the impact to the greenway and the existing embankment. The phasing and reduced width sections will continue over the full construction duration.

Access to the work front for the wall will only be available from the south direction for operations and suitable traffic management plans are to be in place to be most efficient. Key activities will include using an excavator to remove rock armour and excavate into the existing embankment, loading tipper trucks to remove rock armour, unloading low loader trucks with wall elements and geotextiles, and discharging concrete wagons, as well as then ultimately placing the earthworks and topsoil backfill material and access equipment to install the fence. If soil nailing is required, these operations will be carried out during daytime hours only.

Presently OHLE extends along where the turnback is planned to be built but ceases close to its northern end. To ease the management of track possessions in the area, the staging and temporary reduction of the existing OHLE just north of Malahide Station will need to be agreed by the Contractor with IÉ and checked against operational requirements and timetabling.

Full details of the main structural works that form the Proposed Development can be found in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction Strategy) of this EIAR.

8.6.1.3 Drainage Infrastructure

New sections of track drainage will be provided as required in areas of proposed works along the route. The drainage design has been developed to meet project requirements in relation to trackside areas and areas located adjacent to the railway corridor. These areas will typically be in areas of new low points on the alignment, where retaining structures are to be constructed, and at stations and depots.

Non-lineside drainage will comprise the surface water drainage affecting the new platform and substation buildings, new hardstanding areas and other retaining structures. This will also include any foul drainage which may be required. This drainage and associated outflows will be managed with the use of attenuation structures and infiltration measures to ensure that the existing drainage network or watercourses are not adversely affected at times of peak flow.

8.6.1.4 Utility Diversions

Existing 3rd party utilities such as water mains, electricity cables, telecommunication cables and gas mains, both underground and above ground, will require diversion to accommodate the Proposed Development. These diversions will typically involve:

- Relocating existing services along new routes to make space for the new infrastructure;
- Diversion of all existing overhead power line crossings, either over bridge crossings where possible, otherwise through underground track crossing (UTX) to mitigate the

maintenance and operational risk associated with working on or near overhead power lines; and

- Diversion of all existing parallel overhead power lines that fall within the risk zone identified for the new railway electrification infrastructure to mitigate the maintenance and operational risk associated with working on or near overhead power lines.

An assessment of the HV electrical infrastructure has been completed to identify the significant main supplies which are impacted, and which will need re-routing, in most cases underground.

8.6.1.5 Lighting

There are no plans to provide any additional lighting beyond that listed below, around the buildings and in the depot/stabling areas.

8.6.1.5.1 Substations

External Security lighting is to be utilised using the following:

- Use of LED technology.
- Light level in accordance with the minimum requirements applicable to the outdoor access path to the new traction substations.
- Lighting fixtures: ≥ IP56.
- Protection against vandalism as per EN 12464-2.
- Average lux levels are likely to be 15 lux and min of 5 lux

Flood lighting Photocell and Passive Infrared (PIR) sensors will be mounted on buildings to illuminate area in front of entrance during darkness in presence of IE and ESBN staff.

8.6.1.5.2 New signalling equipment buildings (SEB)/ telecommunication equipment rooms (TER) compound lighting

Similar to the substations above, located at:

- Drogheda Station;
- Malahide Station;
- Clongriffin Station; and
- Howth Junction.

8.6.1.5.3 Platforms/Walkways

Drogheda station platform 4 and Clongriffin station platform 0:

- Lighting improvements to bring lux levels up to minimum required by TSI PRM (DECISION 2008/164/EC concerning the technical specification of interoperability relating to persons with reduced mobility in the trans-European conventional and high-speed rail system). Average 20 lux at floor level with 10 lux minimum.

Drogheda Depot:

- There can also be expected to be additional low-level lighting in the Drogheda depot area to improve walkway safety with average 15 lux.

- new low level bollard lighting will be installed between roads. The bollard lighting shall be of LED type and shall be of a fixed colour: cool white, with 720 lumen per meter, 10 watt per stripe typically 5 m and with a LED live warranty of min 50,000 hours.

Malahide turnback:

- Between tracks low level lighting with average of 15 lux on drivers walkway length about 150m.

Fairview Lighting:

- The lighting requirements for Fairview will consist of external low-level lighting for maintenance activities and/or for the driver platforms.

8.6.1.6 Construction Compounds

Construction Compounds are temporary facilities that support the construction of different elements of the project. Some will focus on line-wide works spread along the railway, such as trackwork, overhead electrical cables (OHLE) and signalling, whilst others will support more isolated works such as new substations and bridge works. Some compounds will support both isolated and line-wide works. A list of all Construction Compounds is provided in Table 8-20.

Initial site clearance and establishment activities for the Construction Compounds will typically include:

- Forming the site entrances and exits adjoining public roads;
- Clearing the site as required;
- Installing the site hoarding and gates to ensure that the site is secure;
- Installing general site lighting;
- Carrying out any necessary levelling;
- Stripping topsoil and forming any construction access routes that may be required;
- Laying down areas of hardstanding for material storage;
- Performing all the necessary connections to mains water, sewerage, power, and communications;
- Provision of bunded refuelling areas;
- Installing the site office and welfare facilities;
- Installing site security facilities, goods received checking area, unloading, and loading areas and wheel-washing facilities;
- Establishing segregated pedestrian and vehicle routes to the working areas with clear, designated crossing points and establishing areas for materials and waste storage;
- Establishing power and water distribution and wastewater collection; and
- Forming any Heavy Goods Vehicle (HGV) holding area that may be required for each site.

The activities that will take place on these sites, during the construction phase include:

- Material unloading, storage and loading;
- Erection of prefabricated sections for construction;
- Use of welfare and on-site office space;
- Personnel and machinery access to the railway;
- Parking space for personnel and work vehicles;

- Refuelling of construction plant and vehicles;
- Lifting of material/precast elements, especially in the compounds corresponding to modification of existing overbridges, construction of new bridges and erection of buildings;
- Assembling of catenary cantilevers (the cantilevers consist of metallic bars that are connected by bolts);
- Heavy Goods Vehicles (HGV) and usual construction machinery movement;
- Staff vehicles movement;
- Installation and maintenance of dedicated track access points for Road-Rail Vehicles (RRV); and
- Construction traffic on the access routes for the material/equipment supply by HGV.

Each Construction Compound will require to remain operational for the duration of the works with which it is associated. This is dictated by the construction programme and varies for each compound, ranging from several months (in the case of the overbridge modifications) to three years (for instance, those servicing line wide works).

Construction Compounds will often be set up to be operational 24 hours per day, 7 days per week, especially where they are supporting works to be undertaken during track possessions. For much of this time construction plant and materials will be delivered, marshalled, and delivered along the project, with both road and rail vehicles involved. Temporary lighting will be installed to facilitate works during hours of darkness, and new utility connections may be required to service the compounds. Where activities are happening at compounds outside core working hours these will be coordinated with the local authorities and in consultation with the local community.

Construction Compound locations have been selected, based on where most space is available in close proximity to the majority of the proposed major works and with access to the National and Regional Road network. The Construction Compounds are briefly described below in Table 8-20.

Construction Compound locations have been selected based on where most space is available in close proximity to the majority of the Proposed Development major works and with access to the National and Regional Road network. The proposed Construction Compounds are briefly described below in Table 8-20 and will be located at the following sites:

Table 8-20 List of Construction Compounds

Code	Zone	Location	Primary Discipline	Chainage	Within IÉ property?
CC-2650	A	Fairview Depot South (R834 Entrance car park)	Station	2,650	Yes
CC-2700	A	Fairview Depot Centre (R834 Entrance car park)	Station	2,700	Yes
CC-3000	A	Fairview Depot North (R807 Entrance car park)	Station	3,000	Yes
CC-9000	B	Howth Junction and Donaghmede Station (Donaghmede Entrance)	Station	9,000	No

Code	Zone	Location	Primary Discipline	Chainage	Within IÉ property?
CC-9050	B	Howth Junction and Donaghmede Station (Kilbarrack Entrance)	Station	9,050	No
CC-9100	B	Howth Junction and Donaghmede Station (Central Access)	Station	9,100	Yes
CC-9200	B	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate)	Station	9,200	No
CC-10600	B	Clongriffin Station	Permanent Way	10,600	No
CC-15900E	B	Malahide Turnback (Strand Court)	Permanent Way	15,900	No
CC-15900W	B	Malahide Turnback (Bissett's Strand)	Permanent Way	15,900	No
CC-16100	B	Malahide Turnback (Caves Strand)	Permanent Way	16,100	No
CC-16250	B	Malahide Turnback (Marina Car Park)	Permanent Way	16,250	No
CC-16400	B	UBB30 Malahide Viaduct	Structures	16,400	No
CC-18800	C	Donabate Substation	Substation & SET line-wide works	18,800	No
CC-19800	C	Donabate Station	SET line-wide works	19,800	Yes
CC-23500	C	Rush and Lusk Station	Substation & SET line-wide works	23,500	No
CC-23772 I	C	Rush & Lusk	Utility Diversions	23,772	No
CC-23772 (W)	C	Rush & Lusk	Utility Diversions	23,772	No
CC-25626 (E)	C	Tyrrelstown	Utility Diversions	25,626	No
CC-25626 (W)	C	Tyrrelstown	Utility Diversions	25,626	No
CC-27460 (E)	C	Baldongan	Utility Diversions	27,460	No
CC-27460 (W)	C	Baldongan	Utility Diversions	27,460	No
CC-29000	C	Skerries South Substation	Substation	29,000	No
CC-29140 (E)	C	Golf Links Road	Utility Diversions	29,140	No
CC-29140 (W)	C	Golf Links Road	Utility Diversions	29,140	No
CC-30200	C	Skerries Station	Permanent Way & SET line-wide works	30,200	Yes
CC-31100	C	Skerries	SET local works	31,100	No
CC-32200	C	Skerries North Substation	Substation	32,200	No
CC-34400 (E)	C	Balbriggan	Utility Diversions	34,400	No
CC-34400 (W)	C	Balbriggan	Utility Diversions	34,400	No

Code	Zone	Location	Primary Discipline	Chainage	Within IÉ property?
CC-36000	C	UBB56 Balbriggan Viaduct	Structures	36,000	No
CC-37700	C	Balbriggan Substation	Substation & SET line-wide works	37,700	No
CC-39800 (E)	D	Gormanston Station	Utility Diversions	39800	No
CC-39800 (W)	D	Gormanston Station	Utility Diversions	39800	No
CC-40200	D	Gormanston Station	Permanent Way & SET line-wide works	40,200	No
CC-41400	D	Gormanston Substation	Substation	41,400	No
CC-44390 (E)	D	Laytown	Utility Diversions	44,390	No
CC-44390 (W)	D	Laytown	Utility Diversions	44,390	No
CC-44500	D	UBB72 Laytown Viaduct (South Abutment)	Structures	44,500	No
CC-44600	D	UBB72 Laytown Viaduct (South Pier)	Structures	44,600	No
CC-44700	D	UBB72 Laytown Viaduct (North Pier)	Structures	44,700	No
CC-44900	D	Laytown Station	SET line-wide works	44,900	No
CC-44920 (E)	D	Laytown	Utility Diversions	44,920	No
CC-46900	D	Bettystown Substation	Substation	46,900	No
CC-49600	D	OBB78 Track Lowering	Permanent Way	49,600	No
CC-50270 (S)	D	Drogheda	Utility Diversions	50,270	No
CC-50270 (N)	D	Drogheda	Utility Diversions	50,270	No
CC-51700 (S)	D	Drogheda	Utility Diversions	51,700	No
CC-51800	E	OBB80 (North)	Structures & SET line-wide works	51,800	No
CC-51900	E	OBB80 (South)	Structures	51,900	Yes
CC-52050	E	Drogheda Substation	Substation	52,050	No
CC-52250	E	Drogheda Station	Station	52,250	Yes
CC-52200	E	UBK01 Dublin Road Overbridge (Car Park)	Structures	52,200	Yes

Full details of the proposed Construction Compounds including siting and layout are provided in Chapter 5 (Construction Strategy) in Volume 2 of this EIAR.

8.6.1.7 Estimated Project Duration

The Construction Phase of the Proposed Development will be approximately 36 months in duration. The construction programme has been developed considering efficiency of works and to reduce the

potential for environmental impacts. The approximate duration of the main activities are listed in Chapter 5 (Construction Strategy) in Volume 2 of this EIAR, and will be ongoing concurrently.

8.6.1.8 Construction Working Hours

A key consideration in the design of the construction strategy and programme is the requirement to reduce the impact during construction, on the operation of the railway line and hence, to maintain rail services for passengers. The construction works range from those that are located outside of the railway boundary (thus, having no impact or minimal impact on train operations) to those that will require a temporary closure of a section of railway line normally during night-time or weekend possessions to allow construction to proceed and to limit the impact on rail services.

The general construction hours proposed for the project, particularly for works away from the immediate vicinity of the railway line (these typically needing track closures) are:

- Monday to Friday 07:00 to 19:00 (12 hours);
- Saturday 08:00 to 14:00 (6 hours); and
- Sunday - only when agreed in advance with the local authority and IÉ.

Where required, track possession times will vary across the rail corridor. The times listed below are indicative and are likely to be utilised to a greater or lesser degree depending on likely disruption of railway operations. Non-disruptive track possessions are those possessions which occur outside of the general operational timetable for the railway line, whereas disruptive possessions refer to those track possessions where normal railway operations are disrupted.

Any proposed track possession periods would be finalised when detailed design and detailed construction planning is undertaken. For the purposes of the Railway Order application a reasonable worst case scenario has been assumed here and for the assessments undertaken in this EIAR. In general, night-time possessions will be utilised, but it is anticipated that a number of daytime and weekend possessions will also be required, to accommodate the construction works. These possessions will be planned with other railway works and peak railway user demand periods in mind. Specific possession hours would be advised nearer the start of construction however, possible types of track possessions are noted in Table 8-21.

Table 8-21 Possession Types and Durations

Possession Type	Duration / Timings
Non-disruptive Weekday night	4 hours / 01:00 to 05:00
Non-disruptive Saturday night	6 hours / 01:00 to 07:00
Disruptive Extended Saturday night	10-12 hours
Disruptive Long Weekend (October and Easter)	3-4 days, twice per year
Disruptive Full weekend (anticipated rarely)	52 hours / Saturday morning at 01:00 to Monday morning at 05:00
Disruptive Bank Holiday weekend (anticipated rarely except October and Easter)	72-76 hours / for example Saturday morning at 01:00 to Tuesday morning at 05:00
Disruptive Single Line working at weekends (anticipated rarely).	This may be feasible in specific locations, especially at Malahide, where design and logistics allow.

There are a number of temporary Construction Compounds identified for the Proposed Development (Table 8.21). Given that some works need to be undertaken when the railway is closed to train services, these Construction Compounds will often need to be active at night and at weekends. At these times, contractors would be marshalling construction plant and materials via the Construction Compounds, involving both road and rail vehicles. Many deliveries to the compounds can be made during daytime hours, to reduce disturbance at night for the local community and this will be planned and implemented wherever possible during the construction works. Wherever practicable, measures will be taken to minimise impacts in the vicinity of Construction Compounds during night-time works. For example, where night-time concrete operations are required, a contractor might obtain their concrete from a local concrete batching plant, or batch it themselves, drive it to a trackside compound, transfer the wet concrete to a suitable vehicle (e.g., RRV dumper) and then transport it along the railway.

8.7 Do Nothing Scenario

In this EIAR, the 'evolution of the baseline without the Proposed Development' is described as the 'Do Nothing' scenario. Under this 'Do Nothing' scenario, the lands within the ZoI of the Proposed Development would continue to be maintained as they currently are and as such their current state would persist. The existing corridors would remain with no immediate significant changes to the terrestrial, aquatic and marine biodiversity (flora and fauna) of the area, as there would be no construction impacts from the Proposed Development. This would therefore result in a neutral effect on biodiversity along and adjacent to the Proposed Development.

The interaction between the existing trends, future trends, and other plans or projects with the Proposed Development are considered and assessed further in Chapter 25 (Interactions) and Chapter 26 (Cumulative Effects).

The baseline receiving environment (see Section 8.4) describes the existing land use within and surrounding the Proposed Development. The Greater Dublin Area is highly urbanised with existing trends resulting in added pressure to water resources and habitats due to ongoing development. Due to the absence of a robust historical baseline for fauna species in the study area, it is not possible to establish accurate existing and future trends for fauna species at a local level; however, it is considered likely that the changes in habitats associated with existing and future trends have impacted fauna biodiversity and distributions locally and will continue to do so. The full extent of the Proposed Development will pass through lands zoned under the Dublin City Development Plan 2022 – 2028, Fingal Development Plan 2023 – 2029, Meath County Development Plan 2021 – 2027, and the Louth County Development Plan 2021 - 2027. The current land use zonings provide an indication of what the future short to medium-term biodiversity trends may be as they influence and enable direct development in the surrounding area. Lands within the railway corridor will continue to be used for the existing railway line between Connolly and Drogheda. The lands adjacent and surrounding the Proposed Development in Dublin City Council are largely zoned for residential, commercial, or industrial purposes. The lands adjacent and surrounding the Proposed Development in Fingal County Council are zoned for residential, green belt, amenity, rural and commercial purposes. The lands adjacent and surrounding the Proposed Development in Meath County Council and Louth County Council are zoned for urban, rural and residential development. Current biodiversity trends are likely to continue in areas zoned for development, adding to existing pressures on waterbodies and habitats.

It is also assumed that diesel powered trains will continue on the existing railway line which contains a varying degree of adequate drainage control or pollution control measures. This in turn may have effects on the biodiversity receptors of the baseline environment.

However, any such effects on biodiversity are likely to be moderated to some degree by the environmental protective policies and objectives contained in the Dublin City Development Plan 2022 – 2028, the Fingal Development Plan 2023 – 2029, the Meath County Development Plan 2021 – 2027, and the Louth County Development Plan 2021 – 2027, and overarching pollution control objectives in the River Basin Management Plan 2018 – 2021 (RBMP) (DoHPLG 2018).

8.8 Description of Potential Impacts (Unmitigated)

The following Section presents the assessment of potential impacts on biodiversity within the ZoI of the Proposed Development. As outlined in Section 8.3.6, this is focused on the KERs identified in Section 8.4.

8.8.1 Construction Phase

8.8.1.1 Designated Areas of Nature Conservation

This Section describes and assesses the potential for the Proposed Development 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 NIS prepared for the Proposed Development (and submitted with the Railway Order application). 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 Development would adversely affect the integrity of a European site, then this would constitute a likely significant effect in the context of the EIA Directive.

8.8.1.1.1 European sites

In the context of assessing whether the Proposed Development is likely to result in an impact on the integrity of any European sites, the NIS considers whether the Proposed Development will affect the conservation objectives supporting the favourable conservation condition of any European site's 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 Development would adversely affect the integrity of a European site), as this would constitute a likely significant effect in the context of the EIA Directive.

In view of best scientific knowledge and in view of conservation objectives, the nature and scale of the Proposed Development, and 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 Development, and therefore potentially at risk of the Proposed Development affecting their conservation objectives. The potential impacts associated with the Proposed Development are discussed below in relation to those European sites within its ZoI (further information can also be found in Section 5.1 and Section 6 of the NIS).

The ZoI is a distance within which the Proposed Development 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 Development;
- 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 Development was assessed as having the potential to adversely affect the integrity of the following European sites:

- Malahide Estuary SAC [000205]
- Rogerstown Estuary SAC [000208]
- River Boyne and River Blackwater SAC [002299]
- Baldoyle Bay SAC [000199]
- Boyne Coast and Estuary SAC [001957]
- Rockabill to Dalkey Island SAC [003000]
- Lambay Island SAC [000204]
- North Dublin Bay SAC [000206]
- South Dublin Bay SAC [000210]
- Rockabill to Dalkey Island SAC [003000]
- Codling Fault Zone SAC [003015]
- River Nanny Estuary and Shore SPA [004158]
- Boyne Estuary SPA [004080]
- River Boyne and River Blackwater SPA [004232]
- South Dublin Bay and River Tolka Estuary SPA [004024]
- Howth Head Coast SPA [004113]
- North Bull Island SPA [004006]
- Baldoyle Bay SPA [004016]
- Dalkey Island SPA [004172]
- Malahide Estuary SPA [004025]
- Rogerstown Estuary SPA [004015]
- Dundalk Bay SPA [004026]
- Skerries Islands SPA [004122]
- Ireland's Eye SPA [004117]
- Lambay Island SPA [004069]
- Rockabill SPA [004014]
- The Murrough SPA [004186]
- North-West Irish Sea SPA [004236]
- Seas Off Wexford SPA [003237]
- Saltee Islands SPA [004002]
- Wicklow Head SPA [004127]

The locations of these European sites, relative to the Proposed Development, are shown on Figure A8.1 in Volume 3A of this EIAR.

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

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

Habitat loss and fragmentation, and habitat degradation as a result of hydrogeological impacts were scoped out from further assessment at the Stage 1 AA Screening stage as confirmed in the Stage Two NIS. All European sites with groundwater dependent habitats and species in the same groundwater body as the Proposed Development (i.e., North Dublin Bay SAC and River Boyne and River Blackwater SAC), are upstream of the Proposed Development, and therefore the Proposed Development cannot influence groundwater conditions in these European sites. Whilst there will be habitat loss for wintering bird species in the vicinity of the Proposed Development for Construction Compound and substation locations, the combined loss of these sites, is not considered significant, and will not affect the conservation objectives of any European site, as discussed in Section 6.1 of the NIS.

Habitat degradation / effects on QI / SCI species as a result of hydrological impacts;

Surface water run-off and discharges from the Proposed Development will drain to the existing local surface water drainage network. In the case of works located in the Liffey and Dublin Bay Catchment, *i.e.* works south of Malahide Viaduct, works will drain overland or via groundwater to the closest surface water feature, from where waters will be conveyed downstream to Malahide Estuary, ultimately entering the Irish Sea. In the case of works located in the Nanny-Delvin Catchment, *i.e.* works north of the Malahide Viaduct, works will drain overland or via groundwater to the closest surface water feature, from where waters will be conveyed downstream, and ultimately discharge into the Irish Sea via the Rogerstown, Malahide or River Nanny Estuaries, ultimately discharging into the Irish Sea via the nearest surface water feature. In the case of works located in the Boyne Catchment i.e. works around Drogheda and surrounds, works will drain overland or via groundwater to the closest surface water feature, from where waters will be conveyed downstream, and ultimately discharge into the Irish Sea via the Boyne Estuary. The potential Zone of Influence of potential effects on water quality from the Proposed Development could extend downstream of the study area, via the local surface water network.

Due to the close proximity of surface water features to the Proposed Development, 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, and in the absence of mitigation could undermine the conservation objectives of the European sites in Dublin Bay, Baldoyle Bay, Malahide Estuary, Rogerstown Estuary, River Nanny Estuary, and Boyne Estuary transitional waterbodies and the Irish Sea.

Such an occurrence, of a sufficient magnitude, either alone or in combination with other pressures on water quality, and in the absence of mitigation could undermine the conservation objectives of the European sites in Dublin Bay, Baldoyle Bay, Malahide Estuary, Lambay Island SAC, Rogerstown Estuary, River Nanny Estuary, and Boyne Estuary transitional waterbodies and the Irish Sea i.e., River Boyne and River Blackwater SAC, Boyne Estuary SPA, Boyne Coast and Estuary SAC, River Nanny Estuary and Shore SPA, River Boyne and River Blackwater SPA, Baldoyle Bay SAC, Baldoyle Bay SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SAC, Malahide Estuary SPA, the North-West Irish Sea SPA, North Bull Island SPA, North Dublin Bay SAC, Rockabill SPA, Rockabill to Dalkey Island SAC, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC and Codling Fault Zone SAC. In addition, impacts on water quality if of a sufficient magnitude and duration, could negatively affect the SCI populations for which SPAs are designated by affecting their foraging resources.

As birds are mobile species, it is possible that wintering birds occurring in Dublin Bay, Baldoyle Bay, Rogerstown, Malahide, Nanny, Boyne Estuaries are not limited to these sites. Despite the distance, the recent guidance on bird foraging ranges (Woodward *et al*., 2019) suggests that some of the SCI species from other European sites along the eastern coastline may be subject to likely significant effects from the Proposed Development. Some of the SCI species listed in Table 8-22, are also listed as SCIs for other SPAs within the ZoI of the Proposed Development. Others are beyond their normal forage range and thus outside the ZoI of the Proposed Development (See Table 8-22). However, the Proposed Development is within the foraging distance of some. While it is likely that most of these SCI species from the SPA would not be subject to direct impacts arising from the Proposed Development by virtue of location and dispersal potential within coastal waters, indirect impacts arising from Habitat degradation as a result of pollution/contamination of receiving waterbodies, on SCI birds that have mixed with SCI species in closer proximity to the Proposed Development remain. For this reason, populations of SCI bird species of the following SPAs may also fall within the ZoI of effects of hydrological impacts: Dundalk Bay SPA, Dalkey Islands SPA, Murrough SPA, Stabannan-Braganstown SPA, The Murrough SPA, Seas off Wexford SPA, Wicklow Head SPA and the Saltee Islands SPA.

A number of offshore SACs have been updated in March 2024 to include Annex II QI species, harbour porpoise, and common bottlenose dolphin[29]. Some of the European sites in the vicinity of the Proposed Development support harbour porpoise i.e., Lambay Island SAC, Rockabill Island to Dalkey Island SAC, and the Codling Fault Zone SAC, and are included within the assessment of potential hydrological impacts above due to being less then 8km from the boundary of the Proposed Development. It is recognised that cetaceans have very wide foraging and dispersal ranges (Robinson *et at*., 2012), and therefore these QI species from SACs around the entire Irish Coastline and beyond, could overlap with populations in Dublin Bay and the Irish Sea due to wide foraging ranges. However; there will be no works within any watercourse or waterbody associated with the Proposed Development, and by virtue of coastal dilution, only a localised percentage of the marine environment would be impacted temporarily. Furthermore, the Proposed Development will not restrict access to suitable habitat within the species range, result in any disturbance to these species, or affect habitat condition in critical areas used by the species.

[29] https://iwdg.ie/npws-new-protection-measures/

Therefore, European sites supporting cetaceans that are not located off the eastern coastline are unlikely to be impacted by the hydrological impacts from the Proposed Development, and Lambay Island SAC, Rockbill to Dalkey Island SAC, and Codling Fault Zone SAC, are the only European sites that fall within the ZoI of effects of hydrological impacts from the Proposed Development.

The release of contaminated waters (via the groundwater or surface water) and / or a spillage or pollution event during construction, also has the potential to affect QI mammal species that commute or forage within the watercourse. It could also negatively affect the quantity and quality of prey available to QI populations. River lamprey *Lampetra fluviatilis* and salmon *Salmo salar*, also a QI species of the River Boyne and River Blackwater SAC, could also be negatively impacted from a reduction in water quality. A hydrological connection exists between the Proposed Development and the River Boyne and River Blackwater SAC. It is considered possible that otter, river lamprey, and salmon present within the ZoI of the Proposed Development may be connected with the River Boyne and River Blackwater SAC population, and as such these pollution/contamination impacts could occur to such a degree that the conservation objectives of River Boyne and River Blackwater are undermined.

As the Proposed Development has the potential to result in habitat degradation and effects on the QIs/SCIs of European sites as the result of hydrological impacts, there is the potential for in combination effects to occur. All other European sites are not within the ZoI of the Proposed Development, and therefore are not at risk of any hydrological impacts as a result of the Proposed Development.

Table 8-22 Special Conservation Interest for recently published "Seas off Wexford" SPA and Foraging Distances

Special Conservation Interest	Forage Distance (and confidence level)*	Within ZOI of Proposed Development
[A001] Red-throated Diver *Gavia stellata*	9km (low confidence)	No, based on foraging distance
[A009] Fulmar *Fulmarus glacialis*	1200km (good confidence)	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development.
[A013] Manx Shearwater *Puffinus puffinus*	2365.5km (Moderate confidence)	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development.
[A016] Gannet *Morus bassanus*	509.4km (high confidence)	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development.
[A017] Cormorant *Phalacrocorax carbo*	33.9km (moderate confidence)	No, based on foraging distance
[A018] Shag *Phalacrocorax aristotelis*	23.7km (high confidence)	No, based on foraging distance
[A065] Common Scoter *Melanitta nigra*	None given in 2019 guidance and none explicitly quoted in any SPA for which this sea duck is listed as an SCI	Cannot be ruled out that intermixing of foraging ducks in distal coastal SPAs

Special Conservation Interest	Forage Distance (and confidence level)*	Within ZOI of Proposed Development
[A176] Mediterranean Gull *Larus melanocephalus*	20km (Uncertain)	No, based on foraging distance
[A179] Black-headed Gull *Chroicocephalus ridibundus*	18.5km (Uncertain)	No, based on foraging distance
[A183] Lesser Black-backed Gull *Larus fuscus*	236km (High confidence)	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development
[A184] Herring Gull *Larus argentatus*	85.6km (good confidence)	Cannot be ruled out that SCI populations do not travel (edge of forage range within Proposed Development ZOI) and intermix with populations from SPAs within originally identified ZOI of Proposed Development
[A188] Kittiwake Rissa tridactyla	None given in 2019 guidance. However, Saltee Islands SPA Conservation Document notes: Maximum forage range 200km, mean maximum 65.81km and mean as 24.45km	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development
[A191] Sandwich Tern *Sterna sandvicensis*	57.5km (moderate confidence)	No, based on foraging distance
[A192] Roseate Tern *Sterna dougallii*	23.2km (moderate confidence)	No, based on foraging distance
[A193] Common Tern *Sterna hirundo*	26.9km (good confidence)	No, based on foraging distance
[A194] Arctic Tern *Sterna paradisaea*	40.5km (good confidence)	No, based on foraging distance
[A195] Little Tern *Sterna albifrons*	5km (moderate confidence)	No, based on foraging distance
[A199] Guillemot *Uria aalge*	95.2km (highest confidence)	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development
[A200] Razorbill *Alca torda*	122.2km (good confidence)	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development
[A204] Puffin *Fratercula arctica*	265.4km (good confidence)	Cannot be ruled out that SCI populations do not travel and intermix with populations from SPAs within originally identified ZOI of Proposed Development

Habitat degradation as a result of introducing / spreading non-native invasive species

Five non-native invasive plant species, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) (as amended) were present in 11 locations within or in close proximity to the Proposed Development. In addition, records of invasive species in the vicinity of the Proposed Development were returned from the desk study.

Therefore, in the absence of mitigation there is potential for invasive species to spread or be introduced during construction to terrestrial habitat areas in European sites downstream in Dublin Bay (i.e. North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA), Baldoyle Bay (i.e. Baldoyle Bay SAC and Baldoyle Bay SPA), Malahide Estuary (i.e. Malahide Estuary SAC and Malahide Estuary SPA), Rogerstown Estuary (i.e. Rogerstown Estuary SAC and Rogerstown Estuary SPA), Nanny Estuary (i.e. River Nanny Estuary and Shore SPA), and the River Boyne (i.e. River Boyne and River Blackwater SAC, Boyne Coast and Estuary SAC, Boyne Estuary SPA). These in turn may result in the degradation of the existing habitats and therefore undermine the conservation objectives of these European sites. As the Proposed Development has the potential to result in habitat degradation of the QIs / SCIs 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.

Disturbance and displacement impacts.

Construction-related disturbance and displacement of fauna species could potentially occur within the vicinity of the Proposed Development. For mammal species such as otter, disturbance effects would not be expected to extend beyond 150m[30]. Construction-related disturbance and displacement of fauna species could potentially occur within the vicinity of the Proposed Development. For mammal species such as otter, disturbance effects would not be expected to extend beyond 150m[31]. The River Boyne is *c.* 150m from the Proposed Development boundary and therefore just outside the potential disturbance ZoI for otter. The works will be confined to the deck of the Boyne Viaduct south of the River Boyne, and not over the River itself, with the vast majority of works in Drogheda occurring in the existing station area. However, the Stagrennan River, a tributary of the River Boyne) flows under the existing railway line and the Proposed Development, and is within 150m of the River Boyne or its tributaries, and therefore within the potential disturbance ZoI for otter, a QI species of the River Boyne and River Blackwater SAC. Noisy works associated with the Proposed Development could include piling works close to watercourses known to support otter. These potential impacts could occur to such a degree that the conservation objectives of the River Boyne and River Blackwater SAC are undermined. Whilst some works are planned during the day, due to the restrictions with working on an active railway line, works will be required at nighttime.

[30] This is consistent with Transport Infrastructure Ireland (TII) guidance (Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (TII 2006c) and Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes) (TII 2005b) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by surrounding vegetation and buildings, with the actual ZoI of construction related disturbance likely to be much less in reality.

[31] This is consistent with Transport Infrastructure Ireland (TII) guidance (Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (TII 2006c) and Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes) (TII 2005b) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by surrounding vegetation and buildings, with the actual ZoI of construction related disturbance likely to be much less in reality.

An increase in noise levels in close proximity to watercourses used by otter could result in disturbance impacting otter movements. It is predicted that the disturbance could affect the local population over the short term, but that the local otter population could utilise other, unaffected suitable habitat along the watercourse during this temporary period. This is not uncommon among otter who can maintain a number of resting sites within their territory[32]. However; otters could establish holts or resting places in the vicinity of the railway line, and therefore, there is potential for the Proposed Development to result in significant effects (albeit short-term) which could have implications for the conservation objectives of the River Boyne and River Blackwater SAC as a result of disturbance/displacement impacts on otter during construction.For birds, disturbance effects would not be expected to extend beyond a distance of *c.*300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance[33]. There are five European sites within the ZoI of the Proposed Development in relation to disturbance to bird species, namely; Malahide Estuary SPA, Rogerstown Estuary SPA, River Nanny Estuary and Shore SPA, North-West Irish Sea SPA and the South Dublin Bay and River Tolka Estuary SPA, all of which are designated for overwintering bird species.

The Construction Compound locations in Malahide at Caves Strand (CC-16100) and Bissett's Strand (CC-15900W) do not contain suitable wintering bird habitat due to the sward height and lack of management, in the case of Caves Strand, and lack of grassland at Bissett's Strand. Immediately adjacent to the Caves Strand Compound on the eastern side however, there is a short sward amenity grassland that is suitable for brent geese and is a known area of high significance for the species (Scott Cawley Ltd., 2017). Construction noise generated from works within the Compound could disturb foraging and/or roosting brent geese utilising this grassland during the winter months. Four other Construction Compounds/Substation locations were determined to have potential wintering bird habitat, and included Drogheda Substation/Construction Compound, Laytown Construction Compound, Skerries Substation/Construction Compound, and Gormanston Construction Compound. These four Construction Compounds, whilst they contain suitable wintering bird habitat, surveys in these locations determined they are not important foraging and/or roosting sites, as the majority of species were identified flying over the proposed Compound locations. Utility works are proposed in an area south of the Laytown Construction Compound (CC-44390E), and will include minor, temporary works to this area. Surveys in this area identified wintering bird species foraging on the amenity grassland habitat present, and therefore works here could result in disturbance and displacement of SCI bird species.

[32] Species Profiles: Otter. Vincent Wildlife Trust (VWT). Accessed here: https://www.vincentwildlife.ie/species/otter

[33] The disturbance zone of influence for waterbirds is based on the relationship between the noise levels generated by general construction traffic/works (BS 5228:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise) and the proximity of those noise levels to birds – as assessed in Cutts, N. Phelps, A. & Burdon, D. (2009) *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance*, and Wright, M., Goodman, P & Cameron, T. (2010) Exploring Behavioural Responses of Shorebirds to Impulsive Noise. *Wildfowl* (2010) 60: 150–167. At 300m, noise levels are below 60dB or, in most cases, are approaching the 50dB threshold below which no disturbance or displacement effects would arise.

However, there are a number of SPAs located in relatively close proximity to the Proposed Development and/or Construction Compounds 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, Rogerstown Estuary SPA, Lambay Island SPA, Skerries Islands SPA, Boyne Estuary SPA, River Boyne and River Blackwater SPA, Howth Head Coast SPA, Dalkey Island SPA, Dundalk Bay SPA, Skerries Islands SPA, Ireland's Eye SPA, Lambay Island SPA, Rockabill SPA, The Murrough SPA, Baldoyle Bay SPA, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA, River Nanny Estuary and Shore SPA, North-West Irish Sea SPA). These species include light-bellied Brent goose, curlew, oystercatcher, 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 Development. Therefore, there is potential for the Proposed Development to result in disturbance / displacement impacts on SCI populations associated with European sites.

Current understanding of construction related noise disturbance to wintering waterbirds is based on the research presented in 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 *c.* 300m, typical noise levels associated with construction activity (BS 5228) are generally below 60dB or, in most cases, are approaching the 50dB threshold. Chapter 14 (Noise and Vibration) of this EIAR, details the noise levels across the Proposed Development throughout the construction phase. At 100m all construction works are below 74dB, reducing thereafter this distance, with the bulk of the works between 50-65dB at 100m. Therefore, there is potential for the construction stage of the Proposed Development to result in disturbance / displacement impacts on SCI populations associated with European sites listed above.

Marine mammals associated with European sites may commute and forage within lower parts of estuaries along the east coast. It is not considered to be likely that there will be any impacts on these species as a result of the Proposed Development as the works are proposed inland, in an urbanised environment and where water levels can drop diurnally, reducing the likelihood of marine mammals venturing this far inland.

Habitat Degradation as a result of impacts from air quality

A reduction in air quality within the immediate vicinity of the Proposed Development may occur as a consequence of dust deposition associated with construction activities. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Whilst potential impacts on vegetation and habitats arising from air pollution associated with a project of this nature is generally greatest within *c.* 50-100m; impacts may also occur beyond this to a maximum distance of *c.* 200m from the road development and haul routes for construction vehicles (NRA, 2011; Natural England, 2016; Bignal *et al*., 2004).

The risk of dust impacts as a result of the Proposed Development are summarised in Table 12-30 of Chapter 12 (Air Quality). The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity to prevent significant impacts occurring.

In accordance with the EPA Guidelines (EPA 2022) the likely effects associated with the Construction Phase dust emissions pre-mitigation are overall negative, moderate, and short-term. Therefore, European sites within 200m of the Proposed Development have the potential to be impacted by dust during the Construction Phase of the development, i.e., Malahide Estuary SAC, Rogerstown Estuary SAC, Baldoyle Bay SAC, River Boyne and River Blackwater SAC.

8.8.1.1.2 NHAs and pNHas

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

Considering the ZoI of the Proposed Development, in the absence of mitigation measures, the Proposed Development has the potential to have a likely significant effect upon the following one NHA and 23 pNHAs:

- Skerries Island NHA [001218];
- Royal Canal pNHA [002103];
- Grand Canal pNHA [002104];
- North Dublin Bay pNHA [000206];
- South Dublin Bay pNHA [000210];
- Dolphins, Dublin Docks pNHA [000201];
- Booterstown Marsh pNHA [001205];
- Baldoyle Bay pNHA [000199];
- Howth Head pNHA [000202];
- Malahide Estuary pNHA [000205;]
- Ireland's Eye pNHA [000203];
- Rogerstown Estuary pNHA [000208];
- Portraine Shore pNHA [001215];
- Lambay Island pNHA [000204];
- The Murrough pNHA [004186];
- Sluice River Marsh [001763];
- Boyne Coast and Estuary pNHA [001957];
- Loughshinny Coast pNHA [002000];
- Knock Lake pNHA [001203];
- Boyne River Islands [001862];
- Rockabill Island pNHA [000207];
- Dalkey Coastal Zone and Killiney Hill [001206];
- Dundalk Bay pNHA [004026]; and
- Laytown Dunes/Nanny Estuary pNHA [000554];

The locations of these designated areas for nature conservation, relative to the Proposed Development, and the predicted ZoI, are shown on Figure 8.2 in Volume 3A of this EIAR. The potential effects on European sites arising from the Proposed Development, described in Section 8.8.1.1.1 may also negatively affect the pNHA sites located within the boundaries of these European sites.

These pNHA sites comprise of North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA, Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Malahide Estuary pNHA, Boyne Coast and Estuary pNHA, Rockabill Island pNHA, Laytown Dunes/Nanny Estuary pNHA, Baldoyle Bay pNHA, Rogerstown pNHA, Portraine Shore pNHA, Ireland's Eye pNHA, Lambay Island pNHA and The Murrough pNHA. These sites are primarily designated for similar reasons. Potential impacts arising from the Proposed Development on these NHA and pNHA sites could result in a likely Significant effect at a National geographic scale. Therefore, the potential impacts during construction on these National sites would be as previously described above in Section 8.8.1.1.1 (European sites), under their respective headings.

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

The assessment of potential impacts arising from the Proposed Development on the Royal Canal pNHA, Santry Demesne pNHA, Sluice River Marsh pNHA, Loughshinney Coast pNHA, and Knock Lake pNHA is provided in the sections below. The Proposed Development will not result in any direct impacts on the above pNHAs as they are all located outside of the Proposed Development boundary and are not being impacted by construction of the Proposed Development. Potential indirect impacts as a result of negative effects on surface water quality to the Royal Canal, the River Sluice,Loughshinny coast which forms a hydrological connection between these pNHA and the Proposed Development, is dealt with in Section below under the respective heading. Impacts on Santry Demesne pNHA and Knock Lake pNHA are also addressed below.

Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and / or an accidental spillage or pollution event directly into the Royal Canal, Sluice River Marsh, or any surface water feature, including existing drainage infrastructure that drain to the east coast where Loughshinny Coast pNHA is located, has the potential to have a significant negative effect on water quality and consequently affect aquatic and wetland habitats in the receiving environment, including the Royal Canal pNHA, Sluice River Marsh pNHA and Loughshinny Coast pNHA. The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, large extents of the Royal Canal pNHA, Sluice River Marsh pNHA downstream could also be affected. as well as drainage features connecting Loughshinny Coast pNHA. It is considered unlikely that a pollution event of such a magnitude would occur during construction, or if it did occur, it would be temporary in nature. Nevertheless, a precautionary approach has been adopted in the assessment of potential risk of impacts on water quality. Consequently, detailed mitigation measures are required to further minimise the risk of contaminated surface water runoff and / or an accidental spillage or pollution events having any perceptible effect on water quality during construction of the Proposed Development

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

There are 11 areas of non-native species listed on the Third Schedule of the European Commuties (Birds and Natural Habitats) Regulations 2011 (as amended) present within, or in proximity to the footprint of the Proposed Development. In the absence of mitigation, there is potential for these invasive species to spread or be introduced, during construction and / or routine maintenance / management works, to terrestrial habitat areas in nationally-designated sites including the Royal Canal, Sluice River Marsh pNHA, and Loughshinny Coast pNHA downstream in Dublin Bay, Baldoyle Bay, Malahide Estuary, Rogerstown Estuary, Nanny Estuary, Boyne Estaury (i.e. North Dublin Bay pNHA, South Dublin Bay pNHA, Malahide Estuary pNHA, Rogerstown Estuary pNHA, Boyne Coast and Estuary pNHA, Laytown Dunes/Nanny Estuary pNHA). This in turn may result in the degradation of the existing habitats, in particular those habitats not permanently or regularly inundated by seawater, in the case of pNHAs located within Dublin Bay, Malahide/Rogerstown Estuary, Nanny Estuary, and Boyne Estuary, potentially outcompeting other native species and affecting species compositive and physical structure of the habitat. Therefore, it is possible that the spread/ introduction of invasive species could affect the integrity of the Royal Canal pNHA, Sluice River Marsh pNHA, and Lughshinny Coast pNHA sites. It is not considered possible that non-native invasive species could spread to aquatic and coastal European sites which are located a significant distance from the outfall locations of the watercourses which are hydrologically connected to the Proposed Development (i.e. Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Ireland's Eye pNHA, Baldoyle Bay pNHA, Skerries Island NHA, Dundalk Bay pNHA) due to the terrestrial (largely non-saline conditions in which these invasive species can become established. As the Proposed Development 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.

8.8.1.2 Habitats

This Section assesses the potential impacts of the Proposed Development 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 Development. 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.

8.8.1.2.1 Habitat Loss and Fragmentation

In general, there will be very little habitat loss as a result of the Proposed Development. The bulk of the works will be within the existing railway corridor. However, some habitat loss will occur in areas where Construction Compounds, substation compounds, access routes, track-lowering, and utilities diversion are proposed. Habitat loss will be minimised as much as possible, with compounds located on existing areas of hardstanding or within IÉ owned land comprising man-made habitats where possible. Access routes in agricultural fields have largely been proposed for areas that are currently used for access by farmers/landowners, therefore further minimising the loss of any habitats. There will be *c*. 13.04ha of habitat removal, comprising mainly of agricultural fields between Malahide and Drogheda, where the electrification works are proposed.

All of the habitats due for removal are valued as either Local Importance (Higher Value), or Local Importance (Lower Value). Habitats due for removal that are Local Importance (Higher Value), include, hedgerows (WL1), treelines (WL2) and (mixed) broadleaved woodland (WD1).

The length of removal for hedgerows totals *c.* 570m, with *c.* 210m of treeline removal across the scheme. A small area of (mixed) broadleaved woodland totalling *c.* 0.2ha will be removed, in an area adjacent to Drogheda MacBride Station. The permanent loss of such habitat types which are of Local Importance (Higher Value) does not have the potential to affect the conservation status of these habitat types due to the small amount of removal across such a large area, and therefore will not result in a significant effect at any geographic scale.

The remaining areas within the footprint of the Proposed Development comprise of habitats of Local Importance (Lower Value). These include, arable crops (BC1), buildings and artificial surfaces (BL3), spoil and bare ground (ED2), recolonising bare ground (ED3), improved amenity grassland (GA2), and scrub (WS1). These habitats are located next to existing urban development, and as such are highly disturbed. Habitat loss will consist of small, isolated sections of the above habitats adjacent to the existing railway line. The overall total area of these habitat types which overlaps which the Proposed Development boundary and will be lost as a direct impact during construction of the Proposed Development, is not significant at any geographic scale.

8.8.1.2.2 Introducing or Spreading non-native invasive plant species

Planting, dispersing, or allowing / causing the dispersal, spread or growth of certain non-native plant species is controlled under Article 49 of the Birds and Habitats Regulations and refers to plant or animal species listed on the Third Schedule of the Birds and Habitats Regulations.

The accidental spread of such non-native invasive plant species as a result of construction works has the potential to impact on terrestrial habitats, potentially affecting plant species composition, diversity and abundance over the long-term. This is not only confined to habitats within and immediately adjacent to the footprint of the Proposed Development but includes habitat areas along the network of proposed haul routes associated with the Proposed Development. The effects of introducing such non-native invasive plant species to highly sensitive and ecologically important habitat areas (i.e. designated areas 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.

Eleven areas of non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011) (as amended) were identified along the Proposed Development (Figure 8.5 in Volume 3A of this EIAR. Five species were recorded including Japanese knotweed, Himalayan balsam, common cord-grass, Rhododendron, and Spanish bluebell. The desk study also revealed records for the following additional species in close proximity to the Proposed Development:

- Giant hogweed;
- Indian balsam;
- Sea-buckthorn; and
- Three-cornered leek.

8.8.1.2.3 Habitat Degradation – Surface Water Quality

During construction contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water feature has the potential to have significant negative effects on water quality and consequently affect aquatic and wetland habitats in the baseline environment.

The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, estuarine and coastal habitats downstream could also be affected. It is unlikely that a pollution event of such a magnitude would occur during construction, or if it did occur, it would be temporary/short-term in nature (i.e. at viaduct works in Malahide, Laytown, Balbriggan and Rogerstown). Nevertheless, a precautionary approach has been adopted in the assessment of the 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 a pollution event as a result of the Proposed Development having any perceptible effect on water quality during construction.

During construction, suspended solids, silt and other harmful materials generated as a result of the Proposed Development could be released into the local drainage infrastructure and travel downstream, including, potentially, into watercourses such as the River Boyne, Stagrennan River, Mosney River, River Delvin, Palmerstown and the wider estuaries downstream of the Proposed Development (i.e. Dublin Bay, Baldoyle Bay, Rogerstown Estuary, Malahide Estuary, Boyne Estuary, and Nanny Estuary). Cement based products used in the Construction Phase of the Proposed Development (*e.g.* concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, the potential to be negatively impacted from a wide range of pollutants contained within surface water runoff remains. Habitat degradation as a consequence of construction effects on surface water quality has the potential to affect the conservation status of downstream estuarine and coastal habitats in the previously mentioned estuaries and the European sites within, and therefore, has the potential to result in a significant negative impact from a local to an international scale. Habitat degradation as a consequence of construction effects on surface water quality also has the potential to affect the conservation status of tidal rivers (CW2) / Annex I habitat Estuaries [1130], and therefore, has the potential to result in a likely significant effect at a National and International scale in the case of the aquatic / coastal / wetland Annex I habitats located within the Zol of the Proposed Development.

8.8.1.2.4 Habitat Degradation – Groundwater

Any effects on the existing hydrogeological baseline supporting wetland habitats have 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 Development boundary but can be far-reaching, with significant negative long-term effects. As discussed in Chapter 9 (Land & Soils) and Chapter 11 (Hydrogeology), the Proposed Development may involve excavations, resulting in damage to the underlying aquifer, or change in the existing groundwater regime.

Groundwater dependent habitats were not identified in close proximity to the Proposed Development, therefore no potential impacts as a result of the Proposed Development arise with the interaction between groundwater and surface water.

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 Development 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 negligible.

As detailed in the Construction Environmental Management Plan (CEMP) for the Proposed Development (Appendix A5.1 in Volume 4 of the EIAR), specific controls / mitigation measures (i.e., pollution control plan) will be put in place on a precautionary basis (despite the absence of significant groundwater impacts) to manage runoff and minimise pollution to receiving water bodies during the Construction Phase.

There are no predicted impacts that could give rise to a likely significant negative impact at any geographic scale on any aquatic habitats or species at any time scale (for more detail refer to Chapter 11 (Hydrogeology)).

8.8.1.2.5 Habitat degradation – Air Quality

As discussed in Chapter 12 (Air Quality) and Section 8.8.1.1.1, the Proposed Development has the potential to generate dust during construction works which could affect vegetation in habitat areas adjacent to the Proposed Development. As discussed previously, NOx concentrations and deposition rates were modelled for the Construction Phase of the Proposed Development at distances up to 200m from the Proposed Development (refer to Chapter 12 (Air Quality) for details). The results from the air quality assessment deem the potential impacts of the Proposed Development on habitats, to be significant from a local to international geographic scale.

8.8.1.3 Mammals

8.8.1.3.1 Bats

Roost Loss

There were no confirmed bat roosts identified within any of the bridges within the Proposed Development from the bat surveys undertaken across the Proposed Development. However, a number of bridges identified potential roost features within (i.e. OBB33, OBB39, OBB41, OBB44, OBB46, OBB47, OBB49, OBB54, UBB56, UBB65, OBB68, UBB72, OBB78, OBB80/80A/80B, UBB82), Although roosts were not identified in any of these structures, due to the high activity levels recorded during surveys and numbers of bat records across the site, a precautionary principle has been applied, and subsequent mitigation measures prescribed to ensure there will be no risks of injury/mortality to bats as a result of the Proposed Development. As tree surveys were not carried out within the Proposed Development, due to the lack of mature treelines directly impacted by the Proposed Development, the precautionary principle is also applied in regard to the loss of trees and their potential to hold bat roosts. Bats, and their breeding and resting places, are strictly protected under the Habitats Regulations, and under the Wildlife Acts, and it is an offence under that legislation to intentionally kill or injure bats or to interfere with or destroy their breeding or resting places. Therefore, mitigation measures are required to ensure that any tree removal works do not result in the permanent loss of tree roosting sites or result in bats being accidentally killed or injured during construction.

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 Development will result in the loss of such habitats used for feeding by all bat species recorded in the vicinity of the Proposed Development. Suitable habitat for foraging and commuting bats within the footprint of the Proposed Development includes the railway corridor itself, and habitats adjacent including; hedgerows and treelines, mixed broadleaved woodland, canal, rivers, areas of parkland and open grassland. The area of the habitats which will be lost as a result of the Proposed Development is provided in Section 8.8.1.2 and shown in the Landscape drawings (Figure 15.3) in Volume 3A of the EIAR. This is not deemed significant, considering their location (adjacent to existing artificially lit roads) and the quantity of suitable habitat, which will not be impacted, in the local vicinity. In assessing the impacts of habitat loss as a result of fragmentation of foraging / commuting habitat on bat populations, consideration was given to a species Core Sustenance Zone (CSZ). A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the 'resilience and conservation status' of the colony using the roost. The industry standard guidance *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins 2016) states that:

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

Notwithstanding the fact that there is evidence of bats foraging and commuting within the study area of the Proposed Development, and that all parts of the Proposed Development which contain suitable habitat are likely to be within the CSZ of at least one bat roost, and considering the type of works proposed (e.g. upgrading of existing infrastructure for the most part); there is limited potential for the Proposed Development to act as a barrier to flight paths for bat species, and the habitats within and adjacent to the Proposed Development will continue to provide commuting and foraging habitat.

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

Installation of temporary working and site compound lighting which may cause indirect disturbance of flight patterns

Construction Compounds are located at a number of locations across the Proposed Development (see Table 8.21), as described in Section 5.3.3. of Chapter 5 (Construction Strategy) of this EIAR. Temporary lighting will be installed to facilitate works during hours of darkness for the duration of construction (36 months), thereby temporarily increasing the level of artificial lighting in this area.

Artificial lighting within suitable habitat may result in avoidance behaviour by bats, and could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and result in abandonment of nearby roosts. Given the rural nature of a number of the Construction Compounds, which are largely surrounded by suitable foraging and commuting habitat used by local bat species, the impact of increased artificial lighting at Construction Compounds is short-term, but significant at the local level only.

8.8.1.3.2 Badger

Loss of Foraging Habitat and Breeding/Rest Sites

A total of three confirmed badger setts were recorded across the Proposed Development site. All of these are located within the ZoI of general construction activities (i.e. within 50m) based upon the impact distance bands described in the TII guidance (National Roads Authority, 2005a). However, the badger setts are located away from the existing active railway line, but within the verges of the line, or outside of this (as is the case with the Beaverstown sett). It is not proposed to expand the existing railway line, or work within the verge where the badger sets are located. Therefore, there is no potential for the permanent loss or interference of any badger sett to occur.

Construction will result in the permanent loss of minor sections of suitable foraging / commuting habitat for badgers (i.e. amenity grassland, arable land, scattered trees and parkland, scrub, mixed broadleaved woodland and treelines / hedgerows), some of it disturbed or highly managed In addition, the provision of Construction Compounds for the duration of the construction phase will result in the temporary loss of agricultural grassland which could be used by commuting / foraging badgers. These areas of habitat removal are not likely to provide significant foraging habitat for the local badger population, due to the abundance of suitable habitat for foraging and commuting badgers across the entire Proposed Development, with the exception of towns and villages. Therefore, the Proposed Development 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.

Disturbance/Displacement

In conjunction with any displacement effects associated with habitat loss, localised increased human presence and / or noise and vibration associated with construction works, the Proposed Development has the potential to displace badgers from both breeding / resting places and from foraging habitat located beyond the footprint of the Proposed Development. Given badgers are nocturnal in habit, their displacement from foraging areas (outside of areas where foraging habitat will be lost as a result of the Proposed Development) 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 from the frequent passing trains and maintenance vehicles along the railway line. Disturbance and displacement effects on badgers may also be the result of increased artificial lighting during construction and increased human presence in areas where human disturbance was minimal (i.e., agricultural areas). 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 some of the Proposed Development corridor is already lit artificially, particularly around existing stations and on road/built up areas adjacent to the railway line, the Proposed Development will result in the introduction of additional artificial lighting to previously unlit or poorly lit areas, namely around Construction Compounds. It is likely that the proposed Construction Compounds will require security lighting for the duration of construction. The habitat area adjacent to the Construction Compounds comprises of suitable foraging habitat for badger (e.g., amenity grassland, agricultural land). If high-intensity, non-directional security lighting (e.g., floodlighting) is installed in the proposed compound, light spill into adjacent areas could render these areas unsuitable for foraging badger.

Therefore, lighting associated with the construction phase of the Proposed Development could result in a negative effect on badgers, albeit temporary in nature (i.e. weeks/months in most locations[34]) and significant at the local level.

Mortality Risk

Site clearance works have the potential to result in the mortality of badger species. The potential for this impact to occur would be expected to be greater during the breeding season when juveniles venture out of the maternal sett or indeed when males leave the sett earlier on.

Furthermore, the potential for direct mortality to badger 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 / foraging habitat for badger. Three setts were located during the surveys and the potential for the establishment of new setts along or adjacent to the railway corridor is high given the suitable habitat identified throughout. Thus, there remains the risk that commuting / foraging badger might become entrapped in deep excavations, particularly in areas adjacent to open parkland and along watercourse corridors.

Given the relatively low numbers that might be expected to be affected, and that these species are highly mobile, the risk of mortality due to site clearance and/or excavation 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. However, on a precautionary basis, mitigation measures have been designed to protect badger from such impacts.

8.8.1.3.3 Otter

Otter surveys did not confirm any otter holts or evidence of otter activity within the footprint of the Proposed Development, but it is likely that all watercourses that the railway line crosses over are suitable for use by otters, as listed in Section 8.4.10.1.2. Although it cannot be predicted if otter will establish new holt or couch sites within the ZoI of the Proposed Development before construction works commence, it is a possibility, and this scenario has been taken into account in the mitigation strategy (refer to Section 8.9.1.1).

[34] Whist there will be Construction Compounds that are active for over a year, they are located largely around areas that are already lit i.e. at stations/depots.

As the otter populations that utilise the watercourses that are tributaries of the River Boyne in the northern section of the Proposed Development are likely to be potentially part of European site populations downstream and hydrologically connected to the site (i.e. River Boyne and River Blackwater SAC), any potential impacts predicted on this species are discussed in Section 8.8.1.1.1 above, and in Section 6 of the NIS produced as part of this Railway Order application (Scott Cawley Ltd, 2024). Construction impacts on otter in relation to those populations outside of SAC populations are described below.

Habitat and Food Source Degradation – Water Quality

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

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

During construction of the proposed otter tunnel over the River Pill/Turvey, suspended solids arising from the release of sub-surface sediment during works here have the potential to enter the River Pill/Turvey and travel downstream, including, into the Malahide Estuary. Similarly, the works at the River Nanny will result in sediment disturbance. Similarly, in other areas of the Proposed Development, any works in proximity to existing drainage infrastructure could potentially result in the release of sediment, and other materials generated during construction works, which could be transferred downstream via this drainage infrastructure. In this way, suspended solids and other materials generated during construction works could be transferred to any watercourses / waterbodies within the ZoI, including the River Sluice, River Mayne, River Nanny, River Matt, Rogerstown/Malahide Estuary, Nanny Estuary, River Tolka, Baldoyle Bay. Cement based products used in the construction phase of the Proposed Development (e.g. concrete and / or bentonite which are highly corrosive and alkaline materials), if released into the any of these watercourses may cause surface water degradation and damage to aquatic fauna.

This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment, and therefore has the potential to result in significant negative effects on food supply for aquatic mammals such as otter. Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely significant negative effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed impact, the availability of suitable habitat for otter in the wider vicinity and the abundance of otter across the study area, as revealed in the results of the desk study. Mitigation measures have been designed to protect water quality during construction.

Loss of Breeding/Resting Places

No otter breeding or resting places, holt or couch sites were identified within the boundary of the Proposed Development during field surveys. Therefore, there will not be any loss of holt or couch sites as a result of construction works. Therefore, the Proposed Development 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.

8.8.1.3.4 Other Mammals

No other protected mammal species were recorded during the multidisciplinary surveys carried out along the Proposed Development.

However, based on the results of the desk study, several mammal species, protected under the Wildlife Acts, are known to occur in the wider environment, including pine marten, red squirrel, hedgehog, pygmy shrew and Irish hare.

Habitat Loss

The construction of the Proposed Development will result in the permanent loss of some suitable habitat for small mammals located within the boundary of the Proposed Development. Given the relatively low numbers of individuals of each species that are likely to be affected (i.e. pine marten, red squirrel, hedgehog, pygmy shrew, Irish hare), and the abundance of alternative suitable habitat available locally, the effects of habitat loss associated with construction 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.

Mortality Risk

Site clearance works have the potential to result in the mortality of small mammal species. The potential for this impact to occur would be expected to be greater during the breeding season when juveniles would be present in nests, or in the case of hedgehog impacts may be greater during their hibernation period (i.e. December – March approximately). 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. Although the railway corridor does contain suitable habitat for these species within the grassy verges etc., the extent of the works will not involve the removal of these habitats over the entirety of the scheme, with very localised areas requiring removal for the Construction Compound/Substation locations.

The relatively low numbers of individuals of each species that are likely to be affected, and the fact that they are highly mobile species, means that 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.

Disturbance / Displacement

In conjunction with any displacement effects associated with habitat loss, such as increased human presence and / or noise and vibration associated with construction works, have 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 urban areas and from the passing trains/maintenance vehicles along the trainline in rural areas. 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 Development) is extremely unlikely to affect the local mammal population and will not result in a likely significant negative effect, at any geographic scale.

8.8.1.3.5 Marine Mammals

Habitat and Food Resource Degradation – Water Quality

As discussed in Section 8.8.1.1.1, the construction phase of the Proposed Development could result in contamination of receiving water bodies. This could result in negative impacts on marine mammals either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats). During construction at the estuaries, sediment may be released into the estuaries and be transported downstream to the Irish Sea. Cement based products used in the Construction Phase of the Proposed Development (i.e. concrete which is a highly corrosive and alkaline material), released into connecting water bodies, may cause surface water degradation and damage to aquatic fauna. This has the potential to result in negative and significant effects on the local food supply. 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 negative and significant effect, at a local geographic scale. This is in consideration of the temporary nature and scale of the proposed effect and the availability of suitable habitat in Dublin Bay and the wider eastern coastline.

8.8.1.4 Birds

8.8.1.4.1 Breeding birds

The assessment carried out in the AA Screening and NIS for the Proposed Development (Scott Cawley Ltd., 2024 a, b – submitted as standalone documents provided within the Railway Order application) considered the potential for the Proposed Development to affect the bird species listed as SCIs of SPA sites within the vicinity of the Proposed Development. That assessment concluded that the Proposed Development would not affect their breeding colonies or have any long-term effects on the local breeding populations. Therefore, for these species, the Proposed Development will not affect the conservation status of the breeding populations and will not result in a significant negative effect on the integrity of the European sites.

Habitat Loss and Loss of Breeding/Resting Places

The Proposed Development will result in the loss of breeding bird nesting and foraging habitat within the footprint of the Proposed Development. The areas of habitat loss are described in Section 8.8.1.2.1. These areas are comprised of scrub, hedgerows, treelines, agricultural grasslands, and (mixed) broadleaved woodland, all of which may provide nesting and/or foraging habitat for birds. These areas will be removed during construction of the Proposed Development resulting in an additional loss of breeding bird nesting habitat.

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

The magnitude of this effect will be largely defined by many unquantifiable factors such future land use changes and whether the local habitat resource has 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 Development is not likely to have any perceptible effects on breeding success or population dynamics.

The habitat areas that will be lost as a result of the Proposed Development 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 Development (i.e., from approximately 0.3 to 2km from these existing sites located within the footprint of the Proposed Development) include:

- Parks and greenspaces with hedgerow, treeline and/or scrub boundaries such as Beaverstown Golfclub, Skerries Golfclub, Ardgillan Demesne;
- Woodland such as that present in Malahide Castle Grounds and Newbridge Demesne; and
- Sections of the watercourses both upstream and downstream of the Proposed Development.

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 Development), 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 8.9.1).

Mortality Risk

If site clearance works were to be undertaken during the breeding bird 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 Development over what is likely to be a single breeding bird season in terms of completing site clearance works, will probably have a short-term effect on local breeding bird population abundance.

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.

Disturbance and 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 Development.

Construction activities will largely involve excavations of the land, piling, bridge clearance works, modifications to the existing railway, installation of OHLE support structures etc. 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 piling, in terms of its ZoI, but will be on-going for a period of between 9-12 months (as well as a 6-month advanced work period) and multiple breeding seasons. The Construction Phase of the Proposed Development will be completed on a phased basis, over a period of 3 years.

Although it is not possible to definitively quantify the magnitude of this potential impact (or the potential effect zone) in a worst-case scenario it could potentially extend for several hundred metres from the Proposed Development. As such, the construction works have the potential to affect the conservation status of affected breeding bird species and will result in a likely short-term significant negative effect, at a local geographic scale.

8.8.1.4.2 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 (Scott Cawley Ltd, 2024b) for the Proposed Development considered the potential for the Proposed Development to affect the bird species listed as SCIs of Malahide Estuary SPA, Rogerstown Estuary SPA, Lambay Island SPA, Skerries Islands SPA, Boyne Estuary SPA, River Boyne and River Blackwater SPA, Howth Head Coast SPA, Dalkey Island SPA, Dundalk Bay SPA, Skerries Islands SPA, Ireland's Eye SPA, Rockabill SPA, The Murrough SPA, Baldoyle Bay SPA, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, North-West Irish Sea SPA, River Nanny Estuary and Shore SPA Seas Off Wexford SPA, Saltee Islands SPA and Wicklow Head SPA, and their wintering populations. That assessment concluded that the Proposed Development could affect their wintering bird colonies and have long-term effects on the local wintering populations. Therefore, for these species, the Proposed Development has the potential to affect the conservation status of the wintering bird populations and result in a significant adverse effect on the integrity of the European sites.

Habitat loss

There will be no direct loss of feeding habitat to accommodate the Proposed Development. However, there will be some habitat loss of wintering bird habitat for the Construction Compounds and substations. The impact of habitat loss on wintering bird species has been discussed above in Section 8.8.1.1.1 in relation to impacts on SCI species from SPAs, and in detail in Section 6.1 of the NIS associated with this Railway Order application (Scott Cawley Ltd., 2024 a, b), and was deemed to not have the potential to affect the conservation objectives of SCI species of European sites. Impacts on SCI wintering bird species will also be relevant for other wintering bird populations identified utilising suitable habitat.

Disturbance/displacement

A temporary and / or permanent increase in noise, vibration and / or human activity levels during the construction of the Proposed Development could result in disturbance to and / or displacement of wintering bird species present within the footprint and / or the vicinity of the Proposed Development.

Assessment of construction related noise disturbance to wintering waterbirds is based on the research presented in C*onstruction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance* (Cutts *et al.,* 2009) and "*Exploring Behavioural Responses of Shorebirds to Impulsive Noise"* (Wright *et al.*, 2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging birds or roosting birds during both day and nighttime hours. 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 (i.e. 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 are generally below 60dB or, in most cases, are approaching the 50dB threshold (BSI 2008). As such, disturbance effects for general construction activities across the majority of the Proposed Development 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. Chapter 14 (Noise and Vibration) of this EIAR, details the noise levels across the Proposed Development throughout the Construction Phase. At 100m all construction works are below 74dB, reducing thereafter this distance, with the bulk of the works between 50-65dB. However, the Proposed Development does traverse through areas of highly suitable habitat for wintering birds, i.e., Malahide Estuary, Rogerstown Estuary, and the Nanny Estuary, coming within metres of the estuarine habitats. The Construction Compound locations in Malahide at Caves Strand (CC-16100) and Bissett's Strand (CC-15900W) do not contain suitable wintering bird habitat due to the sward height and lack of management, in the case of Caves Strand, and lack of grassland at Bissett's Strand. Immediately adjacent to the Caves Strand Compound on the eastern side however, there is a short sward amenity grassland that is suitable for brent geese and is a known area of high significance for the species (Scott Cawley Ltd., 2017). Construction noise generated from works within the Compound could disturb foraging and/or roosting brent geese utilising this grassland during the winter months. Four other Construction Compounds/Substation locations were determined to have potential wintering bird habitat, and included Drogheda Substation/Construction Compound, Laytown Construction Compound, Skerries Substation/Construction Compound, and Gormanston Construction Compound. Works within and adjacent to these areas, particularly during night time hours, could result in disturbance of wintering birds roosting and foraging in the lands.

Therefore, there is potential for the Proposed Development to impact upon and thus affect the conservation status of wintering bird populations and has the potential to result in a likely significant negative effect, ranging from a local to international level.

Habitat Degradation – Surface Water Quality

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

However, it is 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 (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Development having any perceptible effect on water quality during construction.

During construction suspended solids, silt and other harmful materials generated as a result of Proposed Development could be released into the local drainage infrastructure and travel downstream via watercourses, and potentially, into waterbodies such as Dublin Bay, Malahide Estuary, Rogerstown Estuary, Nanny Estuary, and the Boyne Estuary, and ultimately the Irish Sea. Cement-based products used in the Construction Phase of the Proposed Development (*e.g.* concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and could consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, estuarine/ coastal foraging habitats downstream could also be affected.

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 range of local to international geographic scale. Mitigation measures have been designed to protect water quality during the Construction Phase (see Chapter 10 (Water) and Appendix A5.1 (CEMP)).

8.8.1.4.3 Reptiles

There were no reptile species recorded during the multidisciplinary surveys, but suitable habitat is present within the Proposed Development; in areas of grassland, bare ground, railway ballast, and scrub. The desk study returned records for reptile species protected under the Wildlife Acts within the wider surrounding area.

Disturbance and Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of, common lizard, especially during hibernation when reptiles may be hibernating within railway ballast. There is suitable habitat within the Proposed Development, but due to the constant disturbance of the current active railway, 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, particularly as the construction activity at any one location would be temporary/short-term in nature. Nevertheless, mitigation is provided to avoid harm/injury to reptiles.

Habitat Severance / Barrier Effect

The temporary physical disruption of the existing landscape during site clearance and construction will fragment habitat used by common lizard. As a temporary, 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 short-term significant negative effect to the common lizard, at any geographic scale.

8.8.1.4.4 Amphibians

No amphibian species were recorded during the multidisciplinary surveys carried out along the Proposed Development. The desk study returned records for common frog and smooth newt within the vicinity of the Proposed Development, and therefore, it cannot be ruled out that these species occur in the vicinity of the Proposed Development.

Disturbance and Mortality Risk

Site clearance and / or construction works in areas within, or adjacent to, suitable amphibian habitat, have the potential to result in disturbance to, and the direct mortality of amphibians. Given the relatively small area of potentially suitable habitat for amphibians in the Proposed Development study area and its immediate locality, the number of individuals that would potentially be at risk is low. Therefore, potential impacts arising from increased disturbance or mortality risk are not likely to affect the local populations of any amphibian species in the long-term nor their conservation status and as such there is no potential for a likely significant effect, at any geographic scale.

Habitat Severance / Barrier Effect

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

Habitat Degradation – Surface Water Quality

As discussed in Section 8.8.1.2.3, the Construction Phase of the Proposed Development 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 effect, at a Local geographic scale.

8.8.1.4.5 Fish

This section only describes fish species in the local waterbodies within the site and that surface water drains to from the site, outside of European sites. Impacts on QI species within downstream European sites are described above in 8.8.1.1.1 and in Section 6 of the NIS (Scott Cawley Ltd, 2024b).

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 unlikely that a pollution event of such 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 (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Development 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 geographic scale given the fact that the other fish species in question are common in Irish waters and not of conservation concern.

Habitat Loss

No works are proposed in any of the watercourses within the Proposed Development, and therefore habitat loss impacts are not likely to affect fish species conservation status or result in a likely significant effect, at any geographic scale.

8.8.2 Operational Phase

8.8.2.1 Designated Areas of Nature Conservation

8.8.2.1.1 European sites

Habitat Loss and Fragmentation

During the Operational Phase of the Proposed Development, there will be no requirement to carry out works in any European site, beyond regular maintenance and checks that already occur within the Proposed Development. Therefore, there are no potential habitat loss and fragmentation impacts on QI/SCI species as a result of the Operational Phase of the Proposed Development.

Habitat Degradation – Surface Water Quality

The Proposed Development is hydrologically connected to Dublin Bay, Baldoyle Bay, Malahide Estuary, Rogerstown Estuary, Nanny Estuary, and the Boyne Estuary via a number of watercourses, as discussed in Section 8.4.4. The potential 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 suspended solids, and the accidental spillage and / or leaks of contaminants (i.e. fuel, oils, chemicals and concrete washings) into receiving waters.

The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge point and therefore impact the downstream environment (i.e. Dublin Bay Baldoyle Bay, Malahide Estuary, Rogerstown Estuary, Nanny Estuary, and the Boyne Estuary), within which European sites are located:

North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, Baldoyle Bay SAC, Baldoyle Bay SPA, Malahide Estuary SAC, Skerries Islands SPA, Ireland's Eye SPA, Malahide Estuary SPA, Rogerstown Estuary SAC, Rogerstown Estuary SPA, River Nanny Estuary and Shore SPA, Lambay Island SPA, Boyne Estuary SPA, Boyne Coast and Estuary SAC, River Boyne and the River Blackwater SAC, River Boyne and River Blackwater SPA, and the North-West Irish Sea 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, Lambay Island SAC, Rockabill to Dalkey Island SAC, Codling Fault Zone SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Howth Head Coast SPA, Dalkey Islands SPA, Baldoyle Bay SPA, Malahide Estuary SPA, Rogerstown Estuary SPA, Lambay Island SPA, Ireland's Eye SPA, Skerries Islands SPA, Rockabill SPA, River Nanny Estuary and Shore SPA, Boyne Estuary SPA, Boyne Coast and Estuary SAC, River Boyne and the River Blackwater SAC, River Boyne and River Blackwater SPA, Dundalk Bay SPA, The Murrough SPA, the North-West Irish Sea SPA, Seas Off Wexford SPA, Saltee Islands SPA and Wicklow Head SPA are undermined.

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

Six non-native invasive plant species listed on the Third Schedule of the Birds and Natural Habitats Regulations 2011 (as amended) were present in 11 locations within, or in close proximity to the Proposed Development. In the absence of mitigation, there is potential for these species to spread or be introduced, during routine maintenance / management works, to aquatic habitat areas in European sites downstream of the Proposed Development (i.e. North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SAC, Baldoyle Bay SPA, Malahide Estuary SAC, Skerries Islands SPA, Ireland's eye SPA, Malahide Estuary SPA, Malahide Estuary SAC, Rogerstown Estuary SAC, Rogerstown Estuary SPA, River Nanny Estuary and Shore SPA, Lambay Island SPA, Boyne Estuary SPA, Boyne Coast and Estuary SAC, River Boyne and the River Blackwater SAC and the North-West Irish Sea 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 likely that invasive species could spread to European sites which are located a significant distance from the outfall locations of the watercourses intersected by the Proposed Development, by virtue of the habitat conditions in which the species normally occurs and subject to the full implementation of the non-native Invasive Species Management Plan (ISMP) refer to Appendix A5.1 (CEMP) in Volume 4 of the EIAR. In addition, IÉ carry out regular control and management of invasive species across their network. The maintenance of the Proposed Development does not have the potential to result in habitat degradation of the QI / SCI species of any European site as the result of operational impacts.

Disturbance / Displacement

During operation, the Proposed Development has the potential to disturb and displace wintering bird species from their suitable habitat near the Proposed Development boundary due to an increase in noise, human activity and visual disturbance associated with increased human presence at stations and increased train flow enabled by the Proposed Development.

Although the operational disturbance / displacement effect cannot be quantified, the bird species in the estuaries would be habituated to a high level of disturbance from the existing passage of diesel trains and maintenance vehicles throughout the line. The implementation of the DART+ Coastal North electrification between Malahide and Drogheda, would increase railway traffic along this line. However as these trains are electric, they would be relatively quieter than the existing diesel trains that pass through the ZoI of a number of European sites, namely; Malahide Estuary SPA, Rogerstown Estuary SPA, River Nanny Estuary and Shore SPA, and *ex-situ* habitats of several European sites in the wider study area, i.e. North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SPA, Skerries Islands SPA, Ireland's eye SPA, Lambay Island SPA, Boyne Estuary SPA, Dundalk Bay SPA, The Murrough SPA, North-West Irish Sea SPA, Seas Off Wexford SPA, Saltee Islands SPA, and Wicklow Head SPA.

Otter are a QI species of the River Boyne and Blackwater SAC, which is located north of the Proposed Development. Whilst the Proposed Development will not traverse the River Boyne main estuarine channel, it does cross over a number of tributaries of the River Boyne, which have the potential to be utilised by otters from the SAC population, and therefore have the potential to be disturbed from the Proposed Development during operation. However; otters would already be habituated to the passing trains, which are currently diesel generated and have a maximum noise level of 90dB at 25m from the track. The existing DART trains (that run between Dublin City Centre and Greystones) are approximately 10dB quieter than the diesel enterprise trains (maximum speed 100 km/h) and the future DART+ trains are approximately 6dB quieter than the existing diesel Enterprise trains (maximum speed 145km/h). The new electrified DART trains are quieter than the current diesel trains as noted above, and therefore the disturbance/displacement impacts would be lessened following the implementation of the Proposed Development.

Direct Injury/Mortality

A potential increase in the mortality and/or direct injury risk to SCI species associated with increased collisions arising from the introduction of proposed new Overhead Line Equipment (OHLE) on the railway line in the Malahide, Rogerstown, and River Nanny Estuaries has been considered. As the railway line currently has no overhead lines (north of Malahide), areas that are exposed (i.e., are not screened by vegetation and/or where the railway is in line or above the surrounding landscape and therefore exposed) and have suitable wintering bird habitat and/or *ex-situ* habitat (as discussed above in the NIS and Section 8.6 above) have also been considered in terms of potential collision risks to SCI species. This is namely at Gormanston, Balbriggan, and Laytown.

The OHLE is formed by primarily two aerial electrical live wires (catenary and contact wire) located above the tracks which power the trains through the contact between the train pantograph and the OHLE contact wire.

To support the OHLE wires, masts and other infrastructure will be erected along the line and through stations, from north of Malahide to Drogheda (including Drogheda depot). Typical spacing between OHLE support structures will be between 40 m and 50 m, with a maximum spacing of 65 m. The OHLE support heights vary between 6.5 m and 8.5 m (i.e., maximum height is 8.5m from the line).

Wintering bird surveys at Malahide, Rogerstown, Laytown, Gormanston, and Balbriggan, recorded flight lines and the approximate heights birds were flying at over the existing railway line and viaducts (for Malahide, Rogerstown and Laytown).

The number of flights over the railway of each bird species was compared between each height band (i.e., as described in Section 8.3.5.3) and converted into a percentage across all sites surveyed (see Appendix 8.6 of Volume 4 of this EIAR). The majority of birds were flying over the line in the 0-10m height band for surveys in 2021 – 2022, with the 10-20m height band being the second highest number of flights. Whilst in 2022 – 2023, more birds were flying at the 10-20m height band, with the 0-10m height band having the second highest number of flights. Therefore, there is potential for direct injury/mortality related impacts of SCI species as a result of the Proposed Development for the following European sites; Malahide Estuary SPA, Rogerstown Estuary SPA, River Nanny Estuary and Shore SPA, Boyne Estuary SPA, Dundalk Bay SPA, Stabannan-Braganstown SPA, Skerries Islands SPA, Lambay Island SPA, Ireland's Eye SPA, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SPA, North-West Irish Sea SPA, the Murrough SPA and the Seas Off Wexford SPA. Other SPAs not listed that are within the ZoI of the Proposed Development, i.e. Howth Head Coast SPA, Dalkey Islands SPA, Rockabill SPA, and River Boyne and River Blackwater SPA, are not considered as the designated SCI species within these sites were not identified flying over the Proposed Development during wintering bird surveys carried out in 2021 – 2024.

Habitat degradation as a result of Air Quality Impacts

During the Operational Phase of the Proposed Development the railway will (with the exception of intercity services) change from diesel units to electric multiple units (EMUs). The Proposed Development is therefore beneficial, with reductions in emissions of all pollutants modelled and no likely significant effects on European sites as a result of the Operational Phase of the Proposed Development.

8.8.2.1.2 NHAs and pNHAs

The potential impacts on European sites arising from the Proposed Development, outlined in Section 8.8.2.1.1, may also negatively affect the following NHA and / or pNHA sites, which are located within the boundaries of European sites and designated for similar reasons: Skerries Islands NHA, North Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, and South Dublin Bay pNHA, Booterstown Marsh pNHA, Howth Head pNHA, Dalkey Coastal Zone and Killiney Hill pNHA, Lambay Island pNHA, Baldoyle Bay pNHA, Malahide Estuary pNHA, Ireland's Eye pNHA, Portraine Shore pNHA, Rogerstown pNHA, Sluice River Marsh, Boyne Coast and Estuary pNHA, Loughshinny Coast pNHA, Knock Lake pNHA, Boyne River Islands, Rockabill Island pNHA, Dundalk Bay pNHA, Laytown Dunes/Nanny Estuary pNHA and The Murrough pNHA. The respective European sites are provided in Table 8-9. Potential impacts arising from the Proposed Development on these NHA and / or pNHA sites would result in a likely negative and significant effect at a National geographic scale.

In the case of the Sluice River Marsh pNHA, Knock Lake pNHA and Loughshinny Coast pNHA potential impacts arising from the Proposed Development on these pNHA sites may occur as a result of (as per the descriptions provided above under Section 8.2.2.1.1):

- Habitat degradation as a result of surface water runoff related hydrological impacts; and,
- Habitat degradation as a result of introducing/spreading non-native invasive species.

8.8.2.2 Habitats

8.8.2.2.1 Habitat Degradation – Surface Water

Mitigation for the Operational Phase has been built into the design of the Proposed Development. The drainage system for the Proposed Development will discharge to the following surface water receptors:

- Stagrennan River;
- Betaghstown River;
- River Nanny (Meath);
- Mosney River;
- Delvin River;
- River Matt;
- Mill Stream (Skerries);
- Balcunnin River;
- Palmerstown River;
- Ballyboghill River;
- Turvey River;
- Sluice River;
- Mayne River;
- Santry River;
- Tolka River; and
- Royal Canal.

The potential impacts predicted for the Operational Phase are related to water quality and surface runoff which may occur due to increased impermeable areas which may lead to increased surface runoff and an increase in pollution and sediment load entering surface water receptors from maintenance works required.

The potential for increased runoff is expected to be minimal as the flows will be limited to greenfield runoff rates and SuDS designed as required. The Construction Compounds will be reinstated and landscaped once the construction works are complete. As such there will be no increase in surface water discharge during the Operational Phase. The primary activity during the Operational Phase is the occasional access for maintenance activities which may result in accidental spills, oil leaks, etc. These occasional visits may result in surface water pollution in the absence of mitigation measures which are imperceptible[35].

8.8.2.2.2 Habitat Degradation – Groundwater

The Operational Phase has the potential to present a slight risk of an adverse impact on groundwater quality from leaks, drips and spills. However, the increased use of electric trains and reduction in trains running on diesel will reduce the risk of groundwater pollution to a negligible amount.

[35] EIAR Volume 2: Chapter 10 Water DART+ Coastal North

As the trains will be maintained and the routine maintenance comprises minor works the risk of a serious adverse impact on groundwater quality is negligible. Consequently, the significance of this potential adverse impact on groundwater quality for the Operational Phase is imperceptible.

8.8.2.2.3 *Habitat Degradation – Non-native Invasive Plant Species*

Given the presence of non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011) (as amended) and two additional non-native plant species listed in The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020) in the immediate vicinity of the Proposed Development, there is the potential that these species will recolonise vegetated areas within the Proposed Development post-construction. As such, there is a risk that routine maintenance works may inadvertently spread contaminated vegetation cuttings. IÉ applies a number of procedures across their assets for the ongoing control and management of invasive species on their network. This includes the following documents, which can be found in Appendix A8.7:

- Control and Management of Vegetation;
- Identification and Control of Japanese Knotweed; and
- Identification and Control of Giant Hogweed.

No additional mitigation is required.

8.8.2.3 Mammals

8.8.2.3.1 Bats

Direct Mortality/Injury

The Proposed Development may pose a mortality risk to bats as a result of collision/electrocution with the OHLE, and direct mortality due to collision with passing trains. A potential collision risk between the OHLE and bat species in-flight may arise as a result of the OHLE wires that vary between 6.5 m and 8.5 m in height.

The extent of the effect is the entire operational area within the Proposed Development, noting that new electrification will only occur between Malahide and Drogheda MacBride Station. The magnitude of the effect is in an increase in train traffic services as presented in Section 4.11 of Chapter 4 (Description of the Proposed development) and the operation of approximately 37 km of overhead lines on two tracks. The duration of the effect extends to the entire operational timeframe associated with Proposed Development and is likely to be permanent. The timing of the operational activities (i.e. train movements) will influence the magnitude (i.e. operational activities during night-time hours in the summer months are more likely to affect commuting and foraging bats). This effect is likely to be reversible as bats become habituated to the new infrastructure. Due to the magnitude, the effect of biodiversity loss, fragmentation, and alteration during the Operational Phase of the Proposed Development is predicted to be not significant at any geographic scale.

Irish bat species navigate largely by echolocation and as such fixed structures (such as the viaducts and substation buildings) are unlikely to pose any significant collision risk to bats.

A study carried out by EirGrid on the potential impacts on bat species from overhead lines (powerlines), concluded that collision with power lines is very low risk for most Irish bat species, as their echolocation capabilities should allow them to detect support structures and lines, and electrocution is not possible due to their wingspan (max 34cm) (EirGrid, 2015). Therefore, it is unlikely that the proposed new OHLE would result in a notable increase in collision risk that would in turn significantly affect any bat populations at any geographic scale, as a result of mortality and/or injury.

Indirect Disturbance of Flight Patterns Due to Operational Lighting

Bats are nocturnal in habit and as such any operational and maintenance works undertaken during the hours of darkness that may alter the existing environmental conditions in areas of suitable habitat have the potential to impact on bats. As discussed under construction impacts in Section 8.8.1.3.1, bats are particularly sensitive to light disturbance and as such any changes in existing light levels as a result of the Proposed Development could impact on local bat populations, including their roosting, foraging and/or commuting behaviours.

No bat roosts were identified within any of the structures within the Proposed Development. However; a number of the existing bridges within the railway corridor, do have the potential to be used by roosting bats due to the presence of potential bat roosting features within. There will be no lighting along the extent of the electrification of the line, with lighting only proposed around substations and in depot/stabilising areas that are largely already illuminated. Whilst there are some areas where suitable commuting and/or foraging habitat for bats (i.e., hedgerows/treelines) will be impacted by light spill from the Proposed Development, PIR sensor mounted lights will only be used, and therefore will not be lit under normal conditions and only in the presence of IE and ESBN staff.

The following elements of the operational lighting design will ensure minimal impacts on bats from light disturbance:

- All proposed lighting will be from a LED light source, which is a more bat-friendly light source as it contains very little/no ultra-violet (UV) frequency lighting that bats are particularly sensitive to (BCI, 2010);
- Lighting will include an automatic dimming and switching off mechanism in order to reduce the duration of light disturbance as much as possible;
- Lighting will be directional, i.e. there will be no upward light projection and lighting will not be projected behind lighting columns in order to reduce any backward lighting and any obtrusive lighting into adjacent areas.
- Where possible, the shortest lighting columns will be used to further reduce any light spill.

Given the design measures that will be in place during operation, there is no potential for operational lighting to result in a significant negative effect on bat populations at any geographic scale.

8.8.2.3.2 Badger

Mortality and/or Injury Risk

The increase in frequency of trains between Malahide and Drogheda has the potential to directly injure badgers using the line for commuting and/or foraging between breeding/resting areas.

However, badgers would be habituated to a certain level of disturbance from the existing trains and would therefore likely habituate to the increase in train frequency which will be enabled as a result of the Proposed Development. The operation of DART trains on the DART+ Coastal North rail line is likely to be between 06:00am – 01:00am, and as badgers are nocturnal, the hours for potential operational impacts are reduced. There is no suitable habitat within the railway line itself for badger, but there is along the verges within scrub, so whilst injury/mortality might occur to badgers crossing the railway line, it is unlikely to result in a significant negative effect on the local badger population, at any geographic scale.

Light spill

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

There will be no lighting along the extent of the electrification of the line, with lighting only proposed around substations and in depot/stabilising areas that are largely already illuminated. Whilst there are some areas where suitable commuting and/or foraging habitat for badgers (i.e., field margins, scrub) will be impacted by light spill from the Proposed Development, PIR sensor mounted lights will only be used, and therefore will not be lit under normal conditions and only in the presence of IÉ and ESBN staff.

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

8.8.2.3.3 Otter

The otter population in the northern section of the Proposed Development where the existing railway line crosses tributaries of the River Boyne, are likely part of the River Boyne and River Blackwater SAC QI population. Whilst the otter population within this area is not part of a European site population, the operational impacts on otters as a result of the Proposed Development are as discussed above in Section 8.8.2.1.1.

There is an increased risk to local otter populations across the Proposed Development, due to the likely increase in the number and frequency of trains between Malahide and Drogheda in the future, enabled by the Proposed Development. This is especially relevant in Malahide Estuary, where the Turvey/Pill River flows under the railway line, and a sluice gate is present to prevent egress of sea water into the agricultural fields on the other side of the railway embankment, which also prevents otters from using this watercourse for commuting between the sides of the railway embankment. Although trail cameras deployed in the area did not identify otters using the railway line during deployment, it cannot be concluded that otters do not use this crossing point at all. However; given the relatively low numbers that might be expected to be affected in Malahide and in other areas along the Proposed Development, and that these species are highly mobile, the risk of mortality due to mortality from trains is unlikely to result in a level of mortality that would affect the species' conservation status, and result in a significant effect, even at a local geographic scale.

Nevertheless, following consultation with NPWS and IÉ, mitigation is provided to protect otters from mortality impacts. There is also potential for disturbance to otters during construction at this watercourse, due to the installation of an otter tunnel under the existing railway line.

8.8.2.3.4 Other Mammals

No evidence of other protected terrestrial mammals was recorded along the Proposed Development during surveys undertaken. However, based on the results of the desktop study, other protected terrestrial mammals (see Section 8.4.10.1) are known to occur within the wider vicinity and therefore impacts on this species cannot be excluded.

Habitat Severance/Barrier Effect

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

Mortality Risk

The Proposed Development will not result in any increase in terms of mortality risk to mammals during Operation. This is because the Proposed Development is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. Whilst there will be operational maintenance of vegetation along the railway line, this activity already occurs, and therefore, the Proposed Development will neither exacerbate nor improve the level of mortality risk associated with this infrastructure. Therefore, the impact of mortality risk to terrestrial mammals, as a result of the Proposed Development is not regarded to be significant at any geographic scale.

Light Spill

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

There will be no lighting along the extent of the electrification of the line, with lighting only proposed around substations and in depot/stabling areas that are largely already illuminated. Whilst there are some areas where suitable commuting and/or foraging habitat for small mammals (i.e., field margins, scrub) will be impacted by light spill from the Proposed Development, PIR sensor mounted lights will only be used, and therefore will not be lit under normal conditions and only in the presence of IÉ and ESBN staff.

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

8.8.2.3.5 Marine Mammals

Surface Water Quality and Prey Abundance

As discussed in Section 8.8.2.1.1, without the design mitigation incorporated into the design of the Proposed Development, the Operational Phase of the Proposed Development could result in contamination of receiving water bodies. This could result in significant negative impacts on marine mammals either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

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

8.8.2.4 Birds

8.8.2.4.1 Breeding birds

Disturbance/Displacement

Increases in noise levels associated with the increased frequency of trains, may have a negative effect on bird abundance and occurrence in the locality. Increased noise levels, as well as causing disturbance to birds in the locality, may also affect the breeding success of local bird populations as bird mating calls would become drowned out by train noise, therefore affecting the establishment of breeding bird territories.

Breeding birds within the locality of the Proposed Development would already be habituated to passing train noise and disturbance. As the new DART+ trains will be quieter than the existing diesel trains, the effect of noise is not likely to be significant at any geographic scale.

Therefore, the Proposed Development 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.

Habitat Degradation – Surface water

As discussed in Section 8.8.2.1.1, without the design mitigation incorporated into the design of the Proposed Development, the Operational Phase of the Proposed Development could result in contamination of receiving water bodies. In the absence of mitigation, this could potentially result in significant negative impacts on breeding birds either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

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

8.8.2.4.2 Wintering birds

This section of the impact assessment deals with wintering bird species, i.e. those bird species which are listed on either the BoCCI Red or Amber lists for their wintering populations. The assessment carried out in the NIS for the Proposed Development considered the potential for the Proposed Development to affect the bird species listed as SCIs of European sites for their wintering populations. The assessment carried out in the NIS (Scott Cawley Ltd, 2024b) for the Proposed Development considered the potential for the Proposed Development to affect the bird species listed as SCIs of Malahide Estuary SPA, Rogerstown Estuary SPA, Lambay Island SPA, Skerries Islands SPA, Boyne Estuary SPA, River Boyne and River Blackwater SPA, Howth Head Coast SPA, Dalkey Island SPA, Dundalk Bay SPA, Skerries Islands SPA, Ireland's Eye SPA, Rockabill SPA, The Murrough SPA, Baldoyle Bay SPA, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA, North-West Irish Sea SPA and River Nanny Estuary and Shore SPA, Seas Off Wexford SPA, Saltee Islands SPA and Wicklow Head SPA, and their wintering populations. That assessment concluded that the Proposed Development could affect their wintering bird colonies and could have long-term effects on the local wintering populations. Therefore, for these species, the Proposed Development has the potential to affect the conservation status of the wintering bird populations and result in a significant adverse effect on the integrity of the European sites.

Disturbance/Displacement

During operation, the maximum noise level L_{AFmax} of an existing diesel Enterprise train measured at 25m from the nearest track would be approximately 90dB. This would apply at Malahide, Rogerstown and the River Nanny estuary where the maximum line speed is 145km/h. The existing DART trains (that run between Dublin City Centre and Greystones) are approximately 10dB quieter than the diesel enterprise trains (maximum speed 100 km/h) and the future DART+ trains are approximately 6dB quieter than the existing diesel Enterprise trains (maximum speed 145km/h). At 100m from the trainline, noise levels from the DART would be approximately 78dB. Wintering bird surveys at the estuaries identified birds roosting and foraging right up to the existing railway line and viaducts (Malahide, Rogerstown and River Nanny Viaducts). Bird species in these estuaries are habituated to constant disturbance from the existing diesel trains that pass through these estuaries. Whilst the DART trains will be more regular than the current passing trains, they are quieter, and therefore the noise impact of DART trains on bird species in the estuaries will be less than is currently experienced. Therefore, there is no potential for disturbance related impacts on SCI species during the operation of the Proposed Development.

Direct Mortality/Injury

A potential increase in the mortality and/or direct injury risk to wintering bird species associated with increased collisions arising from the operation of the proposed new Overhead Line Equipment on the railway line across the Proposed Development has been considered.

As the railway line has currently no overhead lines (north of Malahide), areas that are exposed (i.e., are not screened by vegetation and/or where the railway is in line or above the surrounding landscape and therefore exposed) and have suitable wintering bird habitat (i.e. areas of stubble agricultural lands, grassland) have also been considered in terms of potential collision risks to wintering bird species. This is namely at Gormanston, Balbriggan, and Laytown.

The OHLE is formed by primarily two aerial electrical live wires (catenary and contact wire) located above the tracks which power the trains through the contact between the train pantograph and the OHLE contact wire. To support the OHLE wires, masts and other infrastructure will be erected along the line and through stations, from north of Malahide to Drogheda (including Drogheda depot). Typical spacing between OHLE support structures will be between 40 m and 50 m, with a maximum spacing of 65 m. The OHLE support heights vary between 6.5 m and 8.5 m (i.e., maximum height is 8.5m above the railway line).

Wintering bird surveys at Malahide, Rogerstown, Laytown, Gormanston, and Balbriggan, recorded flight lines and the approximate heights birds were flying at over the existing railway line and viaducts (for Malahide, Rogerstown and Laytown). The number of flights over the railway of each bird species was compared between each height band (i.e., as described in Section 8.3.5.3) and converted into a percentage across all sites surveyed (see Appendix 8.6 of Volume 4 of this EIAR). The majority of birds were flying over the line in the 0-10m height band for surveys in 2021 – 2022, with the 10-20m height band being the second highest number of flights. Whilst in 2022 – 2023, more birds were flying at the 10-20m height band, with the 0-10m height band having the second highest number of flights. Direct injury/mortality during operation has the potential to affect wintering bird species' conservation status and result in a likely significant negative effect, at a local geographic scale in the case of all the relevant species recorded during the wintering bird surveys.

Habitat Degradation

As described above for habitats in Section 8.8.1.1.1 during operation, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently an impact on the aquatic environment and supported bird species; either directly (*e.g.* acute or sub-lethal toxicity from pollutants) or indirectly (*e.g.* affecting their food supply or supporting habitats). In addition to surface water runoff, potential impacts on the quality of groundwater as a result of passive drainage of contaminated surface water runoff to ground could in turn impact on the water quality of watercourses which are fed by groundwater sources. 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 unlikely that a pollution event of such a magnitude would occur during operation 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 Development having any perceptible effect on water quality during operation.

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

8.8.2.5 Reptiles

No evidence of any protected reptile species, such as common lizard, was identified along the Proposed Development during surveys undertaken. Suitable habitat was identified i.e. railway ballast, scrub, and grasslands. The desktop review returned records for common lizard in the wider surroundings and in the vicinity of the Proposed Development. A precautionary approach has been adopted which has not excluded the possibility of common lizard being present in the vicinity of the Proposed Development during operation.

Habitat Severance / Barrier Effect

Barriers such as railway 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 Development, for the most part, consists of upgrading existing infrastructure, the effect of habitat severance / barrier effect on common lizard is not significant at any geographic scale. The existing infrastructure itself acts as a barrier to common lizard movement across the landscape and the Proposed Development will neither exacerbate nor improve the barrier effect already in existence. Reptiles are known to bask on railway ballast which therefore indicates that railways don't pose a barrier effect that would effect local populations abundance and distribution.

Mortality Risk

The Proposed Development will not result in any increase in terms of mortality risk to common lizard during operation. This is because the Proposed Development is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The impact significance for the existing infrastructure is unlikely to be significant at any geographic scale due to the mobile nature of the species and the noise generated from trains that would prompt a movement response from any reptiles that may be using the railways.

The Proposed Development 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 Development is not significant at any geographic scale.

8.8.2.6 Amphibians

No evidence of any protected amphibian species, such as common frog or smooth newt, were identified along the Proposed Development during surveys undertaken. Further, no suitable habitat for amphibians was identified within the Proposed Development, however suitable habitat exists adjacent to the existing railway, such as in Mosney Accommodation Centre. The desk study returned records of amphibians in the vicinity of the Proposed Development, and therefore impacts on these species cannot be excluded during operation.

Habitat Severance / Barrier Effect

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

Mortality Risk

The Proposed Development will not result in any increase in terms of mortality risk to amphibians during operation. This is because the Proposed Development is largely focused on upgrading existing infrastructure, the mortality risk of which already exists. The impact significance for the existing infrastructure is unlikely to be significant at any geographic scale, due to the lack of habitat within the existing infrastructure corridor. The Proposed Development 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 Development is not significant at any geographic scale.

Habitat Degradation – Surface Water

As discussed in Section 8.8.2.1.1, without the design mitigation incorporated into the design of the Proposed Development, the Operational Phase of the Proposed Development 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 Proposed Development will not exacerbate the existing surface water quality conditions in any of the receiving surface waters, and the design of the development incorporates pollution control measures, in addition to the ongoing maintenance of the railway and substations to ensure the risks are minimised during the Operational Phase. Maintenance activities will be in accordance with IÉ best practice procedures to ensure that no additional risks to waterbodies are encountered. More detail on these can be found in Chapter 10 (Water) in Volume 2 of this EIAR.

Habitat degradation as a result of effects on surface water quality during the Operational Phase does not have the potential to affect the conservation status of amphibians or result in a significant negative effect, at any geographic scale.

8.8.2.7 Fish

Habitat Degradation – Surface Water

As discussed in Section 8.8.2.1.1, without the design mitigation incorporated into the design of the Proposed Development, the Operational Phase of the Proposed Development could result in contamination of receiving water bodies. This could result in significant negative impacts on Atlantic salmon, lampreys, European eel and other fish species either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

The Proposed Development will not exacerbate the existing surface water quality conditions in any of the receiving surface waters, and the design of the development incorporates pollution control measures, in addition to the ongoing maintenance of the railway and substations to ensure the risks are minimised during the Operational Phase.

Maintenance activities will be in accordance with IÉ best practice procedures to ensure that no additional risks to waterbodies are encountered. More detail on these can be found in Chapter 10 (Water) in Volume 2 of this EIAR.

Habitat degradation as a result of effects on surface water quality during the Operational Phase does not have the potential to affect the conservation status of fish and will not result in a significant negative effect, at any local geographic scale.

8.9 Mitigation Measures

8.9.1 Construction Phase Mitigation

A suitably experienced and qualified ecologist (Ecological Clerk of Works (ECoW) will be employed by the appointed contractor to advise on ecological matters during construction, communicate all findings in a timely manner to IÉ and statutory authorities, acquire any licences or consents required to conduct the work, and supervise and direct the ecological measures associated with the Proposed Development.

8.9.1.1 Designated Areas for Nature Conservation

8.9.1.1.1 European sites

The mitigation measures that are required to ensure that the Proposed Development 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 Development 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;
- Measures to prevent the spread of non-native invasive species to downstream European sites;
- Measures to prevent disturbance and displacement of QI/SCI species from European sites and *ex-situ* sites; and
- Measures to prevent habitat degradation as a result of changes to air quality.

The mitigation measures within the NIS are presented in Appendix A5.1 (CEMP), sub-appendix B within Volume 4 of this EIAR.

8.9.1.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Development on pNHAs within the ZoI are as per those for European sites as the boundaries coincide with the SACs and SPAs. Therefore, the mitigation measures outlined above in Section 8.9.1.1.1, and as detailed in the NIS (Scott Cawley Ltd., 2024b, will prevent the Proposed Development resulting in a significant effect on these pNHAs at the national geographic scale.

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

8.9.1.2 Habitats

8.9.1.2.1 Habitat Degradation – Surface Water Quality

A Surface Water Management Plan (SWMP) is included as part of the Construction Environmental Management Plan (CEMP) which outlines appropriate mitigation measures for the Construction Stage (See Appendix A5.1 in Volume 4 of this EIAR). This includes measures relating to:

- A requirement for a Pollution Incident Response Plan;
- Construction Compound management including the storage of any fuels and materials;
- Control of Sediments;
- Use of concrete; and
- Management of vehicles and plant including refuelling and wheel wash facilities, etc.

As well as these generic mitigation measures, other specific mitigation and/or monitoring measures may be required, which will include, but will not be limited to:

- Works in Flood Zones A and B are avoided where possible. In these areas, the Contractor will be required to provide a method statement for the removal of materials and personnel to minimise sediment discharge into the river and risk to personnel during flood events;
- Construction works in areas prone to flooding are to take place during dry seasons. The Contractor must follow the weather forecast prior to commencing instream works and concrete pouring. It is noted that track levels for the entirety of the development are well above flood levels.
- Works areas to be kept dry at all times through the use of bunds of non-erodible material adjacent to watercourses to avoid contaminated water entering the watercourse.
- Settlement tanks, silt traps/bags and bunds will be used where required to remove silt from surface water runoff. Sizing of the tanks will be based on best available guidelines, CIRIA (2006). Any construction work within a 10m buffer zone must be provided with these measures to minimise sediment discharge to a watercourse;
- Refuelling of all plant, machinery, and vehicles will be undertaken only in designated areas where leaks and spills are can be contained relatively easily. Spill kits will be made available on all temporary and permanent construction sites. Refuelling areas must be kept at least 50m away from any watercourse, including, but not limited to; estuarine, transitional, and coastal waterbodies;

- Construction materials to be managed in such a way as to effectively minimise the risk posed to the aquatic environment;
- Construction Compounds and haul roads will avoid high flood risk zones as much as possible and maintain a minimum buffer of 50m from surface watercourses, and
- Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses.

The mitigation measures to protect surface water during the Construction Phase are also outlined in Chapter 10 (Water) in Volume 2 of this EIAR and Appendix A5.1 - CEMP in Volume 4 of this EIAR.

8.9.1.2.2 Habitat Degradation – Groundwater

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

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

The mitigation measures to protect groundwater quantity and quality during the Construction Phase are also outlined in Chapter 11 (Hydrogeology) and Appendix A5.1 - CEMP in Volume 4 of this EIAR.

8.9.1.2.3 Habitat Degradation – Air Quality

The mitigation measures relating to the containment of dust emissions during construction are outlined in Chapter 12 (Air Quality) and Appendix A5.1 – CEMP in Volume 4 of this EIAR. These include standard measures to control nuisance dust such as inspection and cleaning of public roads, measures for stockpiling of materials within the Construction Compound, water misting / spraying, vehicle coverings, and hoarding (2.4m in height) around the Construction Compounds and noise sensitive receptors.

8.9.1.2.4 Habitat Degradation – Non-native Invasive Plant Species

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

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

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

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

8.9.1.3 Mammals

8.9.1.3.1 Bats

Protection of Bats during Vegetation Clearance

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

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

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

While no active roosts were identified during the surveys within the footprint of the Proposed Development, a number of trees will be removed during the Construction Phase of the Proposed Development, and the following mitigation measures will be implemented by the appointed contractor:

- Retained trees will be fenced off at the outset of works (i.e. at Construction Compounds and substations), and for the duration of construction to avoid structural damage to the trunk, branches, or root system of the tree which could disturb roosting bats. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist;
- Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk and strapping stout buffer timbers around it;
- The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g., hydrocarbons) or concrete washout areas will not be undertaken within 10m of any retained trees, hedgerows and treelines;
- A qualified arborist engaged by the appointed contractor will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Development footprint but whose RPA is impacted by the works; and
- All trees and vegetation to be retained within and adjoining the works area will be protected in accordance with the British Standard Institution (BSI) British Standard (BS) 5837:2012 '*Trees in relation to in relation to design, demolition and construction - Recommendations*' (BSI 2012).
- Works required within the root protection area (RPA) of trees to be retained will follow a project-specific arboricultural methodology for such works, which will be prepared by a professional qualified arborist.
- 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, these will be notified to the appointed ecologist to be surveyed to confirm if these trees have potential roost features (PRFs) or have developed PRF(s) during the interim between the surveys and grant of planning.

Where trees with PRF(s) require works including removal for example due to poor condition, they will be subject to mitigation as described below, under the PRF Re-Appraisal; and

- There will be no additional lighting within 5m of any tree with PRFs during the Construction Phase of the Proposed Development to avoid potential disturbance to roosting bats, as far as reasonably practical, but will not involve direct lighting on any roost features.

Roost Loss

As previously mentioned, there are no known roosts within the Proposed Development. However, a number of bridges identified potential roost features within (i.e. OBB33, OBB39, OBB41, OBB44, OBB46, OBB47, OBB49, OBB54, UBB56, UBB65, OBB68, UBB72, OBB78, OBB80/80A/80B, UBB82), and as a number of trees are due to be removed, a precautionary approach is taken to avoid any harm to local bat species. Where reasonably practicable the removal of trees, and modifications of bridges (i.e. parapet modifications, or any other structural works), with PRFs, will occur only between April – May, and September – October to avoid the most sensitive time periods for bats (i.e. during breeding season and hibernation). However, to ensure the protection of bats and if the project timeframe does not allow for this, the following mitigation will be undertaken.

PRF Re-Appraisal (First Step of Pre-Construction Survey

A pre-construction survey of all trees being removed, and of all bridges with bat roosting potential, to rechecked for PRFs will be undertaken by an experienced bat specialist/ecologist engaged by the IÉ as part of the pre-construction surveys. The survey will:

- Confirm trees due for removal with PRFs;
- Confirm PRFs identified in bridges are still suitable for roosting bats and have not become unsuitable in the meantime (i.e., become inundated with water or filled etc.).

Pre-Construction Survey for trees

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

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

Pre-Construction Survey for Bridges

Bridges where proposed works are being undertaken, i.e., demolition at bridge OBB80/80A/80B, parapet modifications, and track lowering beneath bridges, and that have been deemed to have the potential for roosting bats (as described above) by virtue of having potential bat roosting features, will require a pre-construction survey.

Bats could occupy suitable roosting features at any time prior to the commencement of works. Therefore, there is an inherent risk that bats could be affect by the proposed works at bridges. The following mitigation measures will be followed for the aforementioned bridges with bat roosting potential:

- The night prior to the start of works, a bat activity survey will be undertaken to ensure no roosting bats are present. A suitably qualified and experienced ecologist must carry out one bat emergence and one bat re-entry survey during the active bat season (generally taken as mid-April to mid-September inclusive).
- Where a bat roost is encountered, all relevant works will cease and an application for a derogation licence shall be submitted by the suitably qualified/licenced bat specialist to the NPWS to seek permission for the removal of the roost.

Habitat Loss and Fragmentation

Where practicable, habitats of importance to bats such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, that are not directly impacted by the Proposed Development will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be removed is shown on the Landscaping drawings (Figure 15.3) in Volume 3A of this EIAR.

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 and installed to minimise light spill and be cognisant of light-spill onto these areas. However, during construction, the use of security lighting such as that around the Construction Compounds and/or additional lighting required for nighttime works could impact on commuting / foraging territory. Where deemed necessary, a suitably qualified licensed ecologist(s), engaged by the appointed contractor will ensure that lighting at the Construction Compounds and in active work areas, which are in close proximity to watercourses with known bat activity, will be designed to minimise light spill and be cognisant of downward light spill onto watercourses. Mitigation measures to reduce light spill will include the following:

- The use of sensor / timer triggered lighting;
- LED luminaires to be used where practicable due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights to be considered to minimise light spill; and
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed.

Where night-time works are required the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works.

8.9.1.3.2 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).

Disturbance/Displacement

Badgers were identified utilising the lands within the Proposed Development, for foraging and commuting, and 3 setts were identified within the boundary. As badgers could establish new setts between the time of lodgement and construction, a pre-confirmatory pre-construction check will be required of all suitable badger habitat, 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).

Protection of Badgers from Accidental Harm during Construction (Excavations)

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

To protect badgers from indirect harm during construction, where practicable, open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor. Excavations will also be covered at night, or fenced off where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow badgers to safely exit should they fall in.

8.9.1.3.3 Otter

Otter are listed on Annex II and Annex IV of the Habitats Directive and are strictly protected under the Birds and Habitats Regulations. Otter, and their breeding and resting places, are also protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure an otter or to wilfully interfere with or destroy their breeding or resting places (holts / couches).

Otter are known to occur in the vicinity of the Proposed Development, likely across some watercourses in the vicinity of the Proposed Development. Given the ecological sensitivity of these watercourses in particular, the appointed contractor will engage a suitably qualified and/or licensed ecologist to oversee and advise works at watercourse crossings during construction to communicate all findings in a timely manner to the IÉ and statutory authorities, to acquire any licences or consents required to conduct the work, and to supervise and direct the ecological measures associated with the Proposed Development.

Where a newly established otter holt is encountered, within 150 metres (up and downstream) of a watercourse crossing, the qualified ecologist(s) will consult with the NPWS in conjunction with IÉ and appointed contractor. The qualified ecologist will review method statements; oversee works; provide instruction to the appointed contractor(s), deliver toolbox talks and temporarily halt works, if, and as, necessary, having conferred with the IÉ.

Loss of Breeding/Resting Sites

Although there were no holts recorded during field surveys, evidence of otter usage was recorded in a number of areas (as described in Section 8.4.10.1), and otter could potentially establish new holt or couch sites within the ZoI of the Proposed Development.

IÉ will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed by a suitably qualified ecologist within 12-month period prior to any construction works commencing.

Where any new active holts/couches are recorded within 150m of the Proposed Development the appointed ecologist will ensure that adequate mitigation is provided in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (TII, 2006), and a derogation licence is sought from the NPWS where necessary.

Precautionary Mitigation measures for new active holts/couches recorded within 150m of the Proposed Development

Until such time as otters have been successfully evacuated from active holts, the following provisions will apply to all construction works:

- No works will be undertaken within 150m of any holts at which breeding females or cubs are present. Until consultation with NPWS, works closer to such breeding holts may take place - provided appropriate mitigation measures detailed below are in place;
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence; and
- The prohibited working area associated with otter holts will where appropriate, be fenced with temporary fencing prior to any possibly invasive works. Fencing will be in accordance with Clause 303 of the TII's Specification for Roadworks (TII 2011). Appropriate awareness of the purpose of the enclosure will be conveyed through notification to site staff and sufficient signage should be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt.

Measures to Prevent Injury/Mortality Impacts

As detailed above in Section 8.9.1.1.1 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 any watercourses the Proposed Development crosses in accordance with Guidelines for *The Treatment of Otters Prior to the Construction of National Road Schemes* (TII 2006c).

Habitat Degradation/Reduced Prey Availability – Water Quality

In terms of mitigation, a SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).

Disturbance/Displacement

Security lighting in active works areas in close proximity to watercourses with known otter activity will be designed in conjunction with a suitably qualified ecologist to minimise light spill. Similarly, where any new or amended lighting design is required at a watercourse crossing, it should be cognisant of downward light-spill onto watercourses. Measures to reduce light spill may include the following:

- The use of sensor/timer triggered lighting;
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights should be considered to minimise light spill; and
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed.

To prevent otter mortality/injury during operation, an otter tunnel will be constructed in Malahide Estuary, where the River Pill/Turvey flows under the railway line. During construction, there is potential for disturbance/displacement of otters from this location and in the surrounding area. To prevent disturbance and/or displacement of otters, the above mitigation (i.e., pre-construction checks along the watercourse for any active holts/resting place, and subsequent mitigation should they be identified), will apply in this case.

8.9.1.3.4 Marine Mammals

Habitat and Food Source Degradation – Water Quality

In terms of mitigation, a SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).

8.9.1.3.5 Other Mammals

No other protected mammal species were recorded during the multidisciplinary surveys carried out along the Proposed Development. The Construction Phase of the Proposed Development is not deemed to affect the local populations of other small, protected mammal species and will not result in a significant negative effect, at any geographic scale. No additional mitigation is proposed other than the following:

- A SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 10 (Water).
- Where possible, habitats of importance providing refuge / shelter to other protected mammals such as scattered trees and parkland, scrub, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, 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 removed is shown on the Landscaping drawings (Figure 15.3) in Volume 3A of this EIAR. Similar to the mitigation for breeding birds, tree removal, particularly where understorey vegetation is abundant will be undertaken outside of the bird nesting season, but as late in the wintering season (e.g., February) so as to give small resting mammals such as hedgehog that might be hibernating a chance at moving.

8.9.1.3.6 Birds

Breeding Birds

Habitat Loss and Fragmentation

Where possible, habitats of importance to breeding birds such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, 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 removed is shown on the Landscaping drawings (Figure 15.3) in Volume 3A of this EIAR.

Planting of treeline, hedgerow and grassland habitats within the Proposed Development footprint will be carried out by the appointed contractor, as detailed in the landscape drawings. Refer to the Landscaping drawings (Figure 15.3) in Volume 3A of this EIAR for locations. Many species may not nest near a railway development due to disturbance (e.g., drowning out of bird song by construction noise). Whilst the planting is not likely to fully offset the loss of breeding and foraging habitat (due to the proximity of construction traffic disturbance on the operational railway line) it is likely to provide additional foraging habitat for some species.

Mortality Risk

Where reasonably practicable, vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will not be removed, between 1 March and 31 August, to avoid potential 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. This is only relevant for clearance outside of the active railway line. It would not be possible to carry out pre-vegetation checks on an active railway line due to safety concerns. Therefore, any vegetation removal within the railway corridor, will only happen outside of the active nesting bird season.

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.

Disturbance/Displacement

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

To minimise disturbance and/or displacement to breeding birds from noise and vibration activities the relevant mitigation measures as described in Chapter 14 (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.

Wintering Birds

Measures to Prevent Disturbance and Displacement Impacts to non-SCI Birds Due to Vegetation Loss During Construction

Where practicable, the removal of screening or overhanging vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will be undertaken outside of the breeding bird season (01 March to the 31 August) and before the arrival of the wintering birds at the start of October. This is particularly relevant for areas of highly suitable habitat for wintering birds, i.e., the estuaries along the Proposed Development (Malahide Estuary, Rogerstown Estuary, Nanny Estuary). However, where the construction programme does not allow these seasonal restrictions to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to clearance.

Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken.

Where a site Construction Compound is required, its location relative to the Proposed Development is likely to be adjacent to the potential foraging areas. The appointed contractor will undertake the establishment of the following Construction Compounds outside of the wintering bird season (October to March):

- CC-16100 Malahide (Caves Strand)
- CC-15900W Malahide (Bissett's Strand)
- CC-52050, CC-51800, CC-51900 Drogheda Substation/Compounds
- CC-44900 Laytown Construction Compound
- CC-32200 Skerries Substation/Compound
- CC 40200 Gormanston Construction Compound

In addition, the Construction Compound in Malahide (CC-16100 Caves Strand), and the utilities compound in Laytown (CC- 44390E) will only be in use outside of the wintering bird season (October to March, inclusive) to ensure there are no disturbance related impacts to wintering birds foraging and roosting in the surrounding habitats.

As a further precautionary measures, the design of the lighting will ensure that light-spill will not occur in the direction of any adjacent fields. Mitigation measures to reduce light spill will include the following:

- The use of sensor/timer triggered lighting;
- LED luminaires to be used where practicable;
- Column heights to be considered to minimise light spill; and
- Accessories such as baffles, hoods or louvres to be used to reduce light spill and direct it only where needed.

Habitat Degradation – Surface Water Quality

In terms of mitigation, an SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).

8.9.1.3.7 Reptiles

No reptile species were recorded during the multi-disciplinary surveys carried out along the Proposed Development. The Construction Phase of the Proposed Development is not deemed to affect the local reptile population and will not result in a significant negative effect, at any geographic scale. However, mitigation is provided to avoid harm/injury to reptiles that may be using the railway line and verges.

Temporary Fencing

Temporary fencing (such as bitumen felt, tin, carpet tiles, or bitumen onduline) can be used to deter reptiles from moving into areas where development could cause damage to them. The fencing should be structured to ensure that reptiles cannot pass under, over, or through the fence, by ensuring the fencing is buried deep into the ground, and is high enough so reptiles cannot jump over. Temporary fencing is only required in areas where extensive works are taking place (i.e. where OHLE supports are being installed within railway ballast).

Capture Methods

Prior to reptile mitigation methods, such as translocation, reptiles may need to be captured if they do not leave the area on their own accord. The best time to capture reptiles is between March and September and they should not be captured during autumn, in extreme weather conditions, or when they are hibernating. Capturing heavily gravid reptiles will also be avoided. Reptiles will be moved to an area of suitable reptile habitat not at risk from the works outside of the reptile fencing.

Capture methods can involve the following:

- Use of artificial refuges, such as roofing felt;
- Reduction of the amount of suitable habitat. This will help to concentrate the reptiles into specific areas to make it easier to capture them; and
- Using dismantled rubble, rock, or wood piles as refuges to capture the reptiles.

Translocation

Translocation should be undertaken as a last resort and involves moving the reptiles to an alternative location. The new receptor site should be suitable for reptiles and should be as close as possible to the original development site. The receptor site should also be at least the same size as the original habitat, and better quality, where possible.

If the receptor site has an existing species of reptiles, a small number of reptiles may be introduced to the existing population as long as the habitat has been improved to be able to support the additional reptiles.

8.9.1.3.8 Amphibians

Habitat Degradation – Surface Water Quality

In terms of mitigation, an SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).

8.9.1.3.9 Fish

Habitat Degradation – Surface Water Quality

In terms of mitigation, an SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).

8.9.2 Operational Phase Mitigation

8.9.2.1 Designated Areas for Nature Conservation

8.9.2.1.1 European sites

The mitigation measures that are specifically required to ensure that the Proposed Development 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 Development on the identified relevant European sites, the following mitigation measures were developed to address potential impacts that were identified:

- Measures to protect surface water quality during operation;

- Measures to prevent the spread of non-native invasive species to downstream European sites; and
- Measures to prevent direct injury/mortality.

8.9.2.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Development 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 8.9.1.1.1, and as detailed in the NIS (which accompanies the application for a railway order), will likewise prevent the Proposed Development resulting in a significant negative effect on these pNHAs and NHAs.

8.9.2.2 Habitats

8.9.2.2.1 Habitat Degradation – Surface Water Quality

Measures to control the risk of flooding and contamination to local waterbodies and the hydrological environment have been included within the design of the Proposed Development. Maintenance of the railway and substations will be on-going to ensure the risks are minimised during the Operational Phase. Maintenance activities will be in accordance with IÉ best practice procedures to ensure that no additional risks to waterbodies are encountered.

IÉ will also follow and implement its flood risk management operational procedures which assist in managing flood risk for rolling stock during inclement weather and flooding events, these include:

- CCE-TMS-311 - Irish Rail Weather Management Procedures (2017);
- CCE-TEB-2014-05 - Guidance On Alerts And Service Restrictions During Adverse Weather Events; and;
- CME-TMS-001-008 - Operation Of IE RU Rolling Stock On Flooded Track (2016).

These procedures specify how Iarnród Éireann:

- Monitors and disseminates applicable weather warnings from Met Éireann;
- Prepares and implements local weather management plans for predicted adverse weather events;
- Sets out recommended flood level limits for their rolling stock passing over flooded tracks; and
- Sets out actions to be undertaken by duty managers, drivers, signallers etc when high water alerts are issued.

Operational limits have been specified for the different rolling stock (i.e., types of trains) within their fleet, as shown in Image 8-4 The limits have been set to avoid damage to critical onboard equipment and to mitigate against the risk of a train becoming disabled in a flooded area. The limits are also subject to change depending on the track and weather conditions. It is important to note that no trains may operate over flooded track until permitted to do so by IÉ's Infrastructure Department. The (Electric Multiple Units) EMU is the type of rolling stock of primary concern for this study. The maximum limit identified within the procedure for the EMU is the top of the railway track. A typical railway track is approximately 170mm deep from ground level.

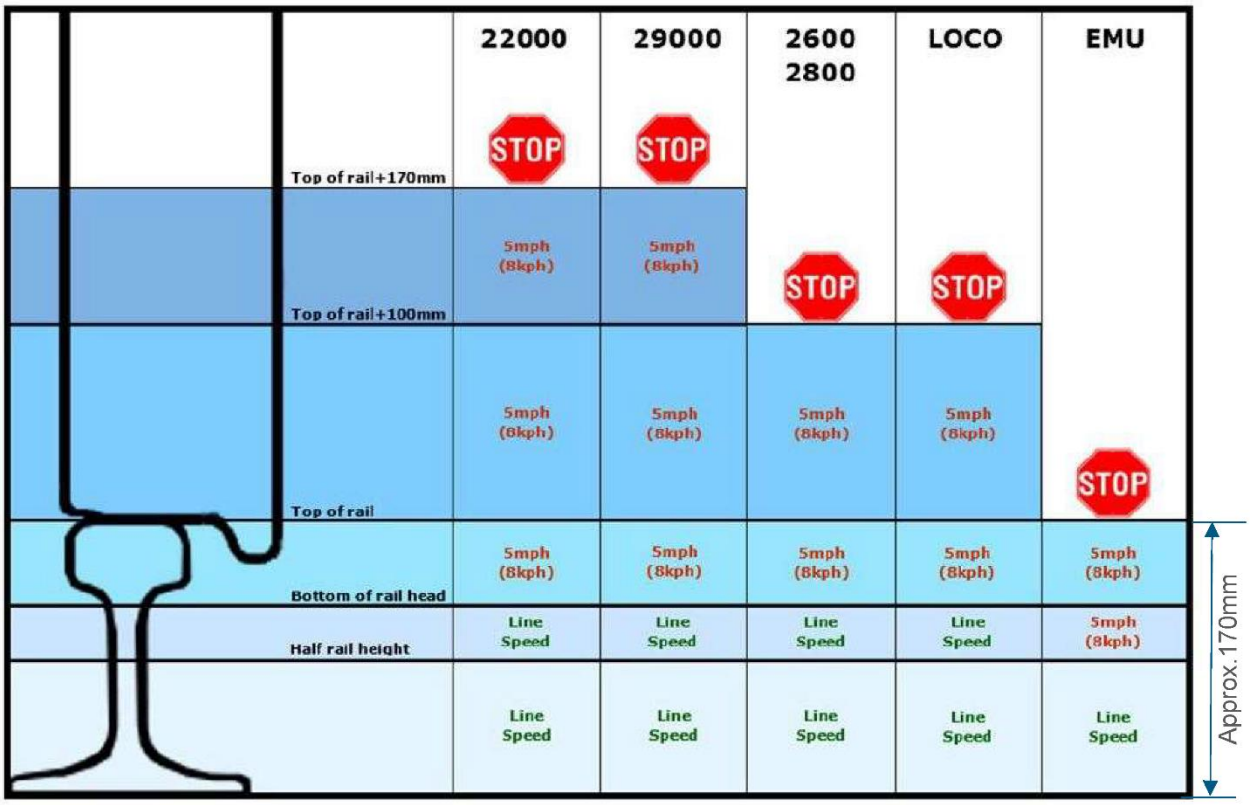

Image 8-4 Iarnród Eireann RU Rolling Stock Operating Procedure on Flooded Track Condition

8.9.2.2.2 Habitat Degradation – Groundwater

With the implementation of the proposed design, no additional mitigation measures for hydrogeology are considered necessary for the operation of the Proposed Development.

In the Operational Phase the infrastructure will be maintained by IÉ and will be subject to their management procedures to ensure that the correct measures are taken in the event of any accidental spillages. This will reduce the potential for any impact.

8.9.2.2.3 Habitat Loss

Whilst the habitat loss of the Proposed Development was not deemed to be significant at any geographic scale during the Construction or Operational Phase, an area of habitat adjacent to the Proposed Development (to the east of the existing user worked level crossing (XB001) in Malahide Estuary which is being closed – i.e. no future access to third parties). This area will be left as a wildlife refuge during construction and operation and will no longer be used for agricultural use. As some management is required so the area does not become overcome with rank and fast-growing grasses, less intensive maintenance will be required on a yearly basis, such as:

- Staggering cutting regime to allow small mammals to move freely through the site;
- Once a year mowing of grassland to reduce the dominance of rank, perennial grass species which will encourage more plant diversity to develop, and allow flowering and seed heads to be retained for pollinators;
- Some areas left in winter in order to provide cover and food sources for local birds;

- No use of pesticides and herbicides.

More details on the management of this area can be found in Appendix A8.8 in Volume 4 of this EIAR.

8.9.2.3 Mammals

8.9.2.3.1 Bats

Indirect Disturbance of Flight Patterns Due to Operational Lighting

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

Excess light spill from the Proposed Development may result in avoidance behaviour from bats within the vicinity of the Proposed Development. Where feasible, operational lighting will be kept to a minimum, and PIR lighting used, and light spill avoided. There are no significant effects on bats predicted during the Operational Phase of the Proposed Development.

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

8.9.2.3.2 Badger

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

8.9.2.3.3 Otter

Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on otter, refer to Section 8.9.2.1.1.

Direct Injury/Mortality

To prevent otter mortality/injury during operation, an otter tunnel will be constructed in Malahide Estuary, where the River Pill/Turvey flows under the railway line. During construction, there is potential for disturbance/displacement of otters from this location and in the surrounding area. To prevent disturbance and/or displacement of otters, the above mitigation (i.e. pre-construction checks along the watercourse for any active holts/resting place, and subsequent mitigation should they be identified), will apply in this case.

Full details of the construction of this otter tunnel are included in Section 5.5.7 of Chapter 5 (Construction Strategy) of this EIAR. The proposed otter crossing in Malahide where the River Pill/Turvey flows under the railway, will comprise a 600mm diameter pipe (as per TII guidance 2006c) which will pass beneath the railway close to Underbridge UBB31.

The pipe will have a crossfall over its length and the pipe has been set at a level to avoid flooding from high tides. At either end of the pipe, an otter-proof fence will extend for at least 100m in each direction, to encourage the otters to make use of the crossing. The fence is partially buried to prevent the otters from burrowing beneath.

8.9.2.3.4 Marine Mammals

Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on marine mammals, refer to Section 8.9.2.1.1.

8.9.2.3.5 Other Mammal Species

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

8.9.2.3.6 Birds

Breeding Birds

Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on breeding birds, please refer to Section 8.9.2.1.1.

Wintering Birds

Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on wintering bird species, please refer to Section 8.9.2.1.1.

Direct Injury/Mortality

For mitigation to avoid the effects of direct injury/mortality to wintering bird species, please refer to Section 8.9.2.1.1.

8.9.2.3.7 Reptiles

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

8.9.2.3.8 Amphibians

Habitat Degradation- Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on amphibians, please refer to Section 8.9.2.1.1.

8.9.2.3.9 Fish

Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on fish, please refer to Section 8.9.2.1.1.

8.9.3 Decommissioning

The DART+ Coastal North project is providing rail infrastructure which will enable an increase in frequency and capacity on the Northern Line and the Howth Branch in the coming years. It is not intended that this infrastructure will be decommissioned, but rather, as the infrastructure reaches the end of its design life, it will likely be refurbished or renewed to enable continued operation of the railway. Any such future renewal or refurbishment may require additional construction works, which would be similar to, but of a much lesser impact (in terms of extent and duration) than, the Construction Phase associated with the DART+ Coastal North project.

8.10 Residual Impacts

8.10.1 Construction Phase

Following the implementation of the mitigation measures outlined in Section 8.9.1, the Proposed Development will not result in any significant residual effects above the local scale on the KERs identified on its own, or cumulatively together with other Proposed Developments during the Construction Phase.

8.10.2 Operational Phase

Following the implementation of the mitigation measures outlined in Section 8.9.2 the Proposed Development will not result in any significant residual effects on the KERs identified on its own, or cumulatively together with other Proposed Developments during the Operational Phase.

8.11 Assessment of Cumulative Effects

The Cumulative Assessment of relevant plans and projects is undertaken separately in Chapter 26 (Cumulative Effects) in Volume 2 of this EIAR.

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