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Appendix A

The Qualifying Interests (QIs) and Special Conservation Interests (SCIs) of the European sites in the vicinity of the proposed development site

Appendix B

SCI wintering bird species recorded during the 2018-2019, 2019-2020 and 2020-2021 wintering bird surveys.

Appendix C

SCI breeding bird species recorded during the 2018, 2019 and 2020 breeding bird surveys

Appendix D

Records of fauna listed under the Habitats and Birds Directives from the desktop study in the vicinity of the study area

Appendix E

Records of Invasive Species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 in the vicinity of the study area.

1. Introduction

This report, which contains information required for the competent authority to undertake a screening for Appropriate Assessment (AA), has been prepared by Scott Cawley Ltd. on behalf of the applicant, Transport Infrastructure Ireland (TII). It provides information on, and assesses the potential for, the proposed Project to impact on the Natura 2000 network (hereafter referred to as European sites)¹. The proposed Project is the MetroLink project (hereinafter referred to as the proposed Project).

An AA is required if significant effects on European sites arising from a proposed development cannot be ruled out at the screening stage, either alone or in combination with other plans or projects. It is the responsibility of the competent authority to make a decision as to whether or not the proposed development is likely to have significant effects on European sites, either individually or in combination with other plans or projects.

For the reasons set out in detail in this AA Screening Report, an **Appropriate Assessment of the proposed Project is required in this instance** as it cannot be concluded, on the basis of objective information, that the proposed Project, either individually or in combination with other plans or projects, will not have a significant effect on the following European site(s): **Baldoyle Bay SAC, Malahide Estuary SAC, North Dublin Bay SAC, South Dublin Bay SAC, Wicklow Mountains SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SPA, North Bull Island SPA, Rockabill SPA, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, and The Murrough SPA.**

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 conservation areas 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).

2. Methodology

2.1 Guidance

This Appropriate Assessment Screening Report has been prepared with regard to the following guidance documents, as relevant.

2.1.1 European Commission Guidance

- Assessment of Plans and Projects in Relation to Natura 2000 sites: Methodological Guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2021);
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC (European Commission, 2019);
- Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC. Clarification of the Concepts of Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence. Opinion of the European Commission (European Commission January 2007, updated 2012);
- Communication from the Commission on the Precautionary Principle (European Commission 2000)²;
- Nature and Biodiversity Cases – Ruling of the European Court of Justice (European Commission 2006); and
- Article 6 of the Habitats Directive – Rulings of the European Court of Justice (European Commission Final Draft September 2014).

2.1.2 Irish Guidance

- OPR Practice Note PN01. Appropriate Assessment Screening for Development Management (Office of the Planning Regulator, 2021);
- Applications for Approval for Local Authority Developments made to An Bord Pleanála under 177AE of the Planning and Development Act, 2000, as amended (Appropriate Assessment) – Guidelines for Local Authorities (An Bord Pleanála, 2013);
- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of Environment, Heritage and Local Government 2010 revision); and
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10 (NPWS, 2010).

2.1.3 UK Guidance

- *Sustainability and Environmental Appraisal LA 115 Habitats Regulations assessment* (formerly HD 44/09) (Design Manual for Roads and Bridges, UK Highways Agency September 2019); and
- *Habitat Regulations Assessment Advice Note 10: Habitats Regulations Assessment relevant to nationally significant infrastructure projects Version 8* (The Planning Inspectorate, November 2017).

² The precautionary principle is a guiding principle that derives from Article 191 of the Treaty on the Functioning of the European Union and has been developed in the case law of the European Court of Justice (e.g. ECJ case C-127/02 – Waddenzee, Netherlands).

This guidance document notes that the precautionary principle “covers those specific circumstances where scientific evidence is insufficient, inconclusive or uncertain and there are indications through preliminary objective scientific evaluation that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the chosen level of protection”.

Applying the precautionary principle in the context of screening for appropriate assessment requires that where there is uncertainty or doubt about the risk of significant effects on a European site(s), it should be assumed that significant effects are likely, and AA must be carried out.

2.1.4 Other International Guidance

- Methodological Guideline for Impact Assessment of Transportation Infrastructure Significantly Affecting Natura 2000 Sites – Guidance on the provisions of Article 6(3, 4) of the Habitats Directive (Federal Ministry of Transport, Building and Housing of the Federal Republic of Germany 2004).

In addition, the following guidance has informed the approach to characterising impacts, including determining magnitude and significance of impacts, as relevant in the application to Appropriate Assessment and European sites:

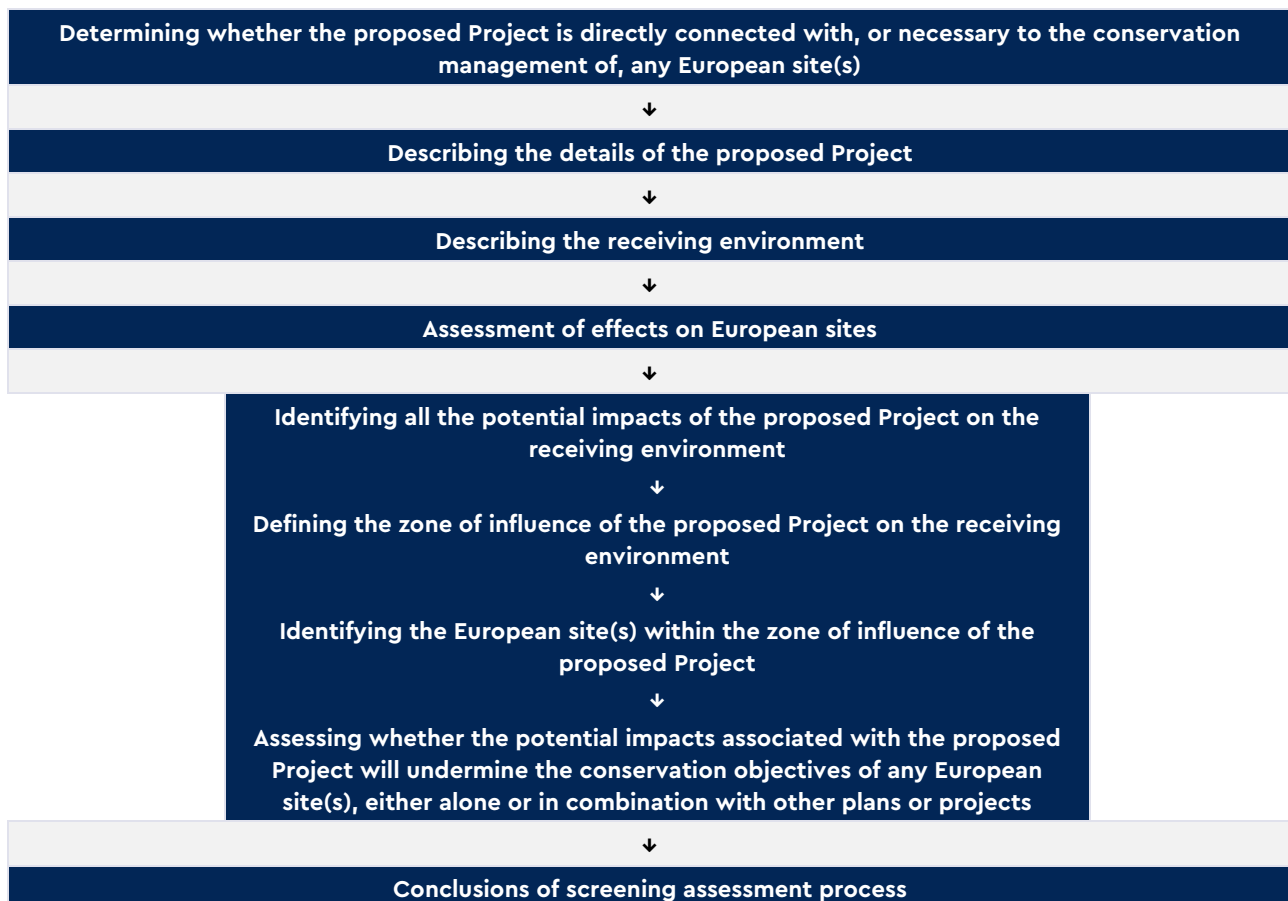
- Guidelines for Ecological Impact Assessment in the UK and Ireland* (Chartered Institute of Ecology and Environmental Assessment, 2018);
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2022);
- Environmental Guidelines Series for Planning and Construction of National Roads* (National Roads Authority, 2005-2009); and
- A guide to the assessment of air quality impacts on designated nature conservation sites* (Institute of Air Quality management, 2020)

2.2 Assessment Methodology

The above referenced guidance sets out a staged process for carrying out Appropriate Assessment. To determine if an Appropriate Assessment is required, documented screening is required. Screening identifies the potential for effects on the conservation objectives of European sites, if any, which would arise from a proposed plan or project, either alone or in combination with other plans and projects (i.e. likely significant effects).

Significant effects on a European site are those that would undermine the conservation objectives supporting the favourable conservation condition of the Qualifying Interest (QI) habitats and/or the QI/Special Conservation Interest (SCI) species of a European site(s).

Screening for Appropriate Assessment involves the following steps:



If the conclusions at the end of screening are that there is no likelihood of significant effects occurring on any European sites as a result of the proposed plan or project, either alone or in combination with other plans and projects, then there is no requirement to undertake an Appropriate Assessment.

In establishing which European sites are potentially at risk (in the absence of mitigation) from the proposed Project, a source-pathway-receptor approach was applied. In order for an impact to occur, there must be a risk enabled by having a source (e.g. water abstraction or construction works), a receptor (e.g. a European site or its QI(s) or SCI(s)³), and a pathway between the source and the receptor (e.g. pathway by air for airborne pollution, or a pathway by a watercourse for mobilisation of pollution). For an impact to occur, all three elements must exist; the absence or removal of one of the elements means there is no possibility for the impact to occur.

The identification of source-pathway-receptor connection(s) between the proposed Project and European sites essentially is the process of identifying which European sites are within the Zone of Influence (ZOI) of the proposed Project, and therefore potentially at risk of significant effects. The ZOI is the area over which the proposed Project could affect the receiving environment such that it could potentially have significant effects on the QI habitats or QI/SCI species of a European site, or on the achievement of their conservation objectives⁴.

The identification of a source-pathway-receptor link does not automatically mean that significant effects will arise. The likelihood for significant effects will depend upon the characteristics of the source (e.g., extent and duration of construction works), the characteristics of the pathway (e.g. direction and strength of prevailing winds for airborne pollution) and the characteristics of the receptor (e.g. the sensitivities of the European site and its QIs/SCIs).

The 'likely significant effects' test is based on the precautionary principle⁵. The precautionary principle means that, based on the most reliable available information, where there is uncertainty or doubt as to the absence of significant effects, the project cannot be screened out and an appropriate assessment must be carried out.

2.3 Desktop Data Review

The desktop data sources used to inform the assessment presented in this report are as follows:

- Online data available on European sites, including habitat and species GIS datasets, and conservation objectives (and supporting) documents, as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie⁶;
- Information on the status of EU protected habitats and species in Ireland (National Parks & Wildlife Service, 2019a, 2019b);
- Online protected species datasets held by the National Biodiversity Data Centre from <http://maps.biodiversityireland.ie>;
- Information on the *Birds of Conservation Concern in Ireland 4: 2020 – 2026* (Gilbert *et al.*, 2021);

³ The term *qualifying interest* is used when referring to the habitats or species for which an SAC is designated; the term *special conservation interest* is used when referring to the bird species (or wetland habitats) for which an SPA is designated.

⁴ As defined in the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2018)

⁵ The precautionary principle is a guiding principle that derives from Article 191 of the Treaty on the Functioning of the European Union and has been developed in the case law of the European Court of Justice (e.g., ECJ case C-127/02 – Waddenzee, Netherlands).

The guidance document *Communication from the Commission on the Precautionary Principle* (European Commission, 2000) notes that the precautionary principle "covers those specific circumstances where scientific evidence is insufficient, inconclusive or uncertain and there are indications through preliminary objective scientific evaluation that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the chosen level of protection".

⁶ The following SAC and SPA GIS boundary datasets are the most recently available at the time of writing: SAC_ITM_2022_06 and SPA_ITM_2021_10.

- Environmental information/data for the area (including water quality) available from www.epa.ie (Envision Online Environmental Map Viewer - <http://gis.epa.ie>);
- Information on soils, geology and hydrogeology in the area available from <http://www.gsi.ie>;
- Information on land-use zoning from the online mapping of the Department of the Environment, Community and Local Government www.myplan.ie;
- *National Biodiversity Action Plan 2017 – 2021* (Department of Culture, Heritage and the Gaeltacht, 2017);
- *Fingal Development Plan 2017-2023* (Fingal County Council, 2017);
- *Draft Fingal Development Plan 2023-2029* (Fingal County Council, 2022);
- *Draft Fingal Biodiversity Action Plan 2022-2030* (Fingal County Council, 2022);
- *Fingal Biodiversity Action Plan 2010-2015* (Fingal County Council, 2010);
- *Draft Dublin City Development Plan 2022-2028* (Dublin City Council, 2022);
- *Dublin City Development Plan 2016-2022* (Dublin City Council, 2016);
- *Dublin City Biodiversity Action Plan 2021-2025* (Dublin City Council, 2021);
- *Dún Laoghaire-Rathdown County Development Plan 2022-2028* (Dún Laoghaire-Rathdown County Council, 2022);
- *Dún Laoghaire-Rathdown County Biodiversity Plan 2021-2025* (Dún Laoghaire-Rathdown County Council, 2021);
- *South Dublin County Council Development Plan 2022-2028* (South Dublin County Council, 2022);
- *Connecting with Nature: Draft Biodiversity Action Plan for South Dublin County 2020-2026* (South Dublin County Council, 2020);
- Documentation submitted as part of the previous Metro North scheme *Environmental Impact Statement – Metro North* (RPA, 2008) including data presented in Chapter 16 Flora and Fauna;
- Documentation submitted as part of the route selection stage of the proposed Project as presented in *New Metro North Alignment Options Study* (Arup, 2018);
- The results of ecological surveys undertaken as part of the Environmental Impact Assessment (EIA) studies for the proposed Project (see Section 3.4 below for details);
- Information on the location, nature and design of the proposed Project supplied by the applicant's design team; and
- Information relevant to biodiversity contained within the EIAR which this report will accompany, in particular Chapter 13 (Airborne Noise & Vibration), Chapter 16 (Air Quality), Chapter 18 (Hydrology), Chapter 19 (Hydrogeology), Chapter 20 (Soils & Geology), Chapter 27 (Landscape & Visual) of the EIAR.

2.4 Consultations

Relevant organisation/bodies were consulted with respect to the proposed Project. Key stakeholders were also consulted during the AA process prior to the submission of the Railway Order. The form of these consultations included written correspondence, telephone conversations and in-person meetings. The consultations relevant to Appropriate Assessment are described in more detail below.

2.4.1 Department of Housing, Local Government and Heritage (NPWS)

A meeting was held with the NPWS on 13 November 2020. NPWS made the following comments/observations relevant to the preparation of this NIS:

- Grassland sites are being used by Special Conservation Interest (SCI) bird species of Special Protection Areas and there is potential for habitat loss in these areas.
- Requirement for an Ecological Clerk of Works during the construction of the proposed Project.

These recommendations have been taken on board and implemented throughout the examination and analysis of this AA Screening, where relevant. The use of grassland sites by SCI bird species is addressed throughout the report, including under Section 3.4.4.2 (Overview of Receiving Environment – Winter Bird Survey) and Section 3.5 (Assessment of Effects on European Sites).

2.4.2 Fingal County Council (FCC)

Fingal County Council (FCC) responded to the scoping consultation request on the 2 August 2019. Their response included the following observations relevant to the preparation of the NIS:

- Consideration should be had of potential noise impacts on habitats and species within Malahide/Broadmeadow Estuary at Swords (*i.e.* within which Malahide Estuary SAC and Malahide Estuary SPA are located) during construction and/or operation of the proposed Project;
- Ensure that European sites located within 15km of the proposed alignment (*i.e.*, "linear site") are fully reviewed and analysed and that sites in excess of this 15km distance are effectively screened in or out as appropriate;
- Consideration of sites utilised by birds for feeding, especially overwintering birds and that overwintering surveys are undertaken as part of the EIAR and Natura Impact Statement (NIS) especially where there are indications that overwintering birds use existing fields or green spaces that may be impacted by construction or operation – *i.e.* a desk study may not be sufficient and therefore field survey is recommended; and
- Consultation with FCC Biodiversity Officer is recommended.

A biodiversity meeting was held on 25th August 2020 with FCC and included the attendance of FCC Biodiversity Officer. FCC made the following comments/observation at the meeting relevant to the preparation of this NIS

- Ecological baseline (as presented in Section 3.4) is consistent with FCC records.
- Atlantic salmon *Salmo salar* are known to spawn in the Ward River.
- Consideration required of the scale of habitat loss.

These observations and comments have been taken on board and implemented throughout the AA Screening, where relevant. Potential noise impacts, review and analysis of European sites within 15km of the proposed Project (and beyond) and the use of sites by SCI bird species are all addressed throughout the report, under section 3.5. The FCC Biodiversity Officer was consulted, and their comments/observations were addressed within the AA Screening as described below.

FCC records were reviewed for consistency with Section 3.4. With respect to AA, the proposed Project is not hydrologically connected to any European site designated for any Annex II Qualifying Interest fish species, including Atlantic salmon. The nearest known European site designated for Salmon is the River Boyne and River Blackwater SAC, located c. 28.6km north-west of the proposed Project in the Boyne River catchment. Habitat loss is considered under Section 3.5.3.

1.1.1 Dublin City Council (DCC)

Dublin City Council (DCC) responded to the scoping consultation request on the 4 July 2019. Their response included the following observations relevant to the preparation of the NIS:

- Consultation with DCC Biodiversity Officer is recommended.

A biodiversity meeting was held on 21 May 2020 with DCC and included the attendance of DCC Biodiversity Officer. DCC made the following comments/observation relevant to the preparation of this NIS:

- Consideration of Santry River:
 - Its hydrological connectivity to North Bull Island;
 - Numerous bird surveys have been undertaken by DCC on the Santry River;
 - Issues with respect to illegal poaching along the Santry River;
 - Potential for impacts due to proposed works located north-west of Santry Demesne;
 - Protection of woodland at Santry Demesne as it provides an important flightpath for light-bellied brent goose (a species that seasonally retreats inland due to the depletion of eelgrass *Zostera* sp. in Dublin Bay);

- Plans to restore/rehabilitate the Santry River.
- Presence of Indian balsam *Impatiens glandulifera* in Ballymun.
- Presence of coot *Fulica atra* in Darndale Park. This species was noted as being uncommon and DCC are gathering information on it.
- Consideration of the avoidance of habitat loss through design, compensation/offsetting of habitat loss and potential for enhancement.
- Requirement for post-construction monitoring.
- Consideration for the DCC updated Biodiversity Action Plan, which is currently underway and will be published in 2021⁷.
- Consideration of local area plans and Park Strategy.

These observations and comments have been taken on board and implemented throughout the AA Screening, where relevant. As recommended by DCC, the DCC Biodiversity Officer was consulted. Potential impacts to the Santry River and associated species relevant to AA have been considered throughout the report, including under Section 3.4 and 3.5. Habitat loss and Non-native invasive plant species, including Indian Balsam, have been addressed under Section 3.5 also. DCC updated Biodiversity Plan (Draft Dublin City Biodiversity Action Plan 2021-2025), local area plans and Park Strategy have been considered.

2.4.3 Inland Fisheries Ireland (IFI)

IFI provided fish records for the proposed crossing points on the 27 July 2018.

The IFI responded to the scoping consultation request on the 5 June 2019. Their response included the following observations generally relevant to Appropriate Assessment:

- There are known records of the Annex II Qualifying Interest fish species Atlantic salmon *Salmo salar* in the Turvey river system, the lower reaches of the Broadmeadow River and Ward River system, the River Tolka and the River Liffey system;
- With regards to the River Tolka, it is noted that it has "*a particularly important nursery function for salmonid species throughout... [and that] salmon were recorded in the Glasnevin area in 2017*";
- The River Tolka is also known to support populations of the Annex I Qualifying Interest species Lamprey *Lampetra sp.*;
- With regards to the Liffey, it is noted that it "*supports a regionally significant population of Atlantic salmon*" and that it "*serves as the natural linkage for species such as salmon... providing the necessary habitat for their transition*";
- It is also noted that "*previous surveys in the Dublin city area of the Liffey have recorded... river lamprey [L. fluviatilis]*"; and
- It is noted that whilst both the Cuckoo River and Mayne River are non-salmonid systems, the "*IFI are currently assessing the viability of a salmonid reintroduction programme*".

With regards to water protection measures, the IFI recommended that the Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016) is consulted for any proposed works undertaken near any of the relevant rivers and streams and that the "*maintenance of habitat integrity (both in-stream and riparian) is essential in safeguarding the ecological value of this important urban natural resource*". They also recommended that "*A comprehensive and integrated approach for achieving estuary and river protection during construction and operation should be implemented through environmental construction management planning*".

⁷ To note that this plan was subsequently published and was included as part of the Desktop Data Review (Section 2.3) for this assessment.

In accordance with the IFI recommendations, fisheries surveys (i.e., electro-fishing and habitat suitability assessments for salmonid and lamprey species) were undertaken at the eight watercourses crossed by the proposed Project on the 28 and 29 September 2018. With respect to AA, the proposed Project is not hydrologically connected to any European site designated for any Annex II Qualifying Interest fish species (including Atlantic salmon and lamprey species). The nearest known European site designated for Salmon, River Lamprey and Brook Lamprey is the River Boyne and River Blackwater SAC, located c. 28.6km north-west of the proposed Project in the Boyne River catchment.

A biodiversity and hydrology meeting was held on 31 August 2020 with IFI and included the attendance of DCC biodiversity officer. DCC made the following comments/observation relevant to the preparation of this chapter of the EIAR:

- Design of culverts.
- Requirement to translocate fish from impacted river channel prior to any temporary diversion works occurring and that this activity must be undertaken by licenced contractors authorised under Section 14 of the Fisheries (Consolidation) Act, 1959.
- Implementation of Sustainable Drainage Systems (SUDS) to reduce amounts of surface water being discharged into watercourses as well as the use of hydrocarbon petrol interceptors.
- Requirement for protective measures during construction especially in the context of management of silt.

These observations and comments have been taken on board and implemented throughout the AA Screening, where relevant. As previously mentioned, with respect to AA, the proposed Project is not hydrologically connected to any European site designated for any Annex II Qualifying Interest fish species.

2.5 Baseline Surveys

2.5.1 Ecological Surveys

This section provides an outline of the various ecological survey methodologies used to collate baseline ecological information in the preparation of this report. A summary of the ecological surveys undertaken to inform the preparation of this AA Screening report are provided in Table 1 and include: habitat surveys; the assessment of the biological water quality status of watercourses; surveys for the presence or signs of terrestrial, mobile Annex II species (i.e. otter *Lutra lutra*); and, surveys for Special Conservation Interest bird species. Additional fisheries surveys (i.e. electro-fishing and habitat suitability assessments for salmonid *Salmo salar* and lamprey species *Lampetra species*) and macroinvertebrate surveys (i.e. white-clawed crayfish *Austropotamobius pallipes*) were undertaken at the proposed crossing points of the proposed Project; however the results of these surveys are not directly relevant to this assessment as the proposed Project is not hydrologically connected to any European site designated for Annex II fish species or white-clawed crayfish. The nearest known European site designated for Salmon, River Lamprey and Brook Lamprey is the River Boyne and River Blackwater SAC, located c. 28.6km north-west of the proposed Project in the Boyne River catchment. The nearest known European site designated for white-clawed crayfish is the River Barrow and River Nore SAC, which is located c. 52km south-west of the proposed Project in the River Barrow catchment, River Nore catchment and River Ballyteigue - Bannow River catchment. A detailed description of those ecological surveys relevant to this assessment along with their respective study areas are provided below.

Table 1. Ecological Surveys and Survey Dates between 2018 and 2020. Rows highlighted in green correspond to those ecological surveys relevant to the Appropriate Assessment

Survey	Survey Date(s)	Surveyor(s)
Amphibian habitat suitability assessment	April 2018 February and March 2020 February 2021 June and July 2021	Scott Cawley Ltd. Triturus Environmental Services Ltd.

Survey	Survey Date(s)	Surveyor(s)
Assessment of biological water quality status	September 2018	Triturus Environmental Services Ltd.
Aquatic macroinvertebrate survey of Royal Canal basin	June 2021	Triturus Environmental Services Ltd.
Bat surveys: Building surveys	July, August and September 2018 July, August, September, November 2019 July, August and September 2020	Scott Cawley Ltd.
Walked transect activity surveys	June, July and August 2018 July, August and September 2019 July and August 2020	
Static detector activity surveys	June, July and August 2018 August 2019	
Identification of potential bat tree roosts	April 2018 March 2020 July 2021	
Breeding bird surveys	April, May and June 2018 April, May and June 2019 May and June 2020	Scott Cawley Ltd.
Fisheries surveys (including survey of macrophytes and assessment of biological water quality status)	September 2018	Triturus Environmental Services Ltd.
Habitat surveys (including non-native plant species and detailed aquatic survey of Royal Canal basin)	May, June and September 2018 June and September 2019 June, July and October 2020 February 2021 June 2021	Scott Cawley Ltd. Triturus Environmental Services Ltd.
Invasive species survey at Glasnevin	March 2020	Jacobs Engineering Ireland Ltd.
Mammal surveys	April 2018 February and March 2020 February and March 2021 June and July 2021	Scott Cawley Ltd.
Otter survey	April 2018 February and March 2020 June 2021	Scott Cawley Ltd.
Reptile habitat suitability assessment	May, June and September 2018 July and September 2019 June, July and October 2020 February 2021 June and July 2021	Scott Cawley Ltd.
White-clawed crayfish survey	September 2018	Triturus Environmental Services Ltd.
Wintering bird surveys	November and December 2018 January and March 2019	Scott Cawley Ltd.

Survey	Survey Date(s)	Surveyor(s)
	January, February, March, November and December 2020 January, February and March 2021	Jacobs Engineering Ireland Ltd.

2.5.1.1 Habitats and Flora Survey

Habitat surveys were carried out on 28 May 2018, 13 to 15 June 2018, 4 September 2018, 5 and 15 July 2019, 19 and 20 September 2019, 26 and 30 June, 2 July 2020, 22 October 2020 and 26 February 2021. Instream aquatic habitats were surveyed by Triturus Environmental Services on the 28 and 29 September 2018. All habitats located within the ZOI of the proposed Project were surveyed and mapped to level three of the Heritage Council's habitat codes, after Fossitt (2000) and in accordance with Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.*, 2011). The likelihood/potential for Annex I habitat types was inferred where possible based on the professional judgement of the surveyor, with reference to the Interpretation manual of European Union Habitats EUR 28 (European Commission, 2013) and definitions of Annex I habitat types published in 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 (European Commission, 2013) with abbreviated names after those used in The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview (NPWS, 2019d). The level of field data quality (as per Smith *et al.*, 2011) was also recorded. Plant species present that were either representative of a habitat or considered to be of conservation interest were recorded, along with their relative abundances. The habitat's extent was mapped onto an aerial photograph, with GPS points taken where a habitat's extent could not be clearly identified from the aerial photograph. Vascular plant nomenclature follows that of the New Flora of the British Isles 4th Edition (Stace, 2019); bryophyte nomenclature follows the Checklist of British and Irish Bryophytes (BBS, 2009 and 2020).

A dedicated invasive species survey was undertaken on 19 March 2020 by an Ecologist from Jacobs Engineering Ireland Ltd. at lands within and immediately surrounding the proposed Glasnevin Station location (i.e. comprising the embankment of the existing railway line and lands in close proximity to the proposed Glasnevin station).

2.5.1.2 Assessment of biological water quality status

Macro-invertebrate samples were collected by Triturus Environmental Services Ltd. at the following eight watercourses crossed by the proposed Project between the 28 and 29 September 2018: Turvey River (Staffordstown stream), Broadmeadow River, Ward River, Sluice River, Cuckoo River, Mayne River, Santry River and Tolka River. All Q₂-samples were taken with a standard kick sampling net (i.e. 250mm in width and with a 500µm mesh size) from riffle/glide habitat, utilising a three minute per sample approach. Large cobble was also washed at each site where present and samples were elutriated and fixed in 70% ethanol for laboratory identification. Macro-invertebrate samples were converted to Q₂-ratings as per Toner *et al.* (2005). The reference classes for Q₂-rating are shown in Table 2.

Table 2. Description of Reference classes for each EPA Q-Value ratings (after Toner et al., 2005)

Q-Value	Water Framework Directive Status	Pollution Status	Condition
Q5 or 4-5	High Status	Unpolluted	Satisfactory
Q4	Good Status	Unpolluted	Satisfactory
Q3-4	Moderate Status	Slightly Polluted	Unsatisfactory
Q3 or 2-3	Poor	Moderately Polluted	Unsatisfactory
Q2, 1-2 or 1	Bad	Seriously Polluted	Unsatisfactory

2.5.1.3 Breeding Bird Survey

Breeding bird surveys were conducted as three visits per season in April, May and June 2018, April, May and June 2019, and May and June 2020 using a methodology adapted from the Breeding Bird Survey

(Gilbert et al., 1998). The survey season in 2020 coincided with the imposition of emergency restrictions on citizen's movement by the Irish Government, in connection with the early stages of the COVID-19 pandemic. Scott Cawley did not undertake field surveys between late March and mid-May 2020 due to these restrictions. Therefore, three surveys were conducted in 2020 between late May and late June. The timing of these surveys was late in the season, however given the completion of surveys across multiple years, the timing of the surveys in 2020 have not imposed any limitations on the survey outcomes or this assessment. All suitable breeding bird habitat located within c. 150m of the proposed Project were slowly walked in a manner allowing the surveyor to come within c. 50m of all habitat features (see Figure 1 overleaf for survey corridor). 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. The conservation status of the bird species was recorded as per:

- Birds of Conservation Concern in Ireland (BoCCI) lists which classify bird species into three categories: Red List – birds of high conservation concern; Amber List – birds of medium conservation concern; and Green List – birds not considered threatened (Gilbert et al., 2021);
- Bird species listed on Annex I of the EU Birds Directive (2008/144/EC); and
- Special Conservation Interest (SCI) species of Special Protection Areas (SPAs) within the ZOI of the proposed Project.

With regards to this AA Screening, relevant bird species recorded are SCI species of SPAs within the ZOI of the proposed Project.

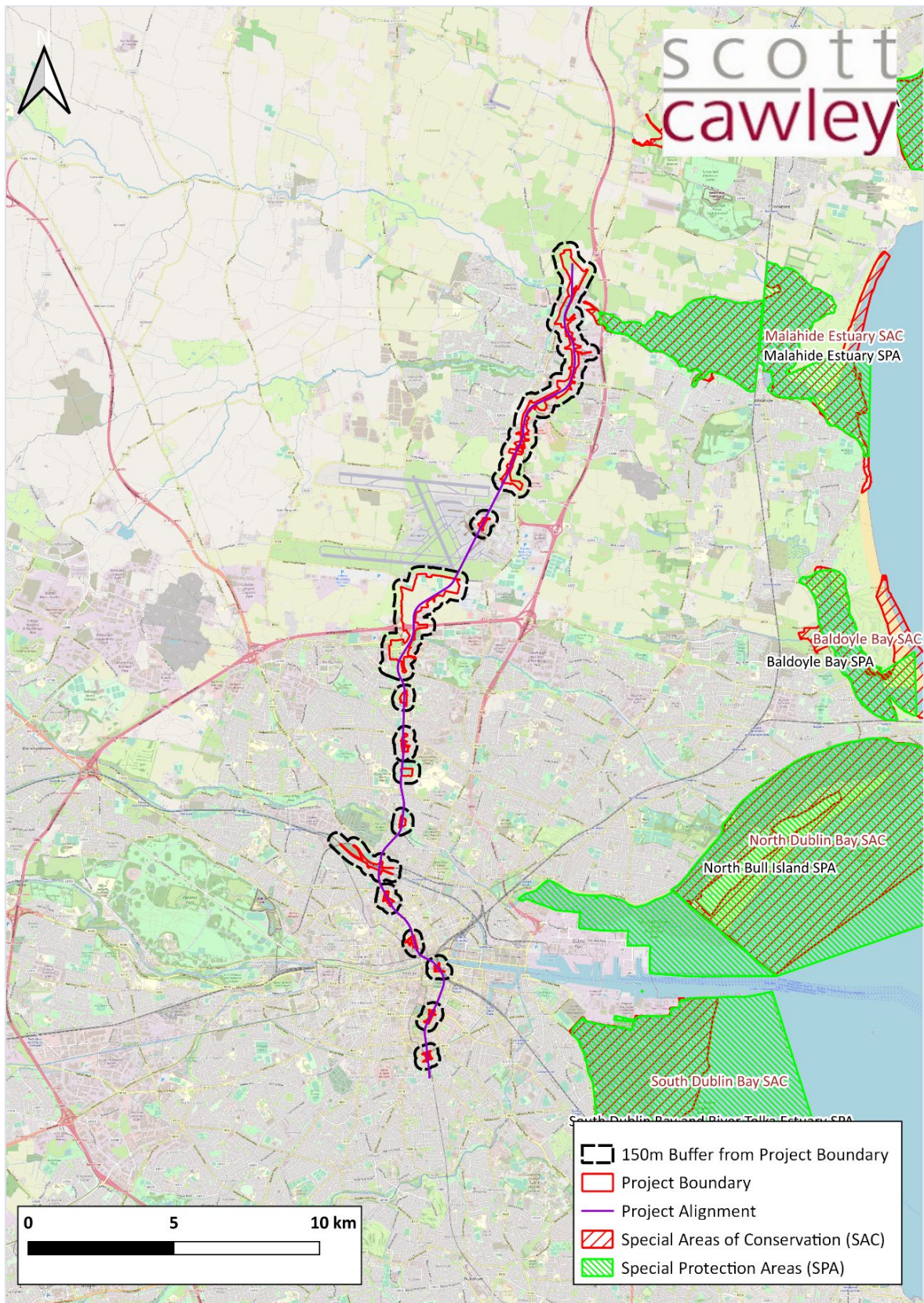


Figure 1. Survey corridor for breeding birds, comprising a 150m buffer from Project Boundary

2.5.1.4 Wintering Bird Surveys

All potential suitable inland feeding and/or roosting sites for winter birds located within c. 300m of the proposed Project were identified as part of a desktop study exercise, which involved a review of recent aerial photography and known inland feeding sites for the SCI species light-bellied brent goose *Branta bernicla hrota* (Scott Cawley Ltd., 2017). The survey sites are shown on Figure 9 in Appendix B. Winter bird field surveys were conducted by Scott Cawley Ltd. and Jacobs Engineering Ireland Ltd. ecologists. Sites were surveyed during four visits across the 2018-2019, 2019-2020 and 2020-2021 wintering bird season on 5, 6 and 8 November 2018, 11 and 12 December 2018, 29, 30 and 31 January 2019, 2 February 2019 and 4, 5 and 6 March 2019 or the 10 January 2020, 3, 27 and 28 February 2020 and 11, 12, 18 and 24 March 2020 or the 1 and 17 December 2020, 22 January 2021, 26 February 2021 and 5 and 25 March 2021. Sites 46, 64, 67, 124-128 and 130-137 at Dardistown were surveyed eight times over the three wintering bird seasons, i.e. 2018-2019 and 2019-2020/2020-2021.

In general, the 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). All birds present within a site were identified with reference to Collins Bird Guide (Svensson, 2010) to confirm identification (where necessary), and were recorded using the BTO species codes. The total flock size of birds present, their general location within the site and any activity exhibited were also recorded.

Additional transect data was also collected at aboveground sites that are intersected by the footprint of the proposed Project, as there is potential for direct habitat loss within these particular sites. Environmental variables recorded included:

- Presence or absence of goose or swan droppings, in particular those of light-bellied brent goose; and
- Height of the grass sward.

This data was collected at ten 1m x 1m sampling points located equidistant from each other along pre-assigned transect line⁸. The length of the transect line varied per site. Transect lines were only completed at sites where no bird species were present, to avoid any potential disturbance. In order to describe the site and its surrounding features, the presence/absence of the following site characteristics was also noted:

- A hedgerow/treeline vegetated boundary surrounding the site;
- Scattered vegetation along the boundary of the site; and
- The presence of standalone trees/shrubs across the site.

The site was also assessed in terms of its accessibility to dogs and whether or not it is open to the public. These site characteristics were considered likely to provide an indication of the level of disturbance at the site to birds.

The full winter bird survey results are provided in Appendix B.

2.5.1.5 Otter survey

A corridor of c. 500m along the alignment of the proposed Project, as shown on Figure 2 overleaf, was surveyed for otter activity as part of the multi-disciplinary walkover survey, undertaken on 6 April 2018, 10 April 2018 to 12 April 2018, 18, 20 and 21 February 2020, 11 March 2020, 26 February 2021, 4 March 2021 and 8, 15 and 29 June 2021. The Royal Canal was also surveyed for otter activity on 27 March 2020. The

⁸ For example, at a transect line with a length of c. 100m, data was collected at 10 sampling points located at every 10m interval

status and activity of any potential otter holt was recorded along with any evidence of activity, including paths, tracks, feeding signs, latrines or couches (otter resting places).

An infra-red motion-activated camera was deployed (under NPWS Licence No. 007/2020) at the entrance of a small burrow located on the southern bank of the Santry River c. 210m downstream of the proposed crossing point location to confirm whether it was being actively used by otter. It was deployed for a period of 10 nights between the 18 February 2020 and the 28 February 2020; during which no otters were using this burrow. The only species recorded using the burrow was a brown rat *Rattus norvegicus*.

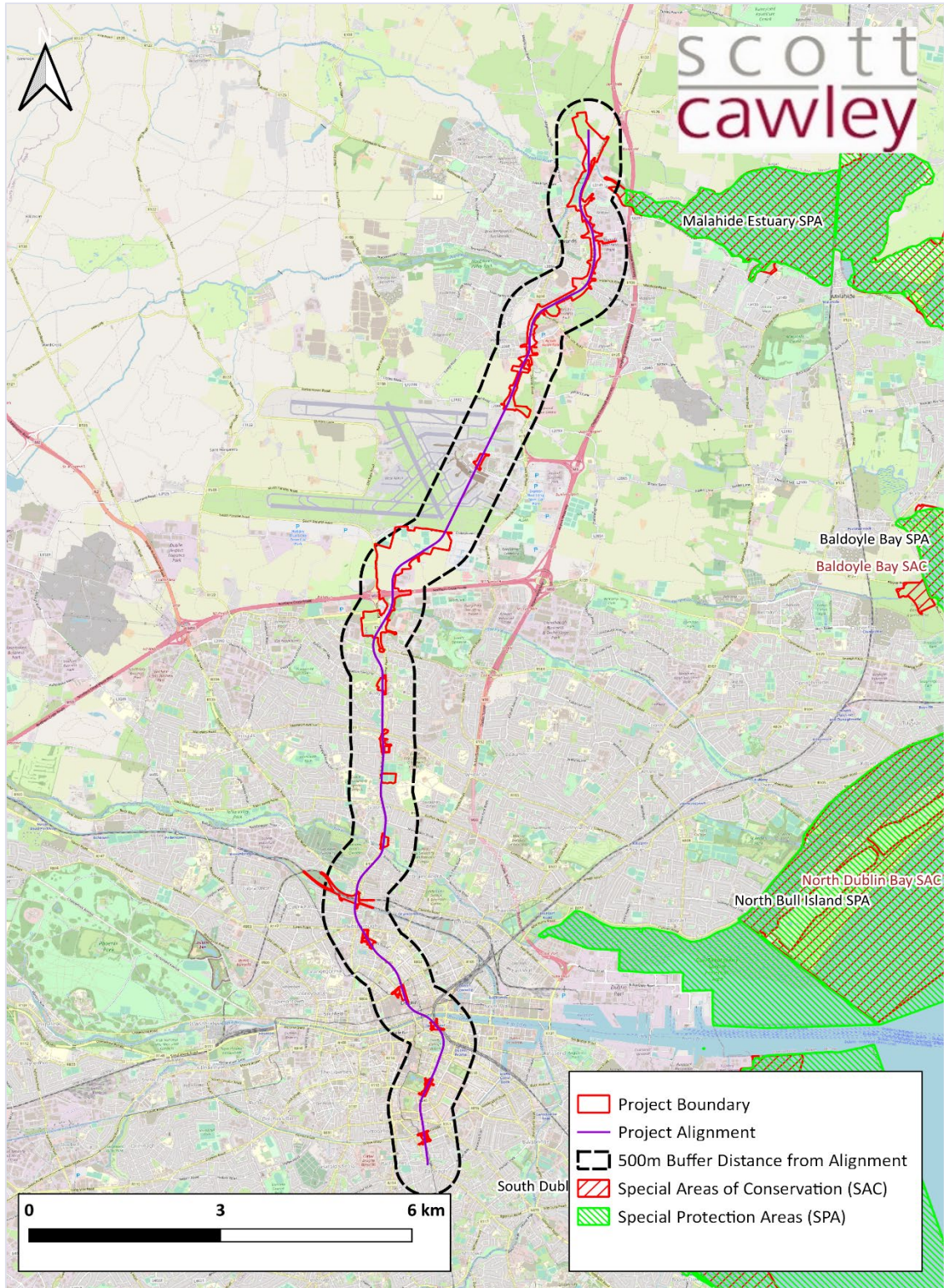


Figure 2: Area of 500m around the Project Alignment surveyed for otter activity

2.5.2 Hydrological Surveys and Monitoring

AWN Consulting Ltd. undertook hydrological surveys and analytical testing to inform an EIAR Hydrology chapter for the proposed Project, and which also informs this report. The hydrological assessment is directly relevant to this report as the proposed Project crosses catchments/sub-catchments that drain to European sites. These catchments/sub-catchments include:

- The Ballough Stream_SC and Broadmeadow_SC_010 sub-catchments in reference area AZ1, which discharge to the Malahide Estuary;
- The Mayne_SC_010 sub-catchment in reference areas AZ1, AZ2, and AZ3 which discharges to the Malahide Estuary, Baldoyle Estuary, and the River Tolka Estuary and Dublin Bay.
- The Tolka_SC_020 sub-catchment in reference area AZ4, which discharges to the Tolka Estuary and Dublin Bay; and
- The Dodder_DC_010 sub-catchment in reference area AZ4, which discharges to the Liffey Estuary and Dublin Bay.

AWN Consulting's hydrological study included both a desktop review and field surveys. The desktop study included consultation with IFI and Waterways Ireland, a review of published hydrological literature, aerial photography, and topographical and hydrometric information related to waterbodies within the zone of influence of the proposed Project. Field surveys and analytical testing undertaken by AWN Consulting included walkover assessment, stream and river surveys and water quality analysis for a suite of physico-chemical parameters which along with the findings and data collated during the desktop review, and assessment of biological water quality status completed by Triturus Environmental, informed the hydrological modelling and assessment of the proposed Project.

The full hydrological survey methodology used to gather hydrological data for the proposed Project is included in Chapter 18 (Hydrology) of the EIAR that accompanies this application.

2.5.3 Hydrogeological Surveys and Monitoring

AWN Consulting Ltd. completed a hydrogeological assessment of the proposed project in Chapter 19 (Hydrogeology) of the EIAR for the proposed Project, which informs this report. The hydrogeological assessment is directly relevant to this report as the proposed Project traverses the same groundwater body (i.e. "Dublin") as the European site Rye Water Valley/Carton SAC, which is designated for the groundwater dependent terrestrial habitat Petrifying springs with tufa formation (Cratoneurion)* [7220] and Annex II species reliant on groundwater dependent terrestrial habitats, i.e. narrow-mouthed whorl snail *Vertigo angustior* and Desmoulin's whorl snail *Vertigo moulinsiana*.

AWN Consulting's hydrogeological study included both a desktop review and field surveys, including ground investigations. The desktop study included a review of historical and contemporary geological/geotechnical data for the full alignment in relation to the hydrogeological environment. This included review of aquifer classification, aquifer vulnerability, the presence of high-yielding water supplies, the water framework directive status (both risk status and quality status), whether there were karst features in the area, the presence of pathways to groundwater-dependent ecosystems, and information on landfill and potential contaminated ground.

Field surveys included a groundwater quality monitoring programme of drilled boreholes undertaken in January and March 2021, with a view to gathering a representative sample of the groundwater environment across the proposed Project.

The full hydrogeological survey methodology used to gather hydrogeological data for the full extent of the proposed Project (including the locations of ground investigation works) is provided in Chapter 19 (Hydrogeology) of the EIAR accompanying this application.

2.5.4 Air Quality Assessment

AWN Consulting Ltd. completed an air quality assessment of the proposed project in Chapter 16 (Air Quality) of the EIAR for the proposed Project, which informs this report. The air quality is potentially

directly relevant to this report as air emissions such as NO_x, SO_x and dust from particular matter emissions (PM₁₀ and PM_{2.5}) can affect vegetation, depending on the sensitivity of the ecological receptor, the concentration of emissions, and the existing background air quality. Awn Consulting Ltd. prepared an Air Quality model for the predicted changes to air emissions arising from the proposed Project during its construction and operation.

The full air quality assessment methodology for the proposed Project is provided in Chapter 16 (Air Quality) of the EIA Report accompanying the application for the proposed Project.

3. Provision of Information for Screening for Appropriate Assessment

The following sections provide information to facilitate the AA screening of the proposed Project to be undertaken by the competent authority.

A description of the proposed Project and the receiving environment is provided to identify the potential ecological impacts. The environmental baseline conditions are discussed, as relevant to the assessment of ecological impacts where they may highlight potential pathways for impacts associated with the proposed Project to affect the receiving ecological environment (e.g. geological, hydrogeological and hydrological data).

The potential impacts are examined in order to define the potential zone of influence of the proposed Project on the receiving environment. This then informs the assessment of whether the proposed Project will result in significant effects on any European sites, i.e. affect the conservation objectives supporting the favourable conservation condition of the European site's QIs or SCIs.

3.1 Description of the Proposed Development

The proposed Project will comprise a metro railway between Estuary Station and the Park and Ride (P&R) Facility, north of Swords via Dublin Airport to Charlemont Station which lies south of Dublin City. The alignment is 18.8km long in total. There will be 16 new stations along the alignment. Estuary Station will be at surface level and four stations at Seatown, Swords Central, Fosterstown and Dardistown will be in retained cut. Dublin Airport Station and a further ten stations along the City Tunnel will be underground. The route of the proposed Project will accommodate two railway tracks, one for northbound and one for southbound services. The rail corridor will also include other features including: signalling; telecommunication and overhead line equipment; electricity cables; railway drainage; and access tracks. The width of the railway corridor will vary along its length in order to accommodate the existing ground, cuttings, embankments and tunnels. Other principal project elements include a Park and Ride (P&R) Facility at Estuary, two viaducts (one over the Broadmeadow and Ward Rivers and one over the M50 Motorway), and a Maintenance Depot at Dardistown. The proposed Project will be located fully within County Dublin, passing through the administrative areas of Fingal County Council (FCC) and Dublin City Council (DCC).

The proposed Project has been split into four geographical assessment zones (AZs) AZ1, AZ2, AZ3 and AZ4, as illustrated in Figure 3 and Table 3, both overleaf.

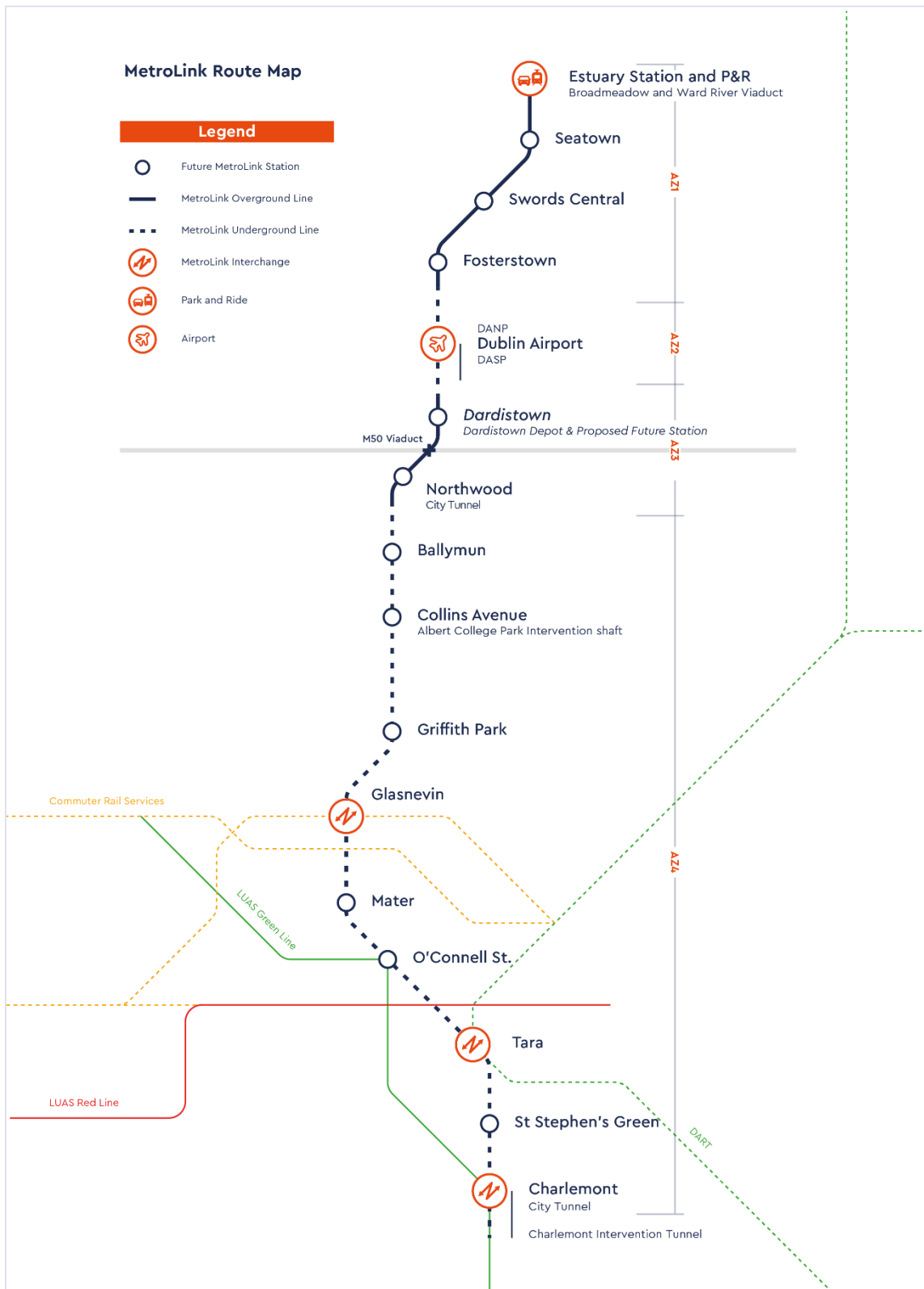


Figure 3: Geographical Assessment zones for the Proposed Project. © Jacobs Engineering Ireland.

Table 3. Description of the Proposed Project's Four Distinct Geographical Sections

Reference	Geographical Split	Description of Extent of Geographical Section
AZ1	Northern Section	<p>Running from north to south, the proposed Project begins at surface level and includes the P&R Facility located next to Estuary Station at Lissenhall. Access to the station will require the construction of a public road connecting the R132 to the access to the P&R Facility.</p> <p>From Estuary the alignment continues south passing over the Broadmeadow and Ward Rivers (and their floodplains) on the Broadmeadow and Ward River Viaduct.</p> <p>South of these river crossings, the alignment passes between the existing R132 and Balheary Park before going into a section of cut and cover under Estuary Roundabout on the R132 Swords Bypass.</p> <p>South of Estuary Roundabout, the alignment will be in open cut for a short distance before entering another section of cut and cover to cross to the eastern side of the R132 Swords Bypass. This section of cut and cover will continue to a point south of Seatown Road Roundabout where Seatown Station will be located.</p> <p>The alignment between Seatown Station and Swords Central Station will be located east of the R132 and will be in an open cut with the exception of localised cut and cover sections to facilitate crossing under the Malahide Road Roundabout and to reinstate access to some private properties.</p> <p>The alignment between Swords Central Station and Fosterstown Station will be constructed in a similar manner with a section of cut and cover required to pass under Pinnock Hill Roundabout. Existing pedestrian bridges will be demolished and new pedestrian and cycling bridges are proposed at Seatown, Swords Central and Fosterstown Stations.</p> <p>The alignment will then cross to the western side of the R132 Swords Bypass just south of the existing junction of the R132 Swords Bypass, Nevinstown Lane and Boroimhe Road, in a further section of cut and cover construction.</p> <p>The alignment will then pass through existing agricultural lands, initially in retained cut, then on low embankments and cuttings, and will cross the Sluice River and Forrest Little Stream, which will be culverted. A new overbridge will be built at the entrance to McComish Limited in Fostertown to provide access.</p> <p>Just north of the Naul Road, the Dublin Airport North Portal (DANP) will be constructed as part of the single bore tunnel under Dublin Airport.</p>
AZ2	Airport Section	<p>Just north of the Naul Road, a tunnel portal (Dublin Airport North Portal) will be constructed as part of the single bore tunnel under Dublin Airport. The tunnel will pass under Dublin Airport in a north-south direction and will be approximately 2.4km in length. The alignment of the tunnel will pass close to Terminals 1 and 2 and the short term stay car parks. Dublin Airport Station will be located under the existing surface car park immediately east of the existing church (turnback at Airport). The tunnel under the airport will end in the lands at Dardistown, south of the Old Airport Road, where another portal (Dublin Airport South Portal – DASP) will be constructed. An intervention tunnel will run parallel to the Airport Tunnel at DASP to allow for emergency access/egress and support ventilation</p>
AZ3	Dardistown to Northwood	<p>The route between the Dardistown tunnel portal and the M50 will be 2km long and will be constructed using cut and cover techniques, together with sections of open cut and embankment as the alignment rises to cross the M50 Motorway by way of a bridge. The Dardistown Depot and administrative buildings will be constructed at ground level in the lands to the west of the main line at Dardistown, accessed by new access roads from the north and west. Dardistown Station will be constructed to the southeast of the depot. The Station will not be a public station but will give access to the Depot for staff.</p>

Reference	Geographical Split	Description of Extent of Geographical Section
		<p>The alignment will continue south, rising to cross over the M50 to the east of Junction 4 on a viaduct before descending to ground level, turning to the southwest and descending below ground level in cut and cover to pass under the R108 Ballymun Road to Northwood Station. The route enters the second section of single bore tunnel immediately south of Northwood Station, where a tunnel portal will be constructed</p>
AZ4	Northwood to Charlemont	<p>From Northwood Station the route continues south in tunnel, to the west of the R108. Ballymun Station will be constructed under the site of the former Ballymun Shopping Centre, adjacent to the Ballymun Road. South of Ballymun Station, the tunnel is located to the west of the R108 until the junction of the R108 and Collins Avenue where it crosses to the eastern side of the R108. Collins Avenue Station will be constructed under the existing open green area in front of Our Lady of Victories Church.</p> <p>Between Collins Avenue Station and Griffith Park Station, the alignment is located to the east or under the corridor of the R108. Due to the distance between these two stations, to support evacuation and emergency services access safely via the stations in the event of an incident, a ventilation and intervention shaft will be constructed in the southwestern corner of Albert College Park.</p> <p>The tunnel then turns east under St Mobhi Road, to the proposed Griffith Park Station. Griffith Park Station will be located under an existing sports field in the lands fronting Whitehall College of Further Education. The alignment will then continue south passing under the Tolka River and then under St Mobhi Road continuing south to Glasnevin Station. A major interchange station for the Maynooth and Kildare rail services is proposed for the Glasnevin Station location, which will provide users with a connection to other rail services in addition to local bus routes.</p> <p>The proposed Project will then pass under the Royal Canal in a south-easterly direction towards Mater Station located in the Four Masters Park by St Joseph's Church which is across the street from the Mater Hospital. From Mater Station, the proposed Project continues underground in a south-easterly direction descending towards O'Connell Street, progressing under rows of Georgian Houses lining Blessington Street, Frederick Street North and Parnell Square East. The proposed Project will pass near to the Garden of Remembrance, the Rotunda Hospital and the Gate and Ambassador Theatres. O'Connell Street Station is proposed to be located within the planned development area immediately west of O'Connell Street and south of Parnell Street.</p> <p>The proposed Project then continues southwards under O'Connell Street where it will cross under the Red Line Luas track near the Abbey Theatre. The proposed Project will then move deeper to cross under the River Liffey between Rosie Hackett Bridge and Butt Bridge towards Tara Station. The proposed location for the Tara Station will be underneath an area bordered by existing rail line to the east, Poolbeg Street to the north, Tara Street to the west and Townsend Street to the south. Tara Station is proposed to be a major interchange station to provide connections to the train and DART services using the adjacent rail line. The construction of Tara Station will require the demolition of College Gate apartment complex, an office building and the existing Markievicz Leisure Centre. A plaza will be put in place over the station, at ground level with associated changes to the public roads overhead. From Tara Station the proposed rail line will continue south and will pass under the eastern end of TCD campus.</p> <p>The proposed Project will then proceed south of Leinster Street South, under several significant buildings including Leinster House, Government Buildings, the National Gallery, National Library, and the National Museum of Ireland. The proposed Project will then pass under St Stephen's Green North before the proposed alignment reaches St Stephen's Green Station. The proposed St</p>

Reference	Geographical Split	Description of Extent of Geographical Section
		<p>Stephen's Green Station will be located partially under the R138 St Stephen's Green East Road, and partially under the existing park, with the station entrance at the north-eastern corner of St Stephen's Green.</p> <p>Continuing southwest, the proposed Project will follow St Stephen's Green East and will pass close to the National Concert Hall, where it will turn south and pass under Harcourt Terrace and the Grand Canal before reaching Charlemont Station. The proposed Charlemont Station will be located on a site south of the "Carroll's Building" on Grand Parade, between Dartmouth Square and the existing Luas Green Line. Charlemont Station is proposed to allow for an interchange to the Luas Green Line services and will include for an improved pedestrian link to the Charlemont Luas stop. The bored tunnel will continue southwards to allow for a turnback and will terminate approximately 360m south of Charlemont Station. South of Charlemont a parallel tunnel will run alongside the main tunnel to provide emergency access and egress from the main tunnel.</p>

3.1.1 Tunnels and Intervention Shafts

The underground section of the proposed Project is constructed by two separate methods. The stations are constructed using the "cut-and-cover" method, which involves excavating the site from ground level and covering it up again. Cut-and-cover tunnel construction requires temporary disruption at the surface while the tunnel is constructed by excavating downwards, building a structural box and then restoring the land over the top.

The tunnels between stations are bored using a tunnel boring machine (TBM). It is proposed to create two geographically separate bored tunnels and each section of the tunnel will contain both northbound and southbound rail lines within the same tunnel. In total there will be approximately 11.8km of bored tunnel along the alignment of the proposed Project.

These tunnels will be located as follows:

- The Airport Tunnel is approximately 2.3km long and runs south from Dublin Airport North Portal (DANP) under Dublin Airport and surfacing south of the airport at Dublin Airport South Portal (DASP); and
- The City Tunnel is approximately 9.4km long and runs south from Northwood Portal and terminating underground south of Charlemont Station.

The openings at the end of the tunnel are referred to as portals. There are three proposed portals, which are:

- DANP;
- DASP; and
- Northwood Portal. This portal will be used during the Construction Phase to provide a launching position for the TBM.

There will be no portal at the southern end of the proposed Project, as the southern termination and turnback would be underground.

For safety reasons, the Airport Tunnel will also include smaller parallel evacuation and ventilation tunnels that run for approximately 600m underneath Dublin Airport, as the length of the tunnel south from the Dublin Airport tunnel exceeds 1km and it is not safe for railway passengers to be evacuated landside of the airport runways. The tunnels will be provided to allow for ventilation and emergency evacuation of passengers from the airport tunnel section to a safe location outside of the Dublin Airport airfield.

The City tunnel will extend 320m south of Charlemont station. At the southern end of the City Tunnel, which will be a 'dead-end' length of tunnel, a parallel evacuation and ventilation tunnel (Charlemont Intervention Shaft) is provided. The parallel evacuation and ventilation tunnel is required from the end of

the city tunnel back to Charlemont station to support emergency evacuation of maintenance staff and ventilation for the tunnel section south of Charlemont.

An intervention shaft will also be required to provide adequate emergency egress from the tunnel and support tunnel ventilation at Albert College Park. This is because the distance between the consecutive stations at Collins Avenue and Griffith Park is too long to safely support evacuation/emergency service access in the event of an incident. In other locations, ventilation shafts and emergency access will be incorporated into the stations and portals.

3.1.2 Power

The proposed Project will include the provision of two high voltage substations at DANP and Dardistown and connecting underground cabling connecting the proposed Project to the grid, enabling powering at the operational stage. The proposed Project will also require eight new traction substations to provide power to the trains, seven for the mainline, which will be located at the following stations: Estuary, Fosterstown, Dardistown, Collins Avenue, Glasnevin, Tara and Charlemont, and one for Dardistown Depot.

The Overhead Contact System (OCS), comprising a series of supported cables and/or conductors above the rolling stock envelope, will provide power to the rolling stock and is fed from the traction substations located along the proposed alignment. The nominal height of the contact wire above the rail level is 4.5m and the minimum contact wire height considered is 4.2m. The OCS wires will be supported on poles not exceeding 8m in height. The poles will be located on both sides of the track, approximately 45m apart. The OCS will operate within the surface and above ground elevated sections, while the Overhead Conductor Rail (OCR) will operate at the retained cut and underground sections.

There are requirements for temporary power during the Construction Phase of the proposed Project. In order to facilitate the construction of the proposed Project, temporary MV power supplies have been agreed with ESNB and these will provide electricity at four of the supply sites: east of DANP and Dardistown Depot, DASP and Northwood to provide power during the tunnelling works

3.1.3 Park and Ride Facility

The P&R Facility is proposed to be located next to Estuary Station. The P&R Facility will comprise three distinct buildings of three, four and five storeys, located on the east side of the proposed Estuary Station. The car park buildings will be linked with the Estuary Station platforms by a pedestrian bridge and steps and lift to platform level and will provide 3,000 car parking spaces, including 208 disabled parking spaces and 126 bike stands at the station.

The proposed Project also includes for a section of the Swords Western Distributor Road (SWDR) which comprises a single carriageway road with a grass verge, cycle lane and footpath in each direction. Approximately 700m of the SWDR will be developed as part of the proposed Project, with FCC responsible for the remainder of the SWDR proposals. This section of the SWDR will be utilised as an access road into the Estuary Station and Park and Ride Facility, with a starting point at a new signalised junction with the R132 Swords Bypass.

To avoid community severance, a pedestrian/cyclist underpass will be provided where the proposed Project alignment crosses Ennis Lane. This underpass will maintain the pedestrian and cycling connectivity between Ennis Lane to the west and Balheary Park to the southeast.

Estuary Station is a surface station that interfaces with the P&R facility. The landscaping of this development area will consist of biodiverse and species rich planting and will tie into the water management network through a series of interlinked rain gardens, detention basins and wetland park/ponds. A park including a pond and wetland park will be created to link Estuary Station and P&R facility with the open space of the Broadmeadow and Ward rivers corridor. The planting will be of local provenance and site specific to enhance the biodiversity of the area whilst fulfilling the principles of the design.

3.1.4 Maintenance Depot

The Dardistown Depot will be 19.5ha in size and is located between the M50 Motorway and Dublin Airport. The Dardistown Depot will function as the main stabling area for the proposed Project rolling stock. Furthermore, all vehicle maintenance will be undertaken at the Depot site and the Operation Control Centre (OCC) will also be located here. The Depot will comprise of a security building, main offices and an administration building, a carpark, main maintenance workshops and pits, an electrical substation, a test track, a train storage/parking area, a sanding system for rolling stock, automatic vehicle wash facilities and a materials storage building. The Depot is provided with separate rail access and exit from the proposed Projects twin track main line. The main vehicular access to the site is via Collinstown Lane (also known as the Old Airport Road) to the northwest of the depot.

The Dardistown depot will be developed at a green field site in the Dardistown area. The development of this site will involve the diversion of an existing stream, while retaining and enhancing the riparian area. The landscape design of the proposed Dardistown Depot has been developed to ensure integration into the existing landscape. Landscape treatments include woodland planting, mature planting, wildflower meadow, tree planting, screen planting and riparian planting to stream edges.

3.1.5 Viaducts and Overpasses

The proposed Project will need to cross the Broadmeadow River and Ward River via a viaduct to raise the infrastructure out of the flood zones and to avoid an adverse effect due to flooding. As such a 260m long viaduct is proposed in order to cross the Broadmeadow and Ward Rivers and their floodplains. The construction of the proposed viaduct over the Broadmeadow River and Ward River will comprise a 13-span concrete piled structure with twin concrete bridge deck beams taking one track each. Temporary construction of 'bailey' bridges crossing the two water courses will be required for access of construction traffic. No in-river construction works will be required as part of this construction work. The design of the bridge span is based upon a modelled understanding of water conveyance for the 100-year period flood event with the recommended allowance for climate change in accordance with OPW requirements.

It is proposed to cross over the M50 Motorway by use of a viaduct structure creating a rail link across the motorway. A 100m long viaduct has been designed to carry the proposed Project across the M50 between the Dardistown Depot and Northwood Station. The proposed crossing will be located east of Junction 4 on the M50 Motorway, which is the intersection of the M50 Motorway and the R108 Ballymun Road.

The viaducts are constructed where embankments would not be a practicable or effective solution. The height of the viaducts is determined by the route alignment, surrounding ground levels and the feature being crossed.

The use of piers is minimised in the construction of viaducts in order to maintain the characteristics of the existing channel. The following environmental design criteria have been incorporated into the design of the viaducts:

- Leave the natural bed and bank undisturbed;
- Leave a natural bank-path of at least 3 m wide at each side for mammals and anglers, facilitating native vegetation recolonization;
- Access for angling and other amenity users should be retained where exists;
- Watercourses and riverbanks, above and below the crossing, should not be disturbed; and
- In-stream piers will be designed to minimize loss of the natural channel bed and streamlined to avoid turbulence.

Within AZ1, the proposed Project alignment will intersect the access road to McComish Limited property and a new bridge (Fostertown Accommodation Bridge) will be required over the proposed Project alignment in order to maintain full access to this property. In addition, the alignment intersects with the surrounding farmland, and a farm underpass will be provided in order to prevent severance of the farming unit. The proposed overbridge structure and farm underpass at the unnamed road to McComish

Ltd. industrial facility will comprise a modular, precast concrete portal frame and wingwalls. Additionally, there are proposed temporary bridges at the following locations to facilitate access over the following watercourses during construction:

- Broadmeadow River located between Ch. 1520 and Ch. 1560;
- Ward River, located between Ch. 1620 and Ch. 1660;
- Mayne River at two locations near Ch. 8680 and Ch. 8900;
- Santry River, located directly west of the Old Ballymun Road between Ch. 9980 and Ch. 10000; and
- Royal Canal, located directly east of the existing Lock 6 abutment between Ch. 14920 and Ch. 14960.

3.1.6 Culverts and Stream Diversions

Within AZ1, the proposed Project alignment crosses the Sluice River and one of its tributaries, Forest Little Stream, in the agricultural land to the north of the Naul Road. Therefore, two culverts are required to allow the proposed Project to cross these watercourses at Ch. 5+963 and Ch. 5+762, which will involve a temporary diversion or dam being constructed upstream of the works and water being pumped back into the watercourses downstream of these works. Additionally, the culvert located at Forest Little Stream will include a culvert underpass to allow the service roads on either side to be connected and includes a mammal ledge to allow for otter and badger passage across the alignment.

Within AZ3, the Dardistown depot will be located at the head of the Mayne River System. A permanent diversion of the Turnapin Stream, which is a tributary of the Mayne River, will be required between Ch. 8660 and Ch. 8920 to maintain local drainage routes. Within AZ3, the alignment will also cross the M50 motorway via a viaduct and then cross over a culverted section of the Santry River. This will require some minor alterations to the Santry River to straighten the channel of the river and provide scour protection, located immediately downstream of the existing culvert outlet.

Within AZ4, there is proposed dewatering and instream works on the Royal Canal basin located between Lock 6 and Lock 5 to facilitate the installation and removal of the temporary working platform at this location.

3.1.7 Playing Pitches

There are playing pitches belonging to seven sports clubs which will be impacted, either wholly or partially, by the proposed Project.

- Whitehall Rangers FC grass pitches at Dardistown will be affected wholly and subject to permanent acquisition by the proposed Project.
- Home Farm FC grass pitches at Mobhí Road (Griffith Park) will be temporarily lost during the construction phase and will be replaced at their current location on a like for like basis.
- Two 5-a-side grass pitches and one 11-a-side grass pitch at Albert College Park will be impacted due to the proposed intervention shaft. It is proposed to reorientate and reline these pitches to accommodate two full size pitches and two 5-a-side pitches.
- Starlights GAA at Dardistown currently use one grass playing pitch and two grass training pitches in this location. It is proposed to reconfigure the pitches to one full size GAA playing pitch with natural grass and one new floodlit training pitch which will be natural grass with improved drainage.
- Na Fianna at Dardistown currently uses three full size grass pitches and one floodlit grass training pitch. It is proposed to reconfigure two of the pitches to one full size GAA pitch with natural grass and one training pitch with natural grass with improved drainage. The remaining two pitch layouts will remain unchanged. Additionally, the Na Fianna pitches will have flood-lighting installed as part of the proposed Project.
- Fingallians GAA currently use two natural grass pitches within Balheary Park. It is proposed to reconfigure the southernmost full-size GAA pitch to facilitate utility diversion works and it will remain a natural grass pitch. The northernmost pitch will be replaced with an all-weather artificial pitch and will be provided flood-lighting.

- Swords Celtic FC also use two natural grass pitches within Balheary Park. The southernmost pitch will be reconfigured (and retained) to suit the proposed Project. The northernmost pitch will be converted to a 7-a-side pitch with minimal disruption to the operation of the pitch.

3.1.8 Construction Compounds

There will be 34 Construction Compounds required during the Construction Phase of the proposed Project. These will consist of 20 main Construction Compounds and 14 Satellite Construction Compounds. The main Construction Compounds will be located at each of the proposed station locations, the portal locations and the Dardistown Depot Location (also covering the Dardistown Station) with satellite compounds located at other locations along the alignment.

Outside of the Construction Compounds there will be works areas and sites associated with the construction of all elements of the proposed Project including an easement strip along the surface sections. **All Construction Compounds and works areas are within the proposed Project boundary and are considered in this assessment.**

3.1.9 Access Roads

Additional to the above, the proposed Project will also include: the construction of access roads to the proposed Estuary Station and Park and Ride Facility and other local access roads; minor road alterations. All access roads are within the proposed Project boundary and are considered in this assessment.

3.1.10 Waste Management

Temporary stockpiles are required during the proposed Project Construction Phase and these will be located outside of specific buffer zones from water courses. Leachate generation from the stockpiles will be collected to avoid discharge to water courses. Stockpiling of excavated material will be managed on a site-per-site basis and designated areas will be suitably sized and isolated from open excavations as well as identified storm/combined sewers in the area.

If any potentially contaminated material is encountered, it will be segregated from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled 'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous' using the HazWasteOnline application (or similar approved classification method). The material will then be classified as clean, inert, non-hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC, which establishes the criteria for the acceptance of waste at landfills. If it is not possible to immediately remove contaminated material, then it will be stored on, and covered by, medium to heavy gauge polythene sheeting to prevent rainwater infiltrating through the material. The time frame between excavation and removal of all natural or contaminated excavated material will be recorded, and volumes kept to an absolute minimum.

All excavated material will, where possible, be reused within the proposed Project for the construction of embankments, in backfill, for bunding and landscaping requirements (such as Dardistown Depot, viaduct embankments). The overall approach to spoil management will be in accordance with the Eastern-Midlands Region Waste Management Plan for 2015-2021 (EMWR 2015) as well as the Local Authority Development Plans. This plan will include the application of the Waste Hierarchy and highlight potential methods and sites for reuse, recovery, recycling and disposal of the excavated material with the aim of minimising disposal as waste.

The contractor(s) will ensure acceptability of the material for reuse for the proposed Project with appropriate handling, processing and segregation of the material. This material would have to be shown to be suitable for such use and subject to appropriate control and testing according to the Earthworks Specification(s). These excavated soil materials will be stockpiled using an appropriate method to minimise the impacts of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff.

Excavated contaminated soils will be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure no cross-contamination with clean soils elsewhere throughout the site. Surplus suitable material excavated that is not required elsewhere for the proposed Project, will be used for other projects where possible, subject to appropriate approvals/notifications. Earthworks haulage will be along agreed predetermined routes along existing national, regional and local routes (outlined in the STMP). Where compaction occurs due to truck movements and other construction activities on unfinished surfaces, remediation works will be undertaken to reinstate the ground to its original condition.

A detailed Waste Management Plan will be prepared by all contractors in accordance with the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG, 2006) prior to construction commencing. This plan will include details on how all construction waste is managed, stored and disposed of in an appropriate manner by appropriate contractors in accordance with all relevant waste legislation.

For full details refer to Chapter 24 Material and Waste Management in the EIAR accompanying this application.

3.2 Drainage

3.2.1 Construction

3.2.1.1 Surface and Foul Water

Water discharges from construction areas of below ground structures are likely to be high in sediment, with potentially elevated alkalinity where cement works are on-going. The construction design incorporates attenuation (acceptable rates as approved by the relevant Local Authorities) and treatment prior to approved discharge to the respective defined sewer, on the basis of a temporary permit/consent as issued by the relevant Local Authority.

Runoff from construction compounds and construction areas may be contaminated with sediment, bentonite, faecal contamination etc. There are no proposed discharges to nearby watercourses. All water from the construction phase will be discharged to sewer under appropriate permit prior to the commencement of the construction works. Grey water arising from on-site toilets and washing facilities for the workforce may be connected to the sewerage system or tankered away. None of the planned construction compound sites are located immediately within areas which have potential for fluvial or coastal flooding.

A full description of the existing and proposed surface water drainage network is included in Chapter 18 (Hydrology) in the Environmental Impact Assessment Report (EIAR) accompanying this application.

3.2.1.2 Groundwater

The elements of the proposed Project that will interact with the hydrogeological environment during the Construction Phase are those activities that have the capacity to change the groundwater regime in terms of recharge of groundwater levels, regional/local flow patterns and water quality. As such, the principal potential hydrogeological impacts on the character of the receiving aquifers include the following:

- Impact to underlying aquifer as a result of removal during tunnelling and deep excavations;
- Changes in groundwater recharge characteristics;
- Changes in groundwater quality due to accidental spillages of potentially polluting substances;
- Impact on groundwater as a result of substances injected into the ground during TBM tunnelling works;
- Impact to groundwater levels and flow patterns along the full alignment due to the proposed Project (potential 'barrier' effect) as a result of cut sections or underground structures intercepting groundwater flow paths; and
- Impact potential on groundwater contributions to identified surface watercourses.

Groundwater discharges from construction areas will be combined with surface water discharges and attenuated and treated prior to approved discharge to the respective, defined sewer.

Within the construction site footprint, there is potential for 'drainage to ground' related pollution (i.e. accidental release during construction) which could include hydrocarbons and alkaline water from cement works, grouting, wheel wash water etc entering local groundwater. Run-off from temporarily stockpiled (sterile and/or contaminated) material on-site, including subsoil stockpiling, could also impact on both groundwater and surface water (where nearby), for example at Northwood Station located south-west of the Santry River.

There are no deep excavation works required to construct the proposed Estuary Station and Park & Ride Facility which are located at grade. Therefore, there will be no impacts on groundwater as a result of the construction of these aspects of the proposed Project. The excavation of the deep stations within Dublin City Centre urban setting will be carried out with the minimum effect on the phreatic water table in order to avoid the potentially significant impact of ground settlement occurring. Possible methods of groundwater extraction from within deep excavations include localised sump pumping, deep well dewatering (groundwater lowering) with submersible pumps, and/or a system of well points around the excavation footprint to effectively lower/draw down the water table level within the excavation in advance of excavation so dry workings can follow. The actual technique used during the Construction Phase will be refined based on the results of further ground investigation and assessments.

The Zol for the cut sections or deep excavation locations is typically referred to as the area within which groundwater levels are affected by dewatering of the saturated overburden and/or bedrock aquifer, i.e. drawdown effects with distance from the pumping location. Modelling undertaken indicates that where pumping will be necessary groundwater levels will remain at/near their natural [pre-construction] level at specific distances outside of the footprint for the works area. As such, groundwater intercepted during the Construction Phase will remain within the surface water catchment that they would naturally have been received by. The modelled Zol for the future stations range from R=24.61m at Dardistown Station to R=213.22m at Collins Avenue Station, from the centre of the station excavations. See Section 19.5.3.5 of Chapter 19 (Hydrogeology) in the EIAIR accompanying this application for details on the groundwater Zol.

Tunnels, cut sections or underground stations can cause a 'barrier effect' of groundwater if they cut through the water table for a considerable linear extent. This obstruction of natural groundwater flow can affect groundwater connectivity with surface water features, including watercourses, for example at the Broadmeadow River, Ward River, Tolka River and River Liffey.

A full description of the existing and proposed groundwater details is included in Chapter 19 (Hydrogeology) in the Environmental Impact Assessment Report (EIAIR) accompanying this application.

3.2.2 Operation

3.2.2.1 Surface Water

During operation, the entirety of the track, transversal slopes will direct any surface water runoff towards the centre of the proposed track where the main channel will be provided to carry runoff to designated discharge points. An enlarged channel section is used to maximise potential online storage and reduce the required size of the attenuation tanks or ponds that are required during discharge. At pumped discharge points, the central channels are joined in a main collector pipe or channel, which directs water towards the pumping well. The channel will be covered for security safety purposes with a grate and breaking load boxes will be placed for inspection. These boxes will also help to create the attenuation effect along the channel and protect the morphology of waterbodies. Prior to discharge into waterbodies at the designated discharge points, rainfall will be attenuated in either attenuation tanks or ponds.

The proposed Project will have eight main outfalls to receiving watercourses either directly or indirectly through existing storm sewers. The outfalls/discharge points will be in the following locations:

- A1 (Swords Western Distributor Road)- Unnamed Watercourse;
- A2 + Estuary Station Parking- Broadmeadow River;
- B + Existing Road- Ward River;
- C1- Unnamed Watercourse;
- C2-D1- Sluice River;
- D2- Sluice River;
- E1 + Depot- Mayne River; and
- E2- Santry River

To minimise any impact to receiving water flows, the design incorporates effective attenuation to greenfield run-off rates for new hardstanding areas following the Institute of Hydrology Report Number 124 (IH 124) Methodology. The proposed attenuation storage volumes are sized to accommodate any potential increase in surface water run-off rates up to the 100-year return period storm event with an allowance for climate change effects.

All outfall structures have been designed with an outlet structure that includes headwall, wingwalls and a bed apron to prevent local scouring of the banks and the channel bed. This, together with management of flow to mimic current runoff rates, will ensure no measurable impact on river morphology, existing surface water flow hydraulics or the potential for an increase in the risk of flooding.

Fire water generated at the Metro Stations and Dardistown Depot will be fully contained and will not be discharged to surface water.

The Proposed Project incorporates two tunnels, the Airport Tunnel and the City Tunnel from Northwood West Station to the southern extent of the development south of Charlemont Station. The tunnelled sections will not receive any rainfall and are designed as water-tight structures. Any drainage within the tunnels will be collected internally and gravitated to sumps where it will be collected and discharged by pumping externally into the public foul drainage system (subject to agreement with Irish Water).

There will be 11 underground stations, one in the Airport Tunnel and ten along the City Tunnel. During the operational phase, there will be negligible water discharge arising from track drainage which will be collected and pumped to public storm water (i.e., separate or combined) sewer if there is no watercourse available. Therefore, all stormwater network discharges to watercourses preferably, and to the combined existing network if not possible.

A full description of the existing and proposed surface water drainage network is included in Section 18.5 of Chapter 18 (Hydrology) in the Environmental Impact Assessment Report (EIAR) accompanying this application.

3.2.2.2 *Foul Water*

There will be no public toilets at the majority of stations or on the trains. There will however be welfare facilities at the main interchange stations and staff welfare facilities for the staff at the stations and Dardistown Depot. All of these discharges will be to foul sewer.

As described above for surface water, the Proposed Project incorporates two tunnels, the Airport Tunnel and the City Tunnel from Northwood West Station to the southern extent of the development south of Charlemont Station. The tunnelled sections will not receive any rainfall and are designed as water-tight structures. Any drainage within the tunnels will be collected internally and gravitated to sumps where it will be collected and discharged by pumping externally into the public foul drainage system (subject to agreement with Irish Water).

There will be 11 underground stations, one in the Airport Tunnel and ten along the City Tunnel. During the operational phase, there will be negligible water discharge arising from track drainage which will be collected and pumped to public storm water (i.e. separate or combined) sewer if there is no watercourse available. Therefore, all stormwater network discharges to watercourses preferably, and to the combined existing network if not possible.

A full description of the existing and proposed foul water system is included in Section 18.5 of the Chapter 18 (Hydrology) in the EIAR accompanying this application.

3.2.2.3 *Groundwater*

During the Operational Phase of the proposed Project, there will be no direct discharges to ground/groundwater. As such, there will be no change to the natural groundwater regime or in the groundwater body status along the full alignment as a result of the overall development.

The Operational Phase will include passive drainage features which will include some filtration to ground where local subsoils are assessed as inherently viable for same; these features relate to AZ1 to AZ3 only and are effectively used for attenuated rainwater management. AZ4 is at tunnel alignment with no direct or passive discharges to ground. There is only a limited potential for collection of drainage water from within the tunnel (which will be an enclosed, watertight system) for example at the interface with stations, and this will be discharged to public wastewater sewer.

During the Operational Phase of the proposed Project there is limited potential for accidental releases to groundwater as the vehicles are electric and there is minimal bulk chemical storage. All on-site bulk chemical storage, for example at Dardistown Depot, will be fully contained and banded and monitored in accordance with approved long-term operational requirements for each site. As each site will mostly be covered in hardstanding with effectively designed drainage, any accidental release from a chemical storage area or other source will be contained and treated prior to discharge from the site.

There will be no Operational Phase dewatering. In the short-term term following completion of the Construction Phase of the proposed Project, groundwater levels will re-stabilise to pre-construction patterns and any Zol associated with Construction Phase dewatering activities will fully dissipate.

A full description of the existing and proposed groundwater details is included in Chapter 19 (Hydrogeology) in the Environmental Impact Assessment Report (EIAR) accompanying this application.

3.3 Construction Activities

This section outlines the construction activities of relevance to European sites. The proposed construction will generally include the following activities outlined in Figure 4.

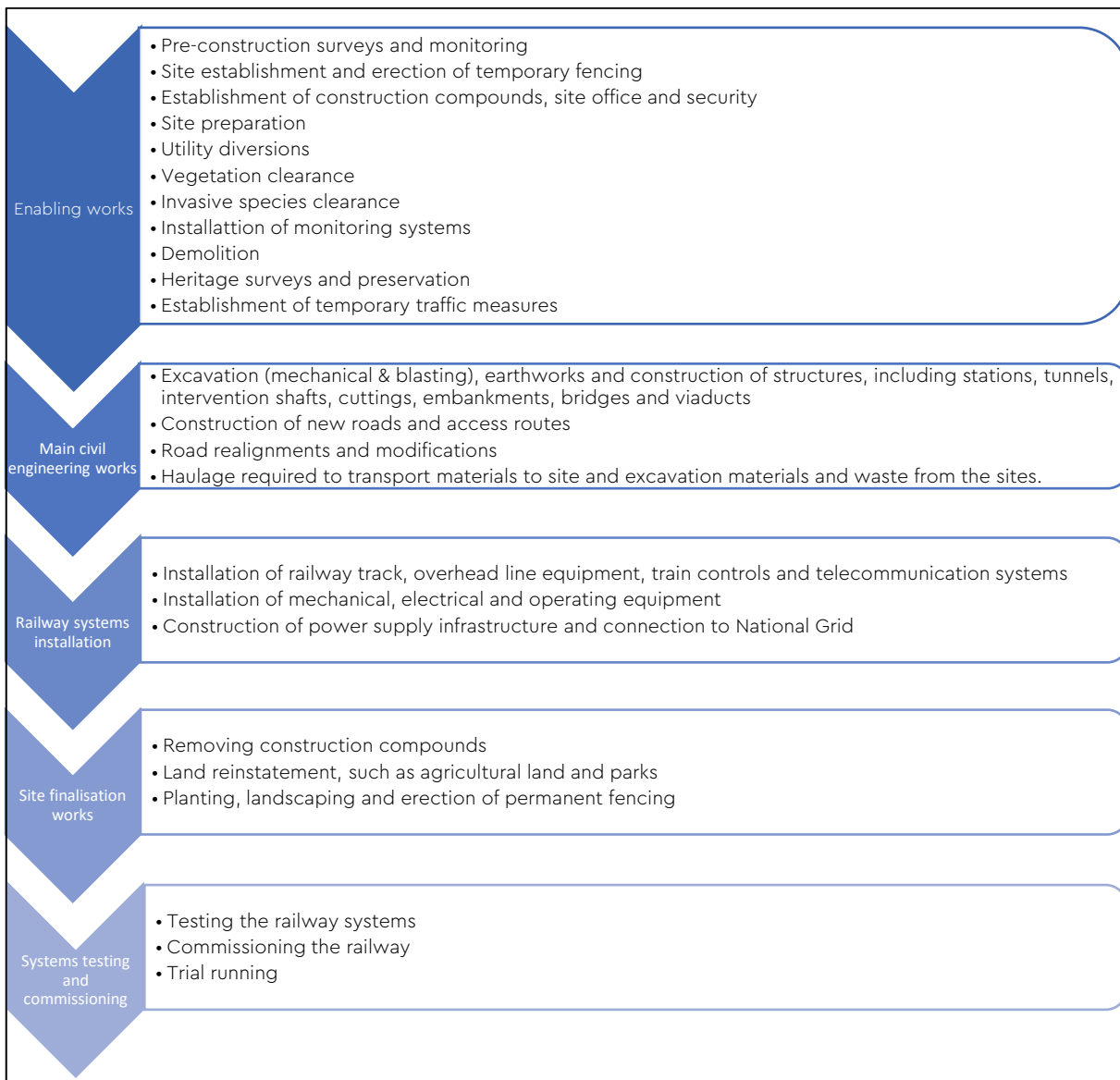


Figure 4: Summary of Construction Activities

Additional to the general activities outlined above, the proposed Project will require the following:

- The initial works will include the temporary storage of excavated material (including the removed topsoil), temporary material stockpiles and their access/egress and the installation of temporary and permanent drainage before the main works commence;
- Provision of office and welfare facilities, site parking, unloading and holding areas, security and wheel washing facilities;
- Diversion, realignment and widening of roads and junctions and/or the provision of temporary alternative routes;
- Groundwater control and grouting activities;
- Transfer nodes for the movement of excavated material and delivery of construction materials and plant; and
- Decommissioning will include the removal of all construction materials and the spread and seeding of topsoil and provision of landscaping.

The enabling works comprise:

- Background surveys and environmental baseline monitoring;
- Vegetation, tree clearance and removal of any invasive species;
- Environmental mitigation works;

- Demolition and the removal of any contaminants;
- Archaeological excavations;
- Utility diversions and protection; and
- Site establishment and traffic works.

It is estimated that the overall construction period will last for approximately nine years. Whilst a variety of construction activities will commence simultaneously at a number of different locations across the proposed Project, its construction will be undertaken in a phased manner.

3.4 Overview of the Receiving Environment

3.4.1 European sites

The proposed Project does not overlap with any European sites. There are 25 European sites⁹ (SACs or SPAs) located within the vicinity of the proposed Project (see Figure 5). As a starting point, all European sites within 15km of the proposed Project were considered (as per Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. (Department of Environment, Heritage and Local Government, 2010 revision)). However, all European sites within the Zone of Influence (ZoI) of the proposed Project, which was determined using the source-pathway-receptor model (as per OPR Practice Note PN01. Appropriate Assessment Screening for Development Management (Office of the Planning Regulator, 2021)), were considered in the assessment. European sites within the ZoI can include sites beyond the 15km radius starting point, for example European sites beyond 15km with a hydrological or hydrogeological connection to the proposed development site, or European sites designated for SCI species with foraging ranges greater than 15km (e.g. the Murrough SPA). The nearest European site is Malahide Estuary SAC, which is located c. 380m downstream of the proposed Project or c. 235m east as the crow flies.

All of the European sites present in the vicinity of the proposed development are shown on Figure 5 below. The QIs/SCIs of the European sites in the vicinity of the proposed development are provided in Appendix A.

⁹ Malahide Estuary SAC and SPA, North Dublin Bay SAC, North Bull Island SPA, Baldoyle Bay SAC and SPA, South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, Rogerstown Estuary SAC and SPA are also RAMSAR sites, under the Ramsar Convention (Ramsar site No. 833, 406, 413, 832 and 412, respectively) and Malahide Estuary SAC and SPA, North Dublin Bay SAC and North Bull Island SPA are marine protected sites under the OSPAR Convention - i.e. Malahide Estuary MPA (O-IE-0002967) and North Dublin Bay MPA (O-IE-0002968).

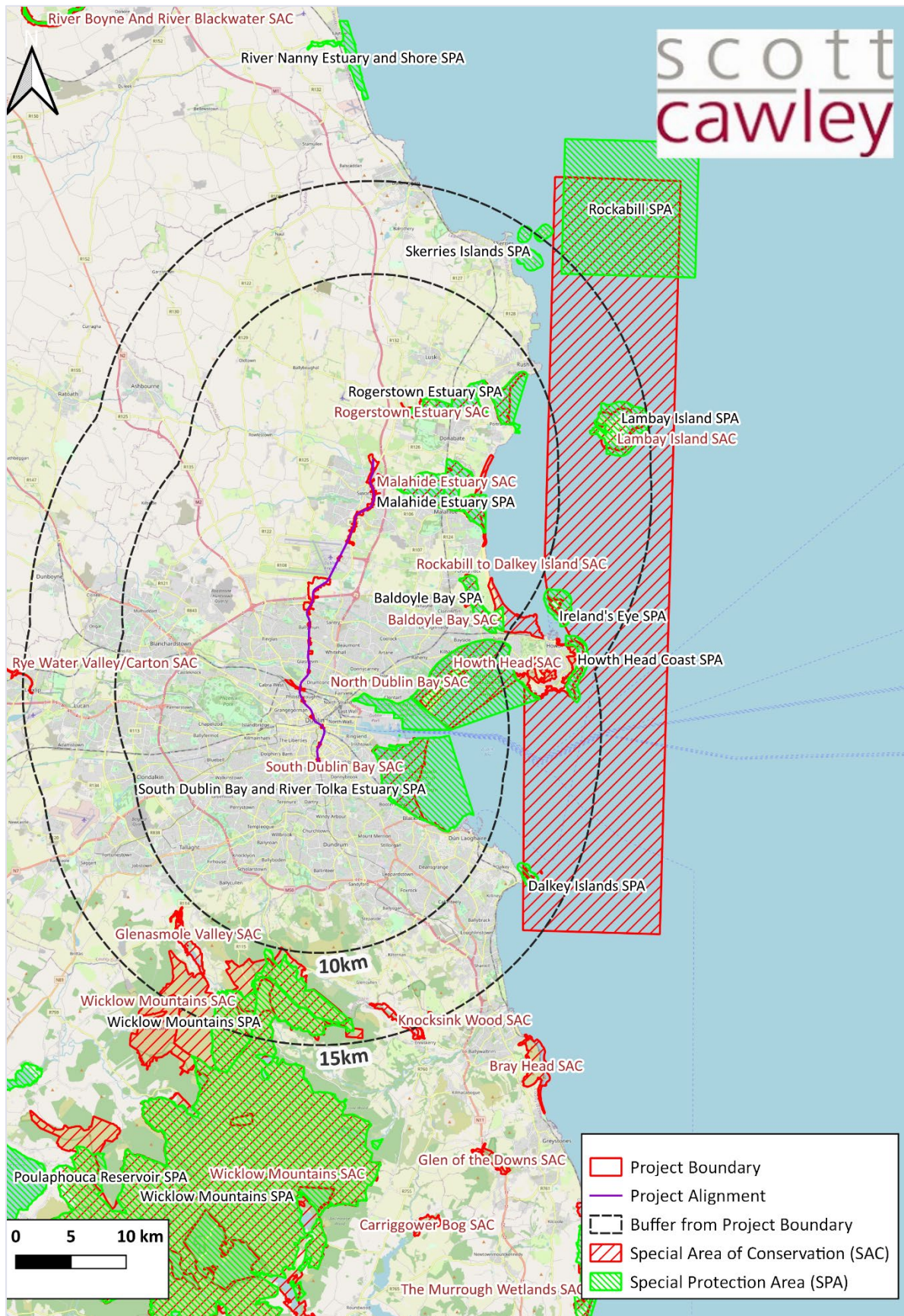


Figure 5: European Sites within the Vicinity of the Proposed Project

3.4.2 Habitats

The footprint of the proposed Project generally comprises:

- Improved agricultural/arable fields of varying sizes, which are bordered by hedgerows, mature treelines, scrub and/or woodland;
- An unimproved, unmanaged semi-natural calcareous grassland, located east of the R132 within the centre of Swords;
- Areas of amenity grassland, scattered trees and parkland and ornamental trees and shrubs located within Silloge Park Golf Club, public parks, such as Albert College Park, Berkeley Road Park, Dartmouth Square and St. Stephen's Green, and residential, commercial and/or industrial estates;
- Private residential dwellings and associated gardens;
- Areas of hardstanding, including the R132 and R108, buildings/structures, including those located within Dublin Airport and residential, commercial and/or industrial estates; and
- Watercourses, such as the Broadmeadow River and the Royal Canal, and drainage ditches.

Two Annex I habitat were identified within the study area, Estuaries [1130] and hydrophilous tall-herb swamp [6430]. The area of Estuaries [1130] corresponds to the Lower Liffey Estuary/River Liffey at the crossing point of the proposed Project. This section of the river is c. 40m to 45m wide and has an average depth of c. 4m to 5m. There are high retaining quay walls either side of the channel, with channelled wrack *Pelvetia canaliculata* present, and a mixed sediment bed that is typical of a tidal section of a large river. This area of Annex I habitat is not part of the QI resource of any European sites. Hydrophilous tall-herb swamp [6430] habitat was noted along the banks of the Royal Canal and Grand Canal but is not part of the QI of resource of any European sites.

The habitat types of the Heritage Council classification system (Fossitt, 2000) present within the study area of the proposed Project within assessment zones AZ1, AZ2, AZ3 and AZ4 are presented in Table 4.

Table 4. Habitats (Fossitt, 2000) recorded within the survey area, the footprint of the proposed Project and within the Assessment Zones AZ1, AZ2, AZ3 and AZ4

Habitat Type Within Survey Area	Within Footprint	AZ1	AZ2	AZ3	AZ4
Arable crops (BC1)	✓	✓	✓	✓	-
Flower beds and borders (BC4)	✓	✓	✓	-	✓
Stone walls and other stonework (BL1)	✓	✓	-	-	-
Earth banks (BL2)	✓	✓	✓	✓	-
Buildings and artificial surfaces (BL3)	✓	✓	✓	✓	✓
Tidal rivers (CW2) including the Annex I habitat Estuaries [1130]	-	-	-	-	✓
Exposed sand, gravel or till (ED1)	-	✓	-	-	-
Spoil and bare ground (ED2)	✓	✓	✓	✓	-
Recolonising bare ground (ED3)	✓	✓	✓	✓	✓
Refuse and other waste (ED5)	✓	✓	-	✓	-
Other artificial lakes and ponds (FL8)	-	✓	-	-	✓
Reed and large sedge swamps (FS1)	✓	-	-	-	✓
Tall-herb swamps (FS2) including the Annex I habitat Hydrophilous tall-herb swamp [6430]	✓	✓	-	-	✓
Depositing/lowland rivers (FW2)	✓	✓	-	✓	✓
Canals (FW3)	✓	-	-	-	✓
Drainage ditches (FW4)	✓	✓	✓	✓	✓
Improved agricultural grassland (GA1)	✓	✓	✓	✓	-

Habitat Type Within Survey Area	Within Footprint	AZ1	AZ2	AZ3	AZ4
Amenity grassland (improved) (GA2)	✓	✓	✓	✓	✓
Dry calcareous and neutral grassland (GS1)	✓	✓	✓	✓	✓
Dry meadows and grassy verges (GS2)	✓	✓	✓	✓	✓
Wet grassland (GS4)	✓	✓	-	✓	-
(Mixed) broadleaved woodland (WD1)	✓	✓	-	✓	✓
(Mixed) conifer woodland (WD3)	✓	✓	-	✓	-
Scattered trees and parkland (WD5)	✓	✓	-	-	✓
Hedgerows (WL1)	✓	✓	✓	✓	✓
Treelines (WL2)	✓	✓	✓	✓	✓
Scrub (WS1)	✓	✓	✓	✓	✓
Immature woodland (WS2)	✓	✓	✓	✓	-
Ornamental/non-native shrub (WS3)	✓	✓	✓	✓	✓

Full descriptions of these habitat types are presented in Section 15.3 of Chapter 15 (Biodiversity) of the EIAR, and corresponding habitat maps are provided in Figure 15.7 of the EIAR accompanying this application.

3.4.3 Non-native Invasive Species

There were seven non-native invasive plant species (four terrestrial species and three aquatic species) listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 present within or in close proximity to the proposed Project. The locations of these non-native invasive plant species are summarised below in Table 5 and shown overleaf.

The following non-native invasive species listed in *The Management of Invasive Alien Plant Species on National Roads - Technical Guidance* (TII, 2020) were also recorded widely across the survey area:

- Winter heliotrope – in canal (FW3) and dry meadows and grassy verges (GS2) habitat types
- Butterfly-bush– recolonising bare ground (ED3), hedgerow (WL1), treeline (WL2) and scrub (WS1)



Figure 6: Invasive plant species locations in the context of the proposed Project and its alignment.

Table 5. Summary of Non-native Invasive Plant Species Listed in the Third Schedule of the Birds and Habitats Regulations 2011 Recorded along or adjacent to the Proposed Project

Common name	Latin name	Location ¹⁰
Canadian pondweed	<i>Elodea canadensis</i>	<p>Survey:</p> <p>Located on the Royal Canal at the 5th level, Cross Gun's Quay, Cabra</p> <p>Located on the Grand Canal near the existing Luas Green Line crossing point</p> <p>Desktop study:</p> <p>Located across almost the entirety of the Royal Canal and Grand Canal (Waterways Ireland, 2019a and 2019b and NBDC, 2020)</p>
Giant hogweed	<i>Heraclium mantegazzianum</i>	<p>Surveys:</p> <p>Located on the northern and southern banks of the Broadmeadow River, east of the R132, in scattered patches</p> <p>Located on the southern and eastern banks of the Ward River, west of the R132</p> <p>Located in Ballymun, south of Northwood Avenue, west and east of the Domville Wood Road</p> <p>Desktop study:</p> <p>Located on the banks of the Broadmeadow River and River Tolka</p>
Indian balsam	<i>Impatiens glandulifera</i>	<p>Survey:</p> <p>N/A</p> <p>Desktop study:</p> <p>Located on the banks of the River Tolka and River Liffey</p> <p>The presence of Indian balsam in Ballymun was noted by Dublin City Council during the biodiversity meeting held on 21 May 2020 with DCC (which included the attendance of the DCC Biodiversity Officer).</p>
Japanese knotweed	<i>Fallopia japonica</i>	<p>Survey:</p> <p>Located in Dardistown within the eastern section of a field to south of the existing Long-term car park at Dublin Airport</p> <p>Located in Dardistown within the south-western section of a field to south of the existing Long-term car park at Dublin Airport</p> <p>Located within Irish Rail lands along the existing railway embankments and adjacent lands north of the Royal Canal south-east of Glasnevin Cemetery</p> <p>Desktop study:</p> <p>Located on banks of the River Tolka and Royal Canal, and within St Stephen's Green Park</p>
New Zealand pigmyweed	<i>Crassula helmsii</i>	<p>Survey:</p>

¹⁰ These records were identified during surveys. Additional to these results are records of invasive plants species found during the desktop study, as specified.

Common name	Latin name	Location ¹⁰
		Located on the Grand Canal near the existing Luas Green Line crossing point Desktop study: N/A
Nuttall's pondweed	<i>Elodea nuttalli</i>	Survey: Located on the Royal Canal at the 5 th level, Cross Gun's Quay, Cabra Desktop study: Located across almost the entirety of the Royal Canal and Grand Canal (Waterways Ireland, 2019a and 2019b and NBDC, 2020)
Three-cornered leek	<i>Allium triquetrum</i>	Survey: Located on bank west of fields in Bellenstown Located in a garden of St Anne's private dwelling off Charter School Hill Road Located along the eastern boundary of the DCU Sports Complex playing pitches Located at the north-western boundary of CLG Na Fianna playing pitches Located along the northern bank of the Grand Canal directly west of the Luas Green Line crossing point Desktop study: N/A

3.4.4 Fauna Species

3.4.4.1 Breeding Birds

A total of 55 bird species were recorded during the breeding bird survey; only four of which were Special Conservation Interest (SCI) bird species, i.e.:

- Coot *Fulica atra*, which was observed in Blessington Street Park, during the first and second visits, and Stephen's Green Park, during the second and third visits. The nearest SPA designated for this SCI bird species is Lough Derravarragh SPA, located c. 71.4km west of the proposed Project;
- Cormorant *Phalacrocorax carbo*, which was observed on the River Tolka and the Royal Canal during the first visit. The nearest SPA designated for this SCI bird species is Ireland's Eye SPA, located c. 11.3km east of the proposed Project;
- Herring gull *Larus argentatus*, which was relatively widespread; observed in Dardistown and Glasnevin during the second and third visits, Drumcondra and St. Stephen's Green Park during the third visit. The nearest SPA designated for this SCI bird species is Ireland's Eye SPA, located c. 10.2km east of the proposed Project; and
- Kingfisher *Alcedo atthis*, which was observed once, flying east within the Broadmeadow River corridor, during the second visit. The nearest SPA designated for this SCI bird species is the River Boyne and River Blackwater SPA, located c. 28.6km north-west of the proposed Project.

The results of the breeding bird surveys, filtered by SCI species, are illustrated in Figure 7 overleaf with the full list of bird species recorded provided in Appendix C. The full results of the desktop review are presented in Appendix D.

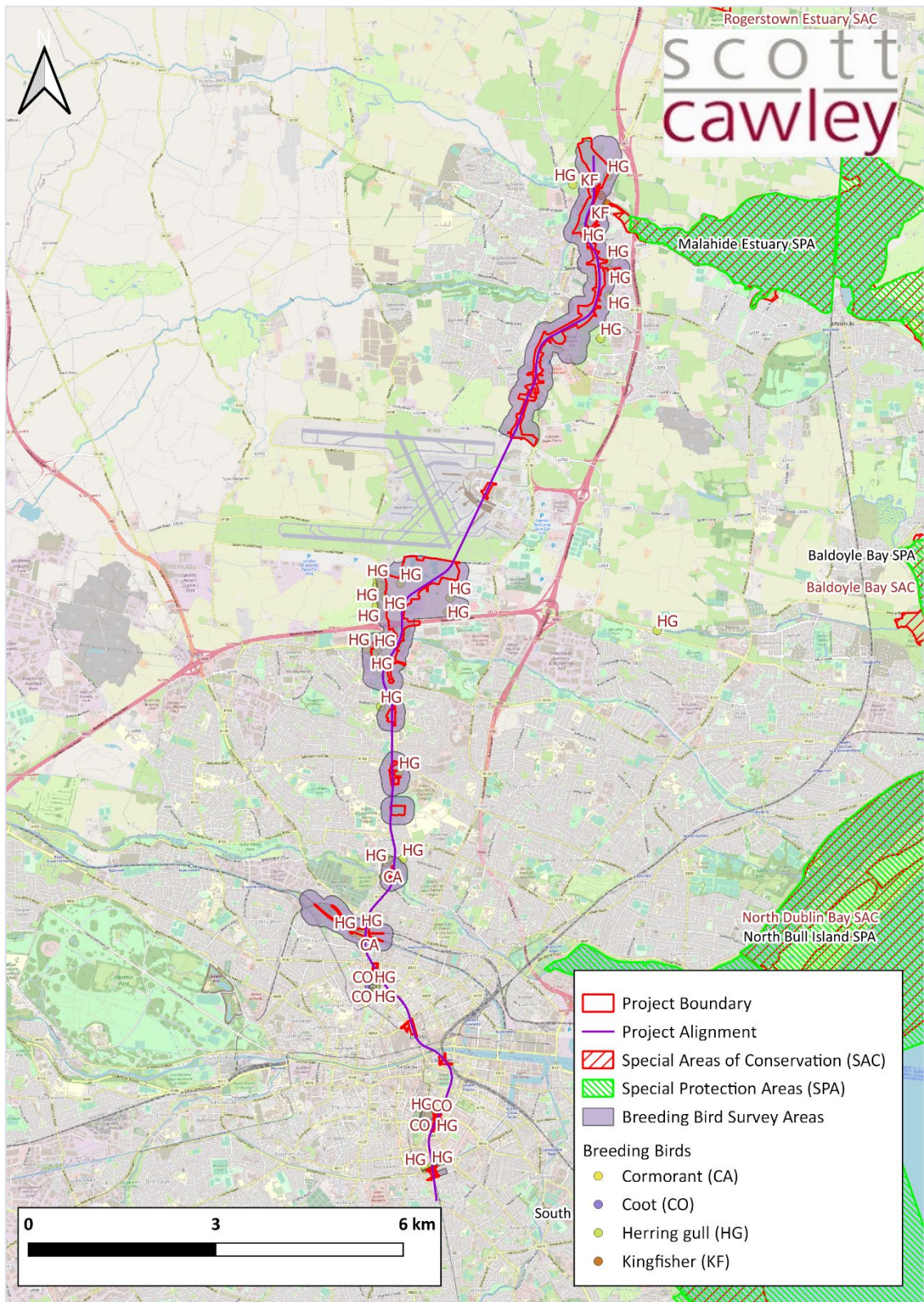


Figure 7: Results of breeding bird surveys, filtered by SCI species. Records of species are displayed as points with the corresponding BTO code for the species in question

3.4.4.2 Wintering Birds

The winter bird surveys recorded a wide range of bird species at sites across the study area. The wintering bird surveys recorded a total of 38 species across the study area; 16 of which were species listed as SCIs for SPAs (see Table 6 below for a list of these sites).

The full results of the winter bird surveys are provided in Appendix B.

Table 6. SCI Bird Species Recorded during the Wintering Bird Surveys

Common name/Latin name/BoC CI Code	Nearest European site	Distribution in the study area	Peak count/Site/Date	Conservation Importance	
				BoCCI (Breeding/Wintering)	Annex I
Black-headed gull <i>Chroicocephalus ridibundus</i> (BH)	North Bull Island SPA, c. 5km east of the proposed Project as the crow flies	Widespread; observed across the entire study area during all four visits and during five visits to lands at Dardistown.	170 birds, west of the M1 Motorway bridge over the Malahide Estuary (site code: 112), fourth visit	Amber (B/W)	-
Black-tailed godwit (<i>Limosa limosa</i>)	Malahide Estuary SPA, c. 490m east of the proposed Project as the crow flies	Observed at site in Barrysparks, south-east of the R132 (site code: 115), during two visits	84 birds, site in Barrysparks south-east of the R132 (site code: 115), third visit	Red (W)	-
Coot <i>Fulica atra</i> (CO)	Lough Derravarragh SPA, c. 71.4km west of the proposed Project as the crow flies	Observed in Blessington Street Park during the second, third and fourth visit (peak count - 11)	11 birds, Blessington Street Park (site code: 89), third visit	Amber (B/W)	-
Common gull <i>Larus canus</i> (CM)	Dundalk Bay SPA, c. 42.6km north of the proposed Project as the crow flies	Observed at Newbury Park (site code: 144) and Glin Park (site code: 146) during one visit	2 birds, Glin Park (site code: 146), second visit	Amber (B/W)	-
Cormorant <i>Phalacrocorax carbo</i> (CA)	Ireland's Eye SPA, c. 10.2km east of the proposed Project as the crow flies	Observed on the Broadmeadow Estuary directly west of the M1 Motorway bridge (site code: 112) during two visits	1 bird, west of the M1 Motorway bridge over the Malahide Estuary (site code: 112)	Amber (B/W)	-
Curlew <i>Numenius arquata</i> (CU)	North Bull Island SPA, c. 5km east of the proposed Project as the crow flies	Observed: in eastern fields in Dardistown (site code: 126) during the first visit in 2018-2019; playing pitch at the Royal College of Surgeons Sports Grounds (site code: 133) during the first visit; playing pitches at DCU (site code: 23) during the first, second and fourth visit; Scoil Chaitríona (site code: 160) during the fourth visit; Na Fianna, St Vincent's School (site code: 11) during first and second visit; and at	165 birds, playing pitch at Royal College of Surgeons Sportsground (site code: 133), first visit in 2018-2019	Red (B/W)	-

Common name/Latin name/BoC CI Code	Nearest European site	Distribution in the study area	Peak count/Site/Date	Conservation Importance	
				BoCCI (Breeding/Wintering)	Annex I
		Belcamp Park (site code: 149) during second visit			
Golden plover <i>Pluvialis apricaria</i> (GP)	Malahide Estuary SPA, c. 490m east of the proposed Project as the crow flies	Observed in a south-eastern field in Dardistown (site code: 132) during the first and second visit	33 birds, south-eastern field in Dardistown (site code: 132), first visit 2018-2019	Red (B/W)	✓
Grey heron <i>Ardea cinerea</i> (H.)	Wexford Harbour and Slobs SPA, c. 95.5km south of the proposed Project as the crow flies	Observed in a playing pitch in Home Farm (site code: 72) during third visit and at pond in Darndale Park (site code: 147) during third visit	1 bird, Home Farm (site code: 72), third visit and 1 bird, Darndale Park (site code: 147) third visit.	Green (B/W)	-
Herring gull <i>Larus argentatus</i> (HG)	Ireland's Eye SPA, located c. 10.2km east of the proposed Project as the crow flies	Widespread; observed across the entire study area during all four visits and during six visits to lands at Dardistown	115 birds, south-eastern field in Dardistown (site code: 132), 12 March 2020	Amber (B/W)	-
Kingfisher <i>Alcedo atthis</i> (KF)	River Boyne and River Blackwater SPA, located c. 28.6km north-west of the proposed Project	Observed flying along the Broadmeadow River during the second visit	1 bird, Broadmeadow River (no site code)	Amber (B)	✓
Lesser black-backed gull <i>Larus fuscus</i> (LB)	Lambay Island SPA, located c. 11.6km east of the proposed Project	Observed during the second and fourth visit: agricultural fields located the Broadmeadow Estuary directly west of the M1 Motorway bridge (site code: 112); at a playing pitch in St Colmcille's Girls National School (site code: 50); at a playing pitch in Santry (site code: 102); rough grassland located south of Ikea in Ballymun (site code: 123); areas of amenity grassland in Ballymun north of Gateway Crescent (site code: 138) and south of Shangan Road (site code: 141); and, Blessington Street Park (site code: 89)	6 birds, amenity grassland in Ballymun south of Shangan Road (site code: 141), fourth visit	Amber (B/W)	-
Light-bellied brent goose <i>Branta bernicla</i> (BG)	Malahide Estuary SPA, c. 490m east of the proposed Project as the crow flies	Observed in: Belcamp Park (site code: 149) on the second visit; Darndale Park (site code: 147) on the second and third visits; amenity grassland west of Newtown Court (site code: 161) on 3 rd February 2020;	113 birds, Darndale Park (site code: 147), 3 February 2020	Amber (W)	-

Common name/Latin name/BoC CI Code	Nearest European site	Distribution in the study area	Peak count/Site/Date	Conservation Importance	
				BoCCI (Breeding/Wintering)	Annex I
		and amenity grassland north of Moatview Drive (site code: 148) on 27 th February 2020			
Little grebe <i>Tachybaptus ruficollis</i> (LG)	Wexford Harbour and Slobs SPA, c. 95.5km south of the proposed Project as the crow flies	Observed on the Broadmeadow Estuary directly west of the M1 Motorway bridge (site code: 112) during the last visit	3 birds, Broadmeadow Estuary directly west of the M1 Motorway bridge (site code: 112), during two visits	Green (B/W)	-
Mallard Anas <i>platyrhynchos</i> (MA)	Dundalk Bay SPA, c. 42.6km north of the proposed Project as the crow flies	Observed: in agricultural fields located the Broadmeadow Estuary directly west of the M1 Motorway bridge (site code: 112); at ponds located south of Barrysparks (adjacent to southern boundary of site code: 115); on the Sluice River during third visit (site code: 39); at a pond within Darndale Park during three visits (site code: 147); and, at Blessington Street Park during three visits (site code: 89)	26 birds, at Blessington Street Park (site code: 89) during third visit	Amber (B/W)	-
Oystercatcher <i>Haematopus ostralegus</i> (OC)	Malahide Estuary SPA, c. 490m east of the proposed Project as the crow flies	Observed: in areas of amenity grassland in the centre of Swords (site code: 154) during the third visit; at playing pitches at DCU (site code: 23) during the first, second and fourth visit; and, at playing pitches in Leinster Cricket Club (site code: 45) during second visit	38 birds, Fingallians GAA Club (site code:4) in Swords, third visit	Red (B/W)	-
Teal Anas <i>crecca</i> (T.)	North Bull Island SPA, c. 5km east of the proposed Project as the crow flies	Observed on the Broadmeadow Estuary directly west of the M1 Motorway bridge (site code: 112) during two visits	14, Broadmeadow Estuary directly west of the M1 Motorway bridge (site code: 112), 3 February 2020	Amber (B/W)	-
Tufted duck <i>Aythya fuligula</i> (TU)	Lough Derravarragh SPA, c. 71.4km west of the proposed Project as the crow flies	Observed in Blessington Street Park (site code: 89) during the second, third and fourth visit	61, Blessington Street Park (site code: 89), third visit	Amber (B/W)	-

During the wintering bird survey, there were a large number of birds, primarily gull species, flying high overhead and not landing at any specific site. These records have not been included in this assessment aside from one record of seven whooper swan flying over lands north of the Broadmeadow River during the first visit in 2018-2019. The nearest European site for this Amber listed Annex I of the Birds Directive species is Lough Derravarragh SPA, located c. 71.4km west of the proposed Project.

*3.4.4.3 Otter *Lutra lutra**

There are desktop records of otter from the Broadmeadow River, Ward River, Cuckoo River, Mayne River, Santry River, Tolka River, Royal Canal, River Liffey and Grand Canal (NBDC, 2021; Waterways Ireland, 2019a; Waterways Ireland, 2019b; Dublin City Council, 2019). Although there are no records of otter along the Sluice River, it is likely that otter use this watercourse to commute and/or forage along as there are records of this species present downstream in the Mayne Estuary transitional waterbody. The following signs of Otter activity were recorded during the surveys:

- Otter spraint recorded on the southern bank of the Broadmeadow River, c. 240m downstream from the proposed Project at Ch. 1620;
- Otter spraint recorded on the northern bank of the Santry River, c. 145m downstream from the proposed Project;
- Otter spraint, footprints, potential couch and potential slides recorded along the northern bank of the Royal Canal before Broombridge, directly adjacent to and c. 80m to 685m north-west from the proposed Project; and
- An otter couch located on the southern bank of the Royal Canal east of Lock 4 c. 120m south-east of the proposed Project at Ch. 14960.

The results of the otter surveys are shown on Figure 8 overleaf.



Figure 8: Results of otter surveys in the context of the proposed Project and its alignment.

It is considered likely that otter utilise various watercourses within the Broadmeadow River, Mayne River, River Tolka and River Liffey sub-catchments for breeding, foraging and commuting activities.

No otters were recorded on the infra-red motion-activated camera deployed (under NPWS Licence No. 007/2020) at the entrance of a small burrow on the Santry River c. 210m downstream of the proposed crossing point location. The only species recorded using this burrow was a brown rat.

A hydrological connection exists between the proposed Project and the Wicklow Mountains SAC (for which otter are a QI), which is located c. 18.5km upstream of the proposed Project via the River Liffey (north of the proposed Tara Station at George's Quay), the River Dodder and Owenadoher River at Tibbradden Wood. It is therefore within the territorial range of male otter in Ireland albeit at the very far end of that range (c. 13.2km ±5.3km) (Ó'Néill *et al.*, 2008) and as such on a precautionary basis it is considered possible that otter present within the ZoI of the proposed Project may be connected with the SAC population.

3.4.5 Hydrological Baseline

The proposed Project crosses the catchments/sub-catchments of 11 watercourses. Details on each of these watercourses, including the river catchment/sub-catchment they are located in, the approximate distances to downstream European sites and the results of the biological water quality status assessment (*i.e.* Q₂-sampling), are provided in Table 7. With regards to water quality, four of the seven watercourses surveyed are classified as "Bad Status", while the remaining three are classified as "Poor Status". The full results of the hydrological study are presented in Chapter 19 (Hydrology) of the EIAR accompanying this application.

Table 7. Watercourses Crossed by, or within the ZoI of, the Proposed Project and links to European Sites, along with the Corresponding Results of the Biological Water Quality Status Assessment (*i.e.*, Q₂-Sampling) (after Toner *et al.*, 2005)

Watercourse Crossed by Proposed Project (catchment and sub-catchment)	Distance to downstream European sites from proposed crossing point and the waterbody they are located in	Q-Value	Water Framework Directive Status	Pollution Status	Condition
Turvey River (Staffordstown stream) (Nanny-Delvin catchment and Ballough [Stream]_SC_010 sub-catchment)	Watercourse flows c. 2.1km downstream of the proposed crossing point until it reaches Malahide Estuary SAC and Malahide Estuary SPA, both of which are located within the Broadmeadow Water transitional waterbody.	Q ₂	Bad Status	Seriously Polluted	Unsatisfactory
Broadmeadow River (Nanny-Delvin catchment and Broadmeadow_SC_010 sub-catchment)	Watercourse flows c. 380m downstream of the proposed crossing point until it reaches the Malahide Estuary SAC and c. 765m downstream of the proposed crossing point until it reaches the Malahide Estuary SPA, both of which are located within the Broadmeadow Water transitional waterbody.	n/a (transitional water)	n/a	n/a	n/a
Ward River (Nanny-Delvin catchment and Broadmeadow_SC_010 sub-catchment)	Watercourse flows for c. 110m downstream of the proposed crossing point, until it reaches the Broadmeadow River, which in turn flows c. 187m downstream of the confluence until it reaches the Malahide Estuary SAC and c. 583m downstream of the confluence until it reaches the Malahide Estuary SPA,	Q ₃	Poor Status	Moderately Polluted	Unsatisfactory

Watercourse Crossed by Proposed Project (catchment and sub-catchment)	Distance to downstream European sites from proposed crossing point and the waterbody they are located in	Q-Value	Water Framework Directive Status	Pollution Status	Condition
	both of which are located within the Broadmeadow Water transitional waterbody.				
Sluice River (Liffey and Dublin Bay catchment and Mayne_SC_010 sub-catchment)	Watercourse flows c. 8.4km downstream of the proposed crossing point until it reaches Baldoyle Bay SAC and Baldoyle Bay SPA, which are located within the Mayne Estuary transitional waterbody.	Q2-3	Poor Status	Moderately Polluted	Unsatisfactory
Cuckoo River (Liffey and Dublin Bay catchment and Mayne_SC_010 sub-catchment)	Watercourse flows c. 6.1km downstream of the proposed crossing point until it reaches the Mayne River, which then flows for a further c. 2.1km until it reaches Baldoyle Bay SAC and Baldoyle Bay SPA, which are located within the Mayne Estuary transitional waterbody.	Q1	Bad Status	Seriously Polluted	Unsatisfactory
Mayne River (Liffey and Dublin Bay catchment and Mayne_SC_010 sub-catchment)	Watercourse flows c. 15km downstream of the proposed stream diversion at Dardistown until it reaches Baldoyle Bay SAC and Baldoyle Bay SPA, which are located within the Mayne Estuary transitional waterbody.	Q1	Bad Status	Seriously Polluted	Unsatisfactory
Santry River (Liffey and Dublin Bay catchment and Mayne_SC_010 sub-catchment)	Watercourse flows c. 8km downstream of the proposed crossing point until it reaches North Dublin Bay SAC and North Bull Island SPA, which are located within the North Bull Island transitional waterbody that drains to Dublin Bay.	Q2	Bad Status	Seriously Polluted	Unsatisfactory
Tolka River (Liffey and Dublin Bay catchment and Tolka_SC_020 sub-catchment)	Watercourse flows c. 3.2km downstream of the proposed crossing point until it reaches South Dublin Bay and River Tolka Estuary SPA, which is partially located within the Tolka Estuary transitional waterbody that drains to Dublin Bay. It flows a further c. 4km until it reaches North Dublin Bay SAC and North Bull Island SPA.	Q2-3	Poor Status	Moderately Polluted	Unsatisfactory
Royal Canal (n/a)	Watercourse flows c. 3.1km downstream of the proposed crossing point until it reaches the Liffey Estuary Lower transitional waterbody at North Wall Quay, which flows for another c.	n/a	n/a	n/a	n/a

Watercourse Crossed by Proposed Project (catchment and sub-catchment)	Distance to downstream European sites from proposed crossing point and the waterbody they are located in	Q-Value	Water Framework Directive Status	Pollution Status	Condition
	6.5km until it reaches Dublin Bay, within which North Dublin Bay SAC, North Bull Island SPA, South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA are located.				
River Liffey (Liffey and Dublin Bay catchment)	Watercourse flows c. 326m downstream of the proposed crossing point until it reaches the Liffey Estuary Lower transitional waterbody, which flows for another c. 7.2km until it reaches Dublin Bay, within which North Dublin Bay SAC, North Bull Island SPA, South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA are located.	n/a	n/a	n/a	n/a
Grand Canal (n/a)	Watercourse flows c. 2.6km downstream of the proposed crossing point until it reaches the Liffey Estuary Lower transitional waterbody, which flows for another c. 5.8km until it reaches Dublin Bay, within which North Dublin Bay SAC, North Bull Island SPA, South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA are located.	n/a	n/a	n/a	n/a

3.4.6 Hydrogeological Baseline

Geological Survey of Ireland (GSI) data indicates that the bedrock formation 1:100k in the northern and central sections of the proposed Project is "Argillaceous bioclastic limestone, shale", "Calcareous shale, limestone conglomerate", "Dark Limestone and Shale (Calp)".

The proposed Project transverses two ground waterbodies. Environmental data sourced from the EPA for each of these ground waterbodies is presented below:

3.4.6.1 Swords Ground Waterbody

- For the majority of this area, it is considered to be of "Good" Ground Waterbody Water Framework Directive (2000/60/EC) (WFD) Status (2010-2015) and "not at risk" of failing the WFD groundwater quality objectives for the majority of its area; however at lands west of the R132 (i.e. at Industrial Facility P0014-03) it is classified as being of "Poor" status and "at risk".
- The aquifers located within this ground waterbody and where the proposed Project transverses are classified as "locally important aquifer - moderately productive only in local zones".

3.4.6.2 Dublin GroundWater Body

- For the majority of this area, it is considered to be of "Good" Ground Waterbody WFD Status (2010-2015) and "not at risk" of failing the WFD groundwater quality objectives for the majority of its area; however at lands at Dublin Airport it (i.e. Industrial Facility P0480-02) it is classified as "Poor" status and considered to be "at risk".

- The aquifers located within this ground waterbody and where the proposed Project transverses are classified as "*locally important aquifer - moderately productive only in local zones*" and "*Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones*".

The vulnerability of both ground waterbodies to human activities ranges from "*Rock at or Near Surface*", "*Extreme*", "*High*", "*Moderate*" to "*Low*".

A full description of the hydrogeological baseline of the proposed Project is presented in Chapter 20 (Hydrogeology) of the EIAR accompanying this application.

3.4.7 Soils and Geology Baseline

As stated in Section 21.3 (Baseline Environment) of the Chapter 20 (Soils & Geology) of the EIAR accompanying this application, the General Soil Map of Ireland (An Foras Talúntais 1980) shows the footprint of the proposed Project is underlain by Grey Brown Podzolics, which is a mainly dry mineral soil comprising associated Gleys. The Quaternary Geological Map of Ireland (GSI 2017) and GSI online maps (GSI 2019) suggest the subsoils primarily consist of till derived from limestone along with areas of alluvium and limestone derived gravels. The till is generally low permeability and cohesive apart from subordinate (although locally extensive) granular horizons, with high strength and low compressibility (Parsons Brinkerhoff 2007). The geological maps (GSI 2014; GSI 2019) indicate that the bedrock geology comprises Carboniferous Tournasian limestone, and Viséan limestone and calcareous mudstone. The heavily faulted older Tournasian rocks are primarily present towards the north and include the Tober Colleen and Malahide formations, and the Waulsortian Limestones. The Viséan limestone and calcareous mudstone of the Lucan Formation are primarily present south of the M50 Motorway.

A full description of the baseline soil and geology of the footprint of the proposed Project is presented in Chapter 20 Soils and Geology of the EIAR accompanying this application.

3.5 Assessment of Effects on European Sites

This section identifies all the potential impacts associated with the proposed development, examines whether there are any European sites within the Zol of effects from the proposed Project, and assesses whether there is any risk of the proposed Project resulting in a significant effect on any European site, either alone or in combination with other plans or projects.

In assessing the potential for the proposed Project to result in a significant effect on any European sites, any measures intended to avoid or reduce the harmful effects of the project on European sites are not taken into account.

Based on the baseline and receiving ecological environment and the nature and characteristics of the proposed Project the following potential impacts have been identified:

- Habitat loss, fragmentation and/or severance (*e.g.* barrier effect), which in turn may result in impacts on QI fauna species and SCI wintering bird species dependent on these habitats for their survival (***e.g.* the loss of foraging and roosting habitats**).
- Mortality risk to terrestrial fauna species (*e.g.* SCI bird species) due to vegetation clearance works undertaken during construction of the proposed Project and/or from collisions associated with rail traffic and/or proposed bridge structures during operation.
- Increases in noise, vibration and human activity levels during construction and/or operation, which in turn could result in the disturbance to and/or displacement of fauna species present within the Zol of the proposed Project.
- Introduction/increase in light levels during construction and/or operation, which in turn could result in the disturbance to and/or displacement of fauna species (*e.g.* SCI bird species) present within the Zol of the proposed Project.
- Reduction in surface water quality in the receiving environment as a result of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features occurring during construction and/or as a result of the long-term discharge of surface water runoff from drainage outfalls associated with the proposed Project to surface water features. This in turn

could result in the degradation of aquatic/wetland habitats and indirect impacts on the aquatic species that these habitats may support, such as SCI bird species.

- Alteration to the existing hydrological regime of watercourses (*i.e.*, flow and/or local flooding regime) crossed by the proposed Project during construction and/or operation, which in turn could result in the degradation of aquatic/wetland habitats and indirect impacts on aquatic species that these habitats may support.
- Reduction in groundwater quality in the receiving environment as a result of tunnelling and/or deep excavation works during construction and/or the long-term discharge of surface water runoff to ground. This in turn could result in effects on groundwater dependent terrestrial ecosystems.
- Alteration to the existing hydrogeological regime of the receiving environment as a result of tunnelling and/or deep excavation works during construction. This in turn could result in effects on groundwater dependent terrestrial ecosystems.
- Reduction in air quality as a consequence of dust deposition associated with construction activities, which in turn could result in habitat degradation in the immediate locality of the proposed Project and impacts on fauna species that these habitats support.
- Introduction and/or spread of non-native invasive plant species during construction and/or during maintenance/management works, which in turn could result in habitat degradation and impacts on fauna species that these habitats support.

These potential impacts are described in detail below as part of the identification of European sites located within the ZoI of the proposed Project.

3.5.1 Determining the Zone of Influence of the Proposed Project

In establishing which European sites are potentially at risk (in the absence of mitigation) from the proposed Project, a source-pathway-receptor approach was applied. In order for an impact to occur, there must be a risk enabled by having a source (e.g. water abstraction or construction works), a receptor (e.g. a European site or its Qualifying Interest(s) (QIs) or Special Conservation Interest(s) (SCIs) species), and a pathway between the source and the receptor (e.g. pathway by air for air borne pollution, or a pathway by a watercourse for mobilisation of pollution). For an impact to occur, all three elements must exist; the absence or removal of one of the elements means there is no possibility for the impact to occur.

The identification of source-pathway-receptor connection(s) between the proposed Project and European sites essentially is the process of identifying which European sites are within the ZoI of the proposed Project, and therefore potentially at risk of significant effects. The ZoI is defined as the area within which the proposed Project could affect the receiving environment such that it could potentially have significant effects on the QI habitats or QI/SCI species of a European site, or on the achievement of their conservation objectives (as defined in CIEEM, 2018).

The identification of a source-pathway-receptor risk does not automatically mean that significant effects will arise. The likelihood for significant effects will depend upon the characteristics of the source (e.g. extent and duration of construction works), the characteristics of the pathway (e.g. direction and strength of prevailing winds for air borne pollution) and the characteristics of the receptor (e.g. the sensitivities of the European site and its QIs/SCIs). However, identification of the risk does mean that there is a possibility of ecological or environmental damage occurring, with the significance of the effect depending upon the nature and exposure to the risk and the characteristics of the receptor. In this case, where uncertainty existed, the precautionary principle was applied.

3.5.2 Identifying Relevant Sites within the ZoI of the Proposed Project

The following potential impacts associated with the proposed Project have the potential to affect the receiving environment and, as a result, the conservation objectives supporting the qualifying interest/special conservation interests of seventeen European sites, *i.e.*: Baldoyle Bay SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SAC, Malahide Estuary SPA, North Bull Island SPA, North Dublin Bay SAC, Rockabill SPA, Rogerstown

Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC, The Murrrough SPA and Wicklow Mountains SAC.

3.5.3 Habitat loss and fragmentation

The proposed Project does not overlap with the boundary of any European site. The nearest European site, Malahide Estuary SAC, is located c. 380m downstream of the Broadmeadow River crossing point of the proposed Project or c. 235m east as the crow flies. As the proposed Project does not traverse or is not located directly adjacent to any European site, there is no potential for direct habitat loss and/or fragmentation to occur. Habitat loss may occur indirectly as a consequence of severe habitat degradation arising from a reduction in water quality, a change to the hydrological regime and/or the introduction and/or spread of non-native invasive species, as discussed in the sections below.

The potential for impacts on SCI bird species as a consequence of loss in ex-situ inland feeding and/or roosting sites is discussed below.

Ex-situ Habitat Loss – SCI bird species

The potential for the loss of ex-situ inland feeding and/or roosting sites¹¹ utilised by SCI bird species as a consequence of the proposed Project to impact on the conservation objectives of any SPA has also been assessed. Potential impacts may arise due to the direct loss of important ex-situ inland sites that individual SCI bird species of local SPA populations rely upon as feeding and/or roosting habitat where these sites fall within the Project boundary.

During the breeding and wintering bird surveys, a total of 15 SCI species were recorded. A total of seven of these SCI species were recorded on lands located within the footprint of the proposed Project, i.e.: black-headed gull, black-tailed godwit, common gull, curlew, grey heron, herring gull and kingfisher. In addition, two other SCI species were recorded on lands connected to and directly adjacent to lands within the footprint of the proposed Project, i.e. golden plover, recorded within an adjacent agricultural field of the same habitat type in Dardistown (site code: 132) and oystercatcher, recorded within the same area of amenity grassland east of the Ward River (site code: 154). Therefore, it is likely that these two SCI species, which utilise the similar adjacent lands to those located within the footprint of the proposed Project, also utilise the lands within the footprint of the proposed Project. Six of these species, i.e. black-headed gull, common gull, curlew, grey heron, herring gull and oystercatcher, along with six additional SCI species, i.e. cormorant, lesser black-backed gull, light-bellied brent goose, little grebe, teal and tufted duck, were also recorded in lands located beyond the footprint of the proposed Project within the 300m study area.

It was determined whether SCI bird species recorded within the study area are connected to any SPA population and as such whether there is potential for impacts to occur based on the following:

- The distance between the study area and the nearest SPA for which the SCI bird species has been designated; and
- The ecology of the bird species in question, and the likely foraging range of these species based on published data on their core and maximum foraging ranges where known (SNH, 2016; BirdLife International 2022), as well as the professional knowledge of the authors of this report of the species ecology.

¹¹ "Several of the listed waterbird species may at times use habitats situated within the immediate hinterland of the SPA or in areas ecologically connected to it [i.e., ex-situ sites]. The reliance on these habitats will vary from species to species and from site to site. Significant habitat change or increased levels of disturbance within these areas could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers"

Of the 15 SCI species observed during breeding and wintering bird surveys, the following eight SCI species recorded within the study area are not likely to be part of any SPA population:

- Common gull – The nearest SPA designated for this SCI bird species is Dundalk Bay SPA, located c. 42.6km north of the proposed Project. It is unlikely that gulls from Dundalk Bay SPA regularly commute from roosting/foraging sites in Dundalk Bay and the study area given the availability of foraging resources in the immediate vicinity of Dundalk Bay;
- Cormorant - The nearest SPA designated for this SCI bird species is Ireland's Eye SPA, located c. 10.2km east of the proposed Project. Although this species can forage up to 20-25km from its winter or breeding roosts, it typically forages within 10km of its roost (BirdLife International, 2022);
- Grey heron – The nearest SPA designated for this SCI bird species is Wexford Harbour and Slobs SPA, c. 95.5km south of the proposed Project. This species is known to typically forage between 2-38km from its nesting site during the breeding season (BirdLife International, 2022), and its winter foraging range from roost site is likely to be similar;
- Herring gull – The nearest SPA designated for this SCI bird species is Ireland's Eye SPA, located c. 10.2km east of the proposed Project. The foraging range for this species has been variously reported as being between 35km and 100km (BirdLife International, 2022);
- Kingfisher – The nearest SPA designated for this SCI bird species is the River Boyne and River Blackwater SPA, located c. 28.6km north-west of the proposed Project and within a separate river catchment. Kingfisher breeding territories for the nearest SPA population are strongly associated with the River Boyne and Blackwater main channels and their tributaries¹². Given the absence of direct connectivity between the Project and the River Boyne by way of watercourses, kingfisher within the study area are not likely to be part of any European site population;
- Lesser black-backed gull – The nearest SPA designated for this SCI bird species is Lambay Island SPA, located c. 11.6km east of the proposed Project;
- Little grebe – The nearest SPA designated for this SCI bird species is Wexford Harbour and Slobs SPA, c. 95.5km south of the proposed Project. This is considered to be beyond the range at which this species is likely to regularly travel between foraging and roosting sites; and
- Tufted duck – The nearest SPA designated for this SCI bird species is Lough Derravarragh SPA, c. 71.4km west of the proposed Project. This species is understood to be largely sedentary in winter and the distance between the project and the nearest SPA site is such that it is likely to be outside of the regular foraging range of the species.

Grey heron, little grebe, kingfisher and tufted duck are all resident in Ireland and local populations are generally sedentary, and as such birds connected with SPA populations are unlikely to travel a distance of 10km or greater from lands within the proposed Project to any SPA site.

The nearest SPAs designated for grey heron and kingfisher are located within different river catchments to the proposed Project. Both species would normally be expected to hold a territory along a linear section of watercourse and therefore not regularly travel beyond their home watercourse/roost within the same catchment/watercourse. Kingfisher breeds in suitable bankside habitat of slow-flowing rivers and can be occasionally found by lakes and estuaries and coasts (particularly in winter), while grey heron typically feeds in riverine and lakeshore habitats and breeds in woodlands near lakes or brackish sea-bays (Svensson, 2010). Given the lack of a hydrological connection between the proposed Project and any European sites designated for these SCI species and the very large distance of separation between the Project and the nearest European site for which these species have been designated (over which it is not anticipated that the birds would normally commute between their foraging and roosting sites), there is no potential for likely significant effects on any such European sites to occur as a consequence of the loss in habitat of an ex-situ breeding, feeding and/or roosting site.

¹² Cummins et al. (2010). *Assessment of the distribution and abundance of Kingfisher Alcedo atthis and other riparian birds on six SAC river systems in Ireland. A report commissioned by the National Parks and Wildlife Service and prepared by BirdWatch Ireland. Dated June 2010.*

Little grebe are resident in Ireland year-round and are associated with freshwater ponds, rivers and loughs in the breeding season. Some pairs migrate to the coast for the winter season¹³. Common gull populations comprise colonies breeding in the West of Ireland and winter visitors from central and northern Scotland, Scandinavia and the Baltic, while tufted duck populations comprise those resident all year in Ireland and winter visitors¹⁴ (Birdwatch Ireland, 2020). The nearest SPAs for little grebe, Wexford Harbour and Slobbs SPA, is over 70km from the Project; the nearest SPA for common gull, Dundalk Bay SPA, is over 40km from the project; and the nearest SPA for tufted duck, Lough Derravarragh SPA is over 70km from the project. Therefore, the closest SPAs are located at a considerable distance from the proposed Project, a distance that they are not likely to regularly travel between foraging and commuting sites. Therefore, it is likely that the birds recorded within the study area, including those species that are SCIs of European site, are not part of any SPA population and as such, there is no potential for likely significant effects on any European sites designated for these SCI bird species to occur as a consequence of the loss in habitat of an ex-situ inland breeding, feeding and/or roosting site.

Even if the populations of any of the abovementioned species in the study area are part of a SPA population, the number of birds observed of each species in the project area during all surveys was below 1% of either their national or international populations. Any potential effects on such a small cohort of any birds' population could not undermine the conservations objectives of any European sites, and therefore there is no potential for likely significant effects on these species arising from ex situ habitat loss.

In the case of the remaining seven SCI species black-headed gull, black-tailed godwit, curlew, golden plover, light-bellied brent goose, oystercatcher and teal, the Project is within the potential foraging ranges of those species closest European sites. As such it is possible that the birds recorded during the surveys may form part of the local relevant SPA populations (see Table 8, Table 9, and Appendices for details).

Curlew and golden plover were only recorded within the footprint of the proposed Project once during eight visits undertaken over two seasons to lands at Dardistown with respective peak flocks of 106 birds and 33 birds recorded in fields located east and south-east of the proposed depot at Dardistown (site codes: 126 and 132, total area of site to be lost c. 8.2ha). Curlew was also recorded beyond the footprint of the proposed Project at multiple locations (see Table 8). The highest peak count recorded for this species was at a playing pitch at the Royal College of Surgeons Sportsground (site code: 133) with 135 birds. Golden plover was not recorded at any other sites within the 300m study area. Similarly, oystercatcher was only recorded once during eight visits undertaken over two seasons to lands located in Swords – i.e., a peak flock of seven birds recorded in an area of amenity grassland located directly east of the Ward River (site code: 154, total area of site to be lost c. 2.1ha). This SCI species was also recorded beyond the footprint of the proposed Project at multiple locations (see Table 8).

The highest peak count was recorded at a playing pitch at Fingallians GAA Club (site code: 4) with 38 birds. Black-tailed godwit were recorded twice during four visits undertaken to lands at Barrysparks, east of the R132 (site code: 115, total area of site to be lost c. 8.1ha) with respective peak flocks of 84 and 80 birds. This species was not recorded at any other site within the 300m study area. Black-headed gull was recorded at multiple locations within the footprint of the proposed Project and the 300m study area. The numbers recorded at these sites within the footprint of the proposed Project were low, i.e. peak flocks ranging from one to 28 individual birds. The overall peak count of black-headed gull was recorded within the footprint of the proposed project at Barrysparks, east of the R132 (site code: 115, total area of site to be lost c. 8.1ha), while the overall peak within the 300m study area was in the Malahide Estuary west of the M1 Motorway bridge (site code: 112).

¹³ BirdWatch Ireland species account for little grebe. Available at <https://birdwatchireland.ie/birds/little-grebe/> [Accessed 4th August 2022]

¹⁴ Birdwatch Ireland species account for common gull. Available at: <https://birdwatchireland.ie/birds/common-gull/> [Accessed 5th April 2020].

No light-bellied brent geese or their droppings were recorded within any of the lands located within the footprint of the proposed Project. Based on the findings of a previous study of this SCI species within the Dublin area, there are no known sites of major, high and/or moderate importance¹⁵ for light-bellied brent goose within the footprint of the proposed Project (Scott Cawley Ltd., 2017). This SCI bird species was only recorded at sites located outside the footprint of the proposed Project; the nearest site to the proposed Project being St. Vincent's Primary School, which is located directly north of the interchange with the existing rail network at Glasnevin Junction. All other known inland foraging sites of this species are over 300m of from the Project, with the next closest site being the DCU Sports Grounds in Drumcondra (Scott Cawley Ltd., 2017).

No teal were recorded within any of the lands located within the footprint of the proposed Project. They were only recorded on two occasions both in the Malahide Estuary west of the M1 Motorway bridge (site code: 112) in relatively low numbers, i.e., peak flocks of 10 and 14 birds.

The relatively low frequency of occurrence of SCI bird species on lands located both within the footprint of the proposed Project and within the 300m study area evidences that they do not regularly use or rely upon the lands as foraging and/or roosting habitat. The peak flocks of each respective SCI bird species recorded at these sites are also relatively low, in particular when compared to 1% of their international¹⁶ flyway and national populations and the mean peak flock of each respective SCI species recorded in the nearest SPA¹⁷ (see Table 8 for details). This is especially the case for black-headed gull, golden plover and oystercatcher for which low peak counts were recorded. The peak flocks of black-tailed godwit and curlew recorded at fields in Dardistown were greater, at 84 and 106 respectively; however, both these numbers are significantly lower than both 1% of the national and international populations and the mean peak of the nearest European site designated for each respective SCI species.

In all cases, the peak flocks of each wintering bird species recorded within the study area was significantly lower than their corresponding 1% of their international population (i.e., the peak flocks recorded range from 0.02-7.64% of their corresponding 1% international population). Whilst the peak flocks of wintering bird species recorded within the study area were not as significantly lower than their corresponding 1% of their national population, they were all less than 47% of their corresponding 1% national population.

Table 8. Peak flock of SCI bird species potentially connected to SPA populations recorded within the study area of the proposed Project in comparison to the 1% of its international and national populations and the mean peak of the nearest SPA (those highlighted in green were recorded within the footprint of the proposed Project)

SCI bird species recorded	Nearest European site	Corresponding I-WeBS Site	Peak count recorded at site (within footprint/study area)	1% of international population	1% of national population	Mean peak count from nearest European site
Black-headed gull	North Bull Island SPA	0U404 Dublin Bay	28 (within footprint)	20,000	n/a	2,642

¹⁵ Major importance site 401+ geese; high importance site 51-400 geese; and, moderate importance site 1-50 geese (Benson, 2009).

¹⁶ According to Birdwatch Ireland I-WeBS Interpretive Notes, a wetland is considered to be of international importance if it regularly supports 1% of the relevant international, or flyway, population.

¹⁷ The mean peak count of each SCI bird species recorded in the SPA is based on the most recent 5-season period available (i.e., from 2008/2009 to 2017/2018). Accessed on the 2nd July 2021 via the Birdwatch Ireland website, i.e.:

<https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88>

SCI bird species recorded	Nearest European site	Corresponding I-WeBS Site	Peak count recorded at site (within footprint/study area)	% of international population	% of national population	Mean peak count from nearest European site
			170 birds (within 300m)			
Black-tailed godwit	Malahide Estuary SPA	0U408 Broadmeadow (Malahide) Estuary	84 (within footprint/300m)	1,100	200	206
Cormorant	Ireland's Eye SPA	0U951 Ireland's Eye	1 (within 300m)	1,200	110	117
Curlew	North Bull Island SPA	0U404 Dublin Bay	106 (within footprint) 165 (within 300m)	7,600	350	850
Golden plover	Baldoyle Bay SPA	0U403 Baldoyle Bay	33 (within footprint/300m)	9,300	920	1,230
Light-bellied brent goose	Malahide Estuary SPA	0U408 Broadmeadow (Malahide) Estuary	113 (within 300m)	400	350	913
Oystercatcher	Malahide Estuary SPA	0U408 Broadmeadow (Malahide) Estuary	7 (within footprint) 38 (within 300m)	8,200	610	1,449
Teal	North Bull Island SPA	0U404 Dublin Bay	14 (within 300m)	5,000	360	1,330

Table 9. Peak flock of SCI bird species not connected to SPA populations recorded within the study area of the proposed Project in comparison to the 1% of its international and national populations and the mean peak of the nearest SPA (those highlighted in green were recorded within the footprint of the proposed Project)

SCI bird species recorded	Nearest European site	Corresponding I-WeBS Site	Peak count recorded at site (within footprint/study area)	1% of international population	1% of national population	Mean peak count from nearest European site
Coot	n/a	0U408 Broadmeadow (Malahide) Estuary	11 (within 300m)	15,500	190	0
Grey heron	Wexford Harbour and Slobs SPA	0O401 Wexford Harbour and Slobs	1 (within footprint)	5,000	25	12
Little grebe	Wexford Harbour and Slobs SPA	0O401 Wexford Harbour and Slobs	3 (within 300m)	4,700	20	27
Mallard duck	Dundalk Bay SPA	0Z401 Dundalk Bay	26 (within 300m)	53,000	280	881
Mute swan	n/a	0U408 Broadmeadow (Malahide) Estuary	2 (within 300m)	100	90	65
Tufted duck	Lough Derravarragh SPA	0W010 Lough Derravarragh	61 (within 300m)	8,900	270	402

There are large areas of suitable foraging and/or roosting habitat (i.e., c. 1,828ha in total area) available for these wintering bird species in the wider locality of the proposed Project (i.e., beyond the 300m study area, from c. 0.3-2km from these existing sites located within the footprint of the proposed Project) including:

- Predominantly agricultural fields located north-west, north, north-east and south of the Broadmeadow River, north of the Ward River and east of the M1 Motorway towards and adjacent to Malahide Estuary SPA (c. 1,295ha in total area);
- Agricultural fields located west of Fosterstown (including Forrest Little Club) and east of Barrysparks in Swords, in particular those located south of Malahide Estuary SPA, (c. 303ha in total area);
- Agricultural fields in the wider area near Dardistown, located east beyond the M1 Motorway (c. 491ha in total area) and west of the proposed Project, beyond the Silloge Park Golf Club (c. 215ha in total area); and,
- Playing pitches at Santry Demesne (c. 15ha in total area)

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

In summary, whilst these SCI bird species recorded within the footprint of the proposed development and the 300m study area may be connected to the local SPA populations, there is no potential for impacts to occur on any SCI bird species population of any European site, in light of their conservation objectives, as a consequence of the loss of inland feeding and/or roosting habitat due to the following reasons:

- Relatively low frequency of occurrence of these SCI bird species on lands located within the footprint of the proposed Project, evidencing that these species do not regularly use or rely upon these lands as foraging and/or roosting habitat, and are likely to use other suitable sites available in the wider area on a similar or more regular basis;
- Relatively low peak flocks recorded on lands located within the footprint of the proposed Project, especially when compared to 1% of both their international flyway and national populations and the mean peak flock of each respective SCI species recorded in the nearest SPA, suggesting that these sites are not significantly important to the overall SPA population of each respective SCI bird species, and are likely to use other suitable sites available in the wider area on a similar or more regular basis; and
- Availability of large areas of suitable foraging and/or roosting habitat for these SCI bird species in the wider locality of the proposed Project, including those in closer proximity to nearby SPAs.

3.5.4 Disturbance/displacement – SCI bird species

A temporary increase in noise, vibration, lighting and / or human activity levels during the construction Project could result in the disturbance to and/or displacement of fauna species present within the vicinity of the Project.

For mammal species such as otter, disturbance effects would not be expected to extend beyond 250m¹⁸. For birds, disturbance effects would not be expected to extend beyond a distance of approximately 300m (Cutts *et al.*, 2009; Wright *et al.*, 2010), as noise levels associated with general construction activities would attenuate to close to background levels at that distance. There are no European sites within the disturbance Zol of the proposed Project (the nearest European site is the Malahide Estuary SAC, located over 300m east of the Project), however, ex situ populations of SCI species (e.g. wintering wetland bird species associated with European sites in Dublin Bay, Malahide Estuary and Baldoyle Bay) and QI species (otter, associated with Wicklow Mountains SAC) associated with European sites have been recorded in the vicinity of the Project as already discussed under the subsection "*Ex Situ Habitat Loss Impacts*" above.

Theoretically, disturbance impacts are most likely to occur at suitable lands located within and/or immediately adjacent to the footprint of the proposed Project and would result in the temporary displacement of fauna species to other suitable lands in the locality (such as those described above under ex situ habitat loss). These potential impacts are associated with general construction activities (e.g. visual impact of construction workers and machinery and the associated vibration and more constant/continuous noise levels and impulse noise disturbance from infrequent noise sources with a high noise level, such as blasting, which will only occur at the proposed underground station locations). Following the completion of the construction of the proposed Project, disturbance levels will likely return to the existing baseline conditions and as a result these lands, which are not subject to habitat loss, will become available again for use by SCI and QI species.

As documented in Section 3.4.4.3, otter populations within the study area are precautionary treated as being part of the Wicklow Mountains SAC population on account of the hydrological pathway between the project and the European site, and considering the large home range of otter males. Although otter utilise the section of the Royal Canal at Glasnevin within the Project area, and therefore the population is within the potential Zol of disturbance impacts from track lowering works and the construction of Glasnevin Station, the potential impacts arising from disturbance or displacement of this species are not likely to be significant for the following reasons:

¹⁸ This is consistent with Transport Infrastructure Ireland (TII) guidance (*Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes and Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by existing surrounding vegetation and buildings, with the actual Zol of construction related disturbance likely to be much less in reality.

- The project area overlaps directly with a short section of the Royal Canal, consisting of a length of c. 500m. This represents a small proportion of an otter's territory, which is between c. 13.2km ±5.3km length for mesotrophic rivers in Ireland (O'Neill *et al.*, 2008). Even if otter were to temporarily abandon this section of canal for the duration of construction, the loss of access to foraging resource is not anticipated to have a negative impact on the local population of this species;
- For track lowering works, which are largely confined to the existing railway cuttings/embankments, the existing railway is screened from the canal for most of its length by existing built features (e.g., embankment walls) and vegetation. Therefore, the presence of additional personnel along the existing railways is not likely to be perceptible to otter using the adjacent sections of the Royal Canal;
- Otter using the Royal Canal and other urban water features in the study area are likely to be habituated to elevated levels of human activity and disturbance when compared to otter that occur in less densely populated areas. While the construction works in associated with the proposed Project are acknowledged to represent an increase in disturbance over the existing baseline, the effects of this on otter are not anticipated to negatively affect the foraging or breeding success of otter in the Royal Canal or other watercourses crossed by the Project.

With regards to wintering birds, the majority of species recorded during the surveys are likely to night-time roost either on top of existing buildings (e.g. herring gull) or at the downstream coastal/estuarine sites (e.g. light-bellied brent goose and wader species such as black-tailed godwit, curlew, golden plover and oystercatcher) and as such it is considered that increases in lighting (as a result of night-time construction work or additional floodlighting of pitches at night) will not result in any impacts on wintering birds as they would be located beyond the Zol of the proposed Project. Given that the bird species present within the footprint of the proposed Project were generally recorded within or adjacent to areas with relatively high levels of human activity (i.e. Balheary playing pitches north-west of the Seatown roundabout, grassland at Barrysparks directly south-west of the R132, grassland at Dardistown directly west of the Quick Park Dublin Airport carpark and grassland at Ballymun directly west of the R108), it is likely that they are habituated to a relatively high level of disturbance from human activity and as such the increased human presence associated with the construction of the proposed Project is unlikely to cause a significant effect on any wintering bird species present. The source of disturbance arising from the construction of the proposed Project likely to be most perturbant to wintering birds present within the Zol of the proposed Project is increases in existing noise levels.

The 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 occurring (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 (i.e., BS 5228-1: 2009, BSI, 2008) are likely to have attenuated to generally below 60dB or, in most cases, are approaching the 50dB threshold. As such, disturbance effects for general construction activities across the majority of the proposed Project 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 and beyond.

There are a number of specific locations identified during the surveys that would theoretically be particularly sensitive to noise impacts due to the wintering bird species recorded at these locations and presence of suitable foraging/roosting habitat. These locations and the potential for impacts to occur are as follows:

- Malahide Estuary SPA (located c. 490m east of the proposed Project) and saltmarsh habitat adjacent to the Broadmeadow Water transitional waterbody (located c. 235m east of the proposed Project). This location is sufficiently set back from the proposed Project (with adequate screening provided by existing buildings, trees and other vegetation) such that noise generated from the construction of the proposed Project will not contribute in any way to the existing noise levels at this specific location (which are currently between 65-69dB during the day and between

55-59dB and 60-64dB during night-time¹⁹⁾ and therefore no potential impacts on the wintering bird species that utilise this location will occur.

- Broadmeadow River and Ward River located directly east of the proposed Project. This area relates to the interface between the Broadmeadow River and the Malahide Estuary, which is located we west of and outside of the Malahide Estuary SPA. The Project crosses the Broadmeadow and Ward River via the Balheary Viaduct, east of the R132, and therefore the project is set back from and separated from the project by the existing R132 road. According to Chapter 13 Airborne Noise and Vibration of the EIAR for the Project, the background noise levels at this location are between 53-64dB during the day, and between 46-51dB at night, e.g. noise levels in the vicinity of the R132 are already loud. This location is considered to be set back far enough from the construction area (areas of open wetland are over 300m from the Project), that the proposed Project will not contribute in any way to the existing noise levels at this specific location, and therefore no potential impacts on the wintering bird species that utilise this location will occur.
- Various locations within and adjacent to the footprint of the proposed Project where flocks of wintering bird species that typically feed inland were recorded:
 - Balheary playing pitches and Fingallians GAA playing pitch, located within the footprint of the proposed Project and directly east of the R132. Given the proximity of these playing pitches to the footprint of the proposed Project, it is likely that wintering birds utilising this location will be disturbed and temporarily displaced in short-term as a result of the proposed construction works.
 - Field at Barrysparks, located partially within the footprint of the proposed Project at the Swords Central Station. Given the proximity of this field to the footprint of the proposed Project, it is likely that wintering birds utilising this location will be disturbed and temporarily displaced for a period of 46 months as a result of the proposed construction works. The flocks of black-tailed godwit recorded at this site were present within the south-eastern section of the field near the MSD Biotech Dublin facility, c. 320m from the R132. The existing noise levels at this location are significantly less compared to along the R132, where the proposed Swords Central station is located (i.e., 50-54dB compared to 60-64dB to 55-59dB). It is expected that the proposed construction works along the R132 and at the proposed Swords Central station will not contribute to the existing noise levels in the wider area and as such it is likely that a proportion of this field will remain suitable for foraging/roosting wintering birds during the construction stage of the proposed Project²⁰.
 - Large field south-east of the depot at Dardistown, north of the M50 motorway. Given the proximity of this field to the footprint of the proposed Project, it is likely that wintering birds utilising this location will be disturbed and temporarily displaced for a period of 81-97 months as a result of the proposed construction. The flocks of golden plover recorded at Dardistown were present within the southern and south-eastern section of the field located beyond the footprint of the proposed Project. It is possible that the existing noise levels within this section of field may remain unchanged as a result of the proposed Project. The existing day time noise levels at this location are very high, ranging from 70-74dB (directly north of M50 Motorway and directly south of Dublin Airport²¹) to 65-69dB.

¹⁹ The existing noise levels are based on EPA datasets that include modelled noise contours associated with major roads in Dublin, including the M1 Motorway, M50 Motorway, R132 and R108, "Noise Round 3 Road - Lden" and "Noise Round 3 Road - Lnight", available on the EPA MapViewer (accessed 4 July 2021): <https://gis.epa.ie/EPAMaps/>.

²⁰ It should be noted however that this area of suitable land located beyond the footprint that will not be subject to habitat loss is currently zoned as "ME - Metro Economic Corridor" and "HT - High Technology" (FCC, 2017) and as such it may be developed in in the future as part of separate development applications. This is considered in section 15.8 Cumulative Impacts and Impact Interrelations.

²¹ The existing noise levels are based on EPA datasets that include modelled noise contours associated with major roads in Dublin, including the M1 Motorway, M50 Motorway, R132 and R108, "Noise Round 3 Road - Lden" and the modelled noise contours associated with Dublin Airport "Noise Round 3 Airport - Lden", available on the EPA MapViewer (accessed 4 July 2021): <https://gis.epa.ie/EPAMaps/>.

- Known inland feeding sites for light-bellied brent goose (not included in the list above):
 - Glasnevin/DCU playing pitches, located c. 200m west of the intervention shaft at Albert College Park. This location is sufficiently set back from the proposed Project (with adequate screening provided by the existing buildings/structures) such that noise generated from the construction of the proposed Project will not contribute in any way to the existing noise levels at this specific location and therefore no potential impacts on the wintering bird species that utilise this location will occur.
 - Glasnevin/St Vincent's Primary School, located directly north of project boundary at Glasnevin. The construction of the proposed Glasnevin station and the proposed track lowering works will result in an increase in the existing noise levels at that location. With regards to the construction of the proposed Glasnevin station, the predicted noise levels at this inland feeding site (with the inclusion of the standard 3m hoarding and based on the various stages of construction) are calculated as 60-45dB, with predicted noise levels within the majority of the site being between 55-45dB and the predicted noise levels quickly attenuated to lower levels. With regards to proposed track lowering works, these will be completed over a number of possessions which include weekend and night-time periods. The predicted noise levels are >65dB at Dalcassian Downs for the track lowering works. The nearest baseline noise monitoring locations to this area have been measured with a daytime noise level of 50-52dB LAeq. The predicted noise levels are not significantly greater than existing noise levels located in close proximity to the site (i.e. at Dalcassian Downs, c. 35m east) are 55-59dB and they gradually increase to 70-74dB along the R108. Therefore, the predicted noise levels at this site are not significantly greater than these current existing noise levels in the general area and it is not anticipated that the proposed works at the site will result in abandonment by foraging brent geese.
- Blessington Street Basin, located c. 70m south-west of the proposed Mater station. This location is sufficiently set back from the proposed Project (with adequate screening provided by the existing buildings/structures) such that noise generated from the construction of the proposed Project will not contribute in any way to the existing noise levels at this specific location and therefore no potential impacts on the wintering bird species that utilise this location will occur.

The temporary displacement of wintering birds from the Balheary playing pitches, the Fingallians GAA playing pitch and fields at Dardistown as a result of the construction of the proposed Project causing increased levels of noise disturbance is not considered likely to result in any significant effects on any populations (including those that may be connected to any SPAs). This is due to:

- The relatively low frequency of occurrence of wintering birds within these lands, suggesting that they do not regularly use or rely upon these lands as important foraging and/or roosting habitat;
- The peak flocks of wintering birds recorded being somewhat low in comparison to their respective 1% of their international²² flyway and national populations and the mean peak flock of each respective SCI species recorded in the nearest SPA²³ (see Table 9 for details); and
- The large availability of suitable foraging and/or roosting habitat for wintering birds in the wider locality (i.e. beyond the 300m study area, from c. 0.3-2km from the existing sites, as described above under habitat loss)

Any effects associated with increased levels of disturbance during construction will only, and worst-case, result in the temporary displacement of QI or SCI species to other suitable available lands in the locality. Following the completion of construction, disturbance levels will return to baseline conditions

²² According to Birdwatch Ireland I-WeBS Interpretive Notes, a wetland is considered to be of international importance if it regularly supports 1% of the relevant international, or flyway, population.

²³ The mean peak count of each SCI bird species recorded in the SPA is based on the most recent 5-season period available (i.e., within the period of 2008/2009 to 2017/2018). Accessed on the 2 July 2021 via the Birdwatch Ireland website, i.e.:

<https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88>

and as a result these lands will become available again as foraging and/or roosting habitat for these QI and SCI species.

Therefore, there is no possibility of the proposed Project undermining the conservation objectives of any European sites as a result of disturbance and/or displacement of otter and SCI bird species.

3.5.5 Mortality Risk - SCI bird species

A potential increase in the mortality risk to SCI bird species associated with increased collisions arising from the introduction of proposed new bridge structures, railway line, and park and ride facility are not considered likely due to the following:

- All of the new structures are relatively low rise in relation to the surrounding landscape, including the park and ride facility, which is a maximum of five storeys;
- Birds tend to be at greatest risk of collision with structures that comprise a high proportion of glazing as part of their façades (Parkins *et al*, 2015). The park and ride facilities do not contain a high proportion of glazing; and
- There are several existing bridge structures downstream of the proposed Balheary Crossing, i.e. from east to west: M1 Motorway, R132 and Lissenhall Bridge.

Therefore, there is no possibility of the proposed Project undermining the conservation objectives of any special conservation interests bird species of any European sites as a result of increased mortality risk.

3.5.6 Habitat degradation as a result of Pollution/Contamination of Receiving Waterbodies

A pollution event of a sufficient magnitude during construction and/or operation of the proposed Project and an increase in the concentration of pollutants in surface water run-off during operation has the potential to negatively affect the water quality of downstream waterbodies. Such a pollution event may include: contaminated groundwater mobilising to the surface network, the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and, the accidental spillage and/or leaks of contaminants (e.g., fuel, oils, lubricants, paints, bituminous coatings, preservatives, weed killer, lime and concrete) 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 waterbodies, i.e. Broadmeadow Water transitional waterbody, Mayne Estuary transitional waterbody, Tolka Estuary transitional waterbody and Dublin Bay, within which European sites are located or hydrologically connected, i.e. Baldoyle Bay SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SAC, Malahide Estuary SPA, North Bull Island SPA, North Dublin Bay SAC, Rockabill SPA, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC and The Murrrough 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 Baldoyle Bay SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SAC, Malahide Estuary SPA, North Bull Island SPA, North Dublin Bay SAC, Rockabill SPA, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC and The Murrrough SPA are undermined.

The release of contaminated waters (via the groundwater or surface water) and / or a spillage or pollution event during construction, or operation, 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. A hydrological connection exists between the proposed Project and the Wicklow Mountains SAC for which otter are a QI. It is considered possible that otter present within the ZOI of the proposed Project may be connected with the Wicklow Mountains SAC population, albeit on a precautionary basis, and as such these pollution/contamination impacts could occur to such a degree that the conservation objectives of Wicklow Mountains SAC are undermined.

3.5.7 Habitat degradation as a result of a change in the existing hydrological regime of watercourses

The permanent alteration to the existing hydrological regime of watercourses (i.e., the flow rate and/or local flooding regime) impacted by the proposed Project could potentially result in the degradation of aquatic/wetland habitats located downstream of the proposed works. Works such as surface water crossings and the culverting of watercourses could impact on a river's flow velocity, both up gradient and down gradient of the proposed Project and inappropriate sizing and design of crossings and culverts can also alter sedimentation and river morphology. This in turn could negatively affect the SCI bird species that rely upon these habitats as foraging and/or roosting habitat. The following elements of the proposed Project during operation could impact on the hydrological regime of watercourses and in turn result in habitat degradation at downstream European sites:

- Proposed permanent viaduct over the Broadmeadow River and Ward River, which is upstream of, and could theoretically affect the Malahide Estuary SPA;
- Two proposed permanent culverts on the Sluice River and one of its tributaries, at Ch. 5+963 and Ch. 5+762. The Sluice River is upstream of Baldoyle Bay SPA, and changes to the hydrological regime could theoretically affect Baldoyle Bay SPA;
- Proposed permanent diversion of the Turnapin Stream, a tributary of the Mayne River, between Ch. 8660 and Ch. 8920. The Turnapin Stream is upstream of Baldoyle Bay SPA, and changes to the hydrological regime could theoretically affect Baldoyle Bay SPA; and

- Proposed minor alteration works to straighten the channel of the Santry River and provide scour protection, located immediately downstream of the existing culvert outlet. The Santry River discharges to Dublin Bay at the north lagoon west of Bull Island, and changes to its hydrological regime could theoretically affect North Bull Island SPA.

Based on the findings of the Finite Element Method (FEM) Flood Risk Assessment and Management (FRAM) modelling study presented in Section 18.5 of Chapter 18 Hydrology of the EIAR, the proposed clear-span viaduct over the Broadmeadow River and Ward River will not result in any impact on the natural flow regime of these watercourses (including under future climate change scenarios) and therefore no impacts on any downstream European sites during operation are predicted. According to Section 18.5 of Chapter 18 Hydrology of the EIAR, the design of the culverts at the Sluice River and one of its tributaries will ensure that there will be continuity of flow towards the Mayne River and that there will be no impact on up gradient or down gradient potential for flooding or water quality during operation; therefore, no impacts on any downstream European sites during operation are predicted. Section 18.5 of Chapter 18 Hydrology of the EIAR, the design of the permanent diversion of the Turnapin Stream, a tributary of the Mayne River, will ensure that there will be continuity of flow towards the Mayne River and that there will be no impact on up gradient or down gradient potential for flooding or water quality during operation; therefore, no impacts on any downstream European sites during operation are predicted. The proposed Project will pass over an existing culverted section of the Santry River. According to section 18.5 of Chapter 18 Hydrology the proposed minor alteration works on the Santry River immediately downstream of this culvert will marginally increase its capacity.

Based on the above, the hydrological regime of watercourses crossed or culverted by the proposed Project will not be altered significantly, and for this reason there is no possibility of the proposed Project undermining the conservation objectives of any special conservation interests bird species of any European sites as a result of increased changes to the existing hydrological regime of watercourses.

3.5.8 Habitat degradation as a result of foul water discharge related hydrological impacts

Foul water from the proposed Park and Ride facility and stations located from Estuary to Fosterstown will be discharged to the existing foul water network for treatment at Swords Waste Water Treatment Plant and therefore, has the potential to affect water quality in the Broadmeadow Estuary transitional waterbody. According to its Annual Environmental Report (Irish Water, 2021), the Swords Waste Water Treatment Plant is operating within the limits of its emission limit values (ELVs) and the capacity of the plant is not anticipated to be exceeded within the short term (within three years of the publication of the report).

Foul water from the proposed depot and stations located from Dublin airport to Charlemont will be discharged to the existing foul water network for treatment at Ringsend WasteWater Treatment Plant (WWTP). Therefore, the proposed Project has the potential to affect water quality in Dublin Bay.

Foul water, comprising sewage and industrial effluent (and some surface water run-off), from the Dublin area has historically been, and will continue to be, treated at Ringsend WWTP prior to discharge to Dublin Bay. The most recent information from Irish Water indicates that the plant is operating above its capacity of 1.64 million P.E. (Irish Water, 2021), with a current operational loading of c. 2.2 million P.E. Ringsend WWTP operates under a discharge licence from the EPA (D0034-01) and must comply with the licence conditions.

Despite the capacity issues associated with the Ringsend WWTP, the Liffey Estuary Lower and Dublin Bay are currently classified by the EPA as being of "*Unpolluted*" water quality status. The Tolka Estuary is currently classified by the EPA as being "*Potentially Eutrophic*". The pollutant content of future surface water discharges to Dublin Bay is considered likely to decrease in the long-term for the following reasons:

- An Bord Pleanála granted planning permission for an upgrade to the Ringsend WWTP in April 2019, which will increase capacity at the plant; and

- There is a commitment in the *National Development Plan 2018-2027*²⁴ to invest in and progress the Greater Dublin Drainage Project which will involve the provision of a new regional wastewater treatment plant at a site in the northern part of the Greater Dublin Area and the provision of a new Orbital Drainage Sewer linking the new plant to the existing regional sewer network, which will enable future connections for identified areas of development within the catchment area. The provision of the Greater Dublin Drainage Project will augment the waste water treatment capacity currently provided by Ringsend WWTP across the Greater Dublin Area.

Considering the above, particularly the current unpolluted status of Dublin Bay, and that foul water discharges from the proposed Project would equate to a very small percentage of the overall discharge volumes sent to Ringsend WWTP for treatment, the proposed Project will not impact on the overall water quality status of Dublin Bay.

Therefore, there is no possibility of the proposed Project undermining the conservation objectives of any of the qualifying interests or special conservation interests of the European sites in, or associated with, Broadmeadow Estuary transitional waterbody or Dublin Bay as a result of foul water discharges.

3.5.9 Habitat degradation as a result of changes to the Hydrogeological Regime

Habitat degradation as a result of changes to the hydrogeological regime in the vicinity of the proposed Project could theoretically arise from drawdown/dewatering during the Construction Phase, arising from active dewatering or barrier effects. Note that effects of changes to the quality of groundwaters is considered in the subsection "Habitat degradation as a result of surface and groundwater contaminants entering the downstream environment".

Theoretically, European sites that have been designated for groundwater-dependent terrestrial ecosystems or species that rely upon groundwater-dependent terrestrial ecosystems and are hydraulically connected to the Project, are at risk of changes to the hydrogeological regime. There is only one European site located within the same ground waterbody as the underground section of the proposed Project, which is designated for groundwater-dependent terrestrial ecosystems or species associated with those ecosystems: The Rye Water Valley/Carton SAC which is designated for its examples of the priority Annex I habitat petrifying springs with tufa formation (Cratoneurion) [7220], and its populations of narrow-mouthed whorl snail and Desmoulin's whorl snail.

According to Awn Consulting, who compiled Chapter 19 (Hydrogeology) of the EIAR for the proposed Project, the characteristics which determine the potential hydrogeological impact on Natura 2000 sites, include the following:

- The proximity of the ecological receptor to the proposed Project and its components;
- A hydraulic connection between the ecological receptor and the aquifer type at the proposed alignment which may support these species, i.e., is the identified feature within the same aquifer unit as the proposed alignment, or is there a hydraulic divide between the feature and the proposed Project in the area assessed;
- The groundwater flow direction in the vicinity of the identified habitat feature;
- The level of proposed cut or deep excavation at the corresponding Project chainage which may determine the degree of variation in the groundwater level and also the extent of dewatering which may occur at that point along the alignment; and
- The degree of interpreted 'barrier effect' spatially and where potential exists for groundwater connectivity with surface water features for example at the Broadmeadow River, Ward River, Tolka River and River Liffey. Where connectivity does exist then there is potential for these watercourses to receive baseflow contribution from groundwater. Consequently, where barrier

²⁴ Government of Ireland (2018) Project Ireland 2040, National Development Plan 2018-2027.

effects impact on the groundwater flow regime and hence impact on these surface water features, there is a potential impact on downstream European sites/ nationally designated sites via this connectivity (i.e., there is a potential 'impact pathway').

AWN Consulting determined in Chapter 19 (Hydrogeology) of the EIA for the Project that no groundwater dependent terrestrial ecosystems or European sites are within the ZoI of drawdown effects (e.g., localised dewatering) of the Project. They also determined that there is no potential impact on any SAC/SPA receptors during construction or operation from drawdown (there will be no ongoing dewatering), or groundwater flow impedance arising from the Project.

Therefore, there is no possibility of the proposed Project undermining the conservation objectives of any of the qualifying interests or special conservation interests of any European sites as a result of changes to hydrogeological conditions.

3.5.10 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 European Communities (Birds and Natural Habitats) Regulations, 2011 were recorded within, or in close proximity to, the proposed Project. In addition, there is a desktop record of Indian balsam on the River Tolka located within c. 2km of the proposed Project.

During construction and/or routine maintenance/management work, three of the four terrestrial species (i.e. giant hogweed, Indian balsam and Japanese knotweed) could potentially spread or be introduced to terrestrial habitats located within downstream European sites via surface water features. Giant hogweed is typically found in damp places such as riverbanks and spreads via seed dispersal (NBDC, 2013a), while Himalayan balsam and Japanese knotweed are both found in a wider variety of habitats including river banks, roadsides, and urban areas such as waste ground and railways; the former species spreading by seed dispersal, the latter vegetatively (NBDC, 2013b; NBDC, 2013c). The remaining terrestrial species three-cornered leek is typically found in hedges, scrubland and waste places and occasionally near coasts and spreads vegetatively in clumps, while seeds are spread by ants (IFI and NBDC, 2014) and as such it considered highly unlikely that this invasive species could spread or be introduced to downstream European sites, which are located at a considerable downstream distance to where it was recorded at Santry (i.e. c. 8km). Giant hogweed, Indian Balsam and Japanese knotweed are all classified as high impact invasive species, while three-cornered leek is classified as a medium impact invasive species.

The introduction and/or spread of these invasive species to downstream European sites could potentially result in the degradation of existing habitats present, in particular coastal habitats not permanently or regularly inundated by seawater. These species may outcompete other native species present, negatively impacting the species composition, diversity and abundance and the physical structural integrity of the habitat. This in turn could undermine the conservation objectives of these European sites.

The three freshwater non-native invasive species recorded in the Royal Canal and Grand Canal (i.e. Canadian pondweed, New Zealand pigmyweed and Nuttall's pondweed) pose no risk to the marine and intertidal qualifying interests, or the special conservation interest bird species (or the habitats they rely upon), of the European sites downstream in the Broadmeadow transitional waterbody, Mayne transitional waterbody and Dublin Bay, as they would not be able to survive the saline conditions of the habitats present.

3.5.11 Habitat degradation as a result of air quality impacts

Temporary dust emissions generated during construction have the potential to degrade sensitive habitats located in the vicinity of the proposed works. 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 construction vehicles (NRA, 2011; Natural, 2016; Bignal *et al.*, 2004). However, even in such a worst-case scenario (i.e. potential impacts on sensitive ecological receptors

within 200m of the proposed Project), there is no potential for impacts on any European sites as there are no European sites located within c. 200m of the proposed Project (i.e. the nearest European site is Malahide Estuary SAC, which is located over 300m east of the proposed Project).

3.5.12 Summary

The only impacts associated with the proposed Project that could potentially affect the receiving environment in any European sites are:

- Pollution/contamination event(s) during construction and/or operation of surface or groundwater origin affecting water quality in the Broadmeadow Water transitional waterbody, the Mayne Estuary transitional waterbody, Tolka Estuary transitional waterbody and Dublin Bay; and
- Accidental introduction and/or spread of non-native invasive species to downstream European sites.

In the absence of mitigation, the potential impacts associated with the proposed Project have the potential to affect the receiving environment and, as a result, the conservation objectives supporting the qualifying interest/special conservation interests of 17 European sites, namely: Baldoyle Bay SAC, Malahide Estuary SAC, North Dublin Bay SAC, South Dublin Bay SAC, Wicklow Mountains SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland’s Eye SPA, Lambay Island SPA, Malahide Estuary SPA, North Bull Island SPA, Rockabill SPA, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, and The Murrrough SPA.

The potential impacts of the proposed Project on the receiving environment, their zone of influence, and the European sites at risk of adverse effects are summarised in Table 10 below.

Table 10. Summary of the Potential Impacts of the Proposed Project on the Receiving Environment, their Potential ZoI, and the European sites within the ZoI

Potential Direct or Indirect Impacts and zone of influence of the Potential Effects	Are there any European sites within the zone of influence?
<p>Habitat loss and fragmentation Habitat loss will be confined to the lands within the proposed Project boundary</p>	<p>No There are no European sites within the footprint of the proposed Project</p>
<p>Ex-situ habitat loss - SCI bird species Important <i>ex-situ</i> sites of SPAs utilised by large flocks of SCI bird species on a regular basis, in particular <i>ex-situ</i> inland feeding sites utilised by light-bellied brent goose</p>	<p>No There are no important <i>ex-situ</i> sites located within the footprint of the proposed Project and as such there is no potential for loss of such sites. Therefore, there are no European sites within the ZoI of this impact.</p>
<p>Disturbance and displacement - SCI bird species Potentially up to several hundred metres from the proposed development boundary, dependent upon the predicted levels of noise, vibration and visual disturbance associated with the proposed development, in conjunction with the sensitivity of the qualifying interest species to disturbance effects</p>	<p>No There are no European sites within the potential disturbance or displacement ZoI of the Project. Several inland feeding sites of SCI species of European sites are located within the vicinity of the Project, however significant impacts are not predicted to arise from noise or disturbance of any SCI species at any inland feeding sites.</p>
<p>Mortality risk - SCI bird species Areas where proposed new bridge structures, railway line and/or other such elevated structures are introduced</p>	<p>No No SCI species of any European sites are at risk of mortality arising from collision with structures constructed as part of the Project, and therefore</p>

Potential Direct or Indirect Impacts and zone of influence of the Potential Effects	Are there any European sites within the zone of influence?
	no European sites are within the potential Zol.
<p>Habitat degradation as a result of Pollution/Contamination of Receiving Waterbodies</p> <p>Habitat degradation as a result of contamination of surface waters and groundwaters which then contribute to the surface water environment. Habitats and species downstream/hydrologically connected to the proposed Project.</p>	<p>Yes</p> <p>Baldoyle Bay SAC, Malahide Estuary SAC, North Dublin Bay SAC, South Dublin Bay SAC, Wicklow Mountains SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SPA, North Bull Island SPA, Rockabill SPA, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, and The Murrough SPA</p>
<p>Habitat degradation as a result of foul water discharge related hydrological impacts</p> <p>Habitat degradation as a result of contamination of surface waters from foul water discharges.</p>	<p>No</p> <p>There are no European sites at risk of Habitat degradation as a result of foul water discharge related hydrological impacts associated with the proposed Project</p>
<p>Habitat degradation as a result of a change in the existing hydrological regime of watercourses</p> <p>European sites downstream of the Project which are designated for aquatic or intertidal habitats, or species that depend on these habitats.</p>	<p>No.</p> <p>No European sites are at risk of impact through changes to their hydrological regime.</p>
<p>Habitat degradation as a result of changes to the hydrogeological regime</p> <p>Groundwater dependant habitats, and habitats that are downstream of the project, and the species those habitats support, in the local area that lie downgradient of the proposed Project.</p>	<p>No.</p> <p>There are no European sites within the potential hydrogeological zone of influence of the Project.</p>
<p>Habitat degradation as a result of the introduction and/or spread of non-native invasive species</p> <p>Habitats and species downstream/hydrologically connected to the proposed Project.</p>	<p>Yes</p> <p>Baldoyle Bay SAC, Malahide Estuary SAC, North Dublin Bay SAC, South Dublin Bay SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SPA, North Bull Island SPA, Rockabill SPA, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, and The Murrough SPA</p>
<p>Habitat degradation as a result of air quality impacts</p> <p>Habitat areas within c. 200m of the proposed Project and haul routes for construction vehicles.</p>	<p>No</p> <p>All European sites are in excess of 200m of the Project and therefore fall outside of the potential Zol of this impact.</p>

4. Conclusions of Screening Assessment Process

Following an examination, analysis and evaluation of the best available information, and applying the precautionary principle, it can be concluded that there is the possibility for significant effects on the following European sites, either arising from the proposed Project alone or in combination with other plans and projects, as a result of habitat degradation as a result of hydrological and hydrogeological impacts and the introduction / spread of non-native invasive species: Baldoyle Bay SAC, Malahide Estuary SAC, North Dublin Bay SAC, South Dublin Bay SAC, Wicklow Mountains SAC, Baldoyle Bay SPA, Dalkey Islands SPA, Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Malahide Estuary SPA, North Bull Island SPA, Rockabill SPA, Rogerstown Estuary SPA, Skerries Islands SPA, South Dublin Bay and River Tolka Estuary SPA, and The Murrrough SPA.

In reaching this conclusion, the nature of the project and its potential relationship with all European sites within the zone of influence, and their conservation objectives, have been fully considered.

Therefore, it is the professional opinion of the authors of this report that the application for consent for the proposed Project does require an Appropriate Assessment and the preparation of a Natura Impact Statement (NIS).

5. References

ARUP (2018). *New Metro North Alignment Options Study.*

Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. (2000). *Bird Census Techniques*, 2nd edition. Academic Press, London.

Signal, K., Ashmore, M. & Power, S. (2004). *The Ecological Effects of Diffuse Air Pollution from Road Transport.* A report prepared for English Nature - English Nature Research Report No. 580.

British Bryological Society (BBS) (2009). *Checklist of British and Irish bryophytes.* The British Bryological Society, Stafford, U.K.

British Bryological Society (BBS) (2020). *A new checklist of the bryophytes of Britain and Ireland.* Journal of Bryology online.

Chartered Institute of Ecology and Environmental Assessment (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland.

Curtis, T.G.F. and McGough, H.N. (1998). *The Irish Red Data Book - 1 Vascular Plants.* Wildlife Service Ireland.

Cutts, N., Phelps, A. and Burdon, D. (2009). *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance.* Report to Huber INCA. Institute of Estuarine and Coastal Studies, University of Hull.

Department of Culture, Heritage and the Gaeltacht (2017). *Ireland's National Biodiversity Plan 2017-2021.*

Department of Environment, Heritage and Local Government (2010). *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities.*

Dublin City Council (2015). *Dublin City Biodiversity Action Plan 2015-2020.*

Dublin City Council (2016). *Dublin City County Development Plan 2016-2022.*

Dublin City Council (2019). *Dublin City Otter Survey: An Action of the Dublin City Biodiversity Action Plan 2015-2020.* Report prepared by Triturus Environmental Ltd. for Dublin City Council August 2019.

Dublin City Council (2021). *Dublin City Biodiversity Action Plan 2021-2025.*

Dublin City Council (2022). *Draft Dublin City Development Plan 2022-2028.* At stage 3 material alterations at the time of writing of this report.

Dún Laoghaire-Rathdown County Council (2021). *Dún Laoghaire-Rathdown County Biodiversity Plan 2021-2025.*

Dún Laoghaire-Rathdown County Council (2022). *Dún Laoghaire-Rathdown County Development Plan 2022-2028.*

European Commission (EC) (2000). *Communication from the Commission on the precautionary principle.*

European Commission (EC) (2019). *Managing Natura 2000 sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC* (EC Environment Directorate-General, 2000); hereinafter referred to as "MN2000".

European Commission, 2013 (2013). *Interpretation manual of European Union Habitats EUR28*. European Commission, DG Environment. Available at:

https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

European Commission (2021). *Assessment of Plans and Projects in Relation to Natura 2000 sites: Methodological Guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC*.

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

Fingal County Council (2022). *Draft Fingal Biodiversity Action Plan 2022-2030*. Published for public consultation in May 2022.

Fossitt, J.A. (2000). *A guide to habitats in Ireland*. Heritage Council, Kilkenny, Ireland.

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

Gilbert, G., Stanbury, A. and Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020 – 2026. *Irish Birds* 43: 1-22.

Inland Fisheries Ireland (IFI) (2016). *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*.

NBDC (2013a). *National Biodiversity Data Centre fact sheet: giant hogweed*. Available:

<https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Giant-Hogweed.pdf> [Accessed on the 3rd April 2020]

NBDC (2013b). *National Biodiversity Data Centre fact sheet: Himalayan balsam*. Available:

<https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Himalayan-Balsam.pdf> [Accessed on the 3rd April 2020]

NBDC (2013c). *National Biodiversity Data Centre fact sheet: Japanese knotweed*. Available:

<https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Japanese-Knotweedv1.1.pdf> [Accessed on the 3rd April 2020]

NBDC (2022). *National Biodiversity Data Centre Database* [Online] Available from

maps.biodiversityireland.ie/Map

NPWS (2010). *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10*.

NPWS (2012). *Conservation Objectives: Baldoyle Bay SAC 000199*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013a). *Conservation Objectives: Malahide Estuary SAC 000205*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

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

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

NPWS (2013d). *Conservation Objectives: Baldoyle Bay SPA 004016*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013e). *Conservation Objectives: Malahide Estuary SPA 004025*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

- NPWS (2013f).** *Conservation Objectives: Rogerstown Estuary SPA 004015.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013g).** *Conservation Objectives: Rockabill to Dalkey Island SAC 003000.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013h).** *Conservation Objectives: Rogerstown Estuary SAC 000208.* Version 1. Department of Culture, Heritage and the Gaeltacht.
- NPWS (2013i)** *Conservation Objectives: Lambay Island SAC 000204.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015a).** *Conservation Objectives: North Bull Island SPA 004006.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015b).** *Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2016).** *Conservation Objectives: Howth Head SAC 000202.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- NPWS (2017a).** *Conservation Objectives: Wicklow Mountains SAC 002122.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- NPWS (2017b).** *Conservation Objectives: Ireland's Eye SAC 002193.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- NPWS (2019).** *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview.* Unpublished NPWS report.
- NPWS (2021a).** *Conservation Objectives: Glenasmole Valley SAC 001209.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- NPWS (2021b).** *Conservation Objectives: Knocksink Wood SAC 000725.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- NPWS (2021c).** *Conservation Objectives: Rye Water Valley/Carlton SAC 001398.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- NPWS (2022a)** *Conservation objectives for Lambay Island SPA [004069].* Generic Version 9.0. Department of Housing, Local Government and Heritage.
- NPWS (2022b)** *Conservation objectives for Dalkey Islands SPA [004172].* Generic Version 9.0. Department of Housing, Local Government and Heritage.
- NPWS (2022c).** *Conservation objectives for Howth Head Coast SPA [004113].* Generic Version 9.0. Department of Housing, Local Government and Heritage.
- NPWS (2022d)** *Conservation objectives for Ireland's Eye SPA [004117].* Generic Version 9.0. Department of Housing, Local Government and Heritage.
- NPWS (2022e)** *Conservation objectives for Wicklow Mountains SPA [004040].* Generic Version 9.0. Department of Housing, Local Government and Heritage
- NRA (2011).** *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.*

(2008) Ó Néill, L., Veldhuizen, T., de Jongh, A. and Rochford, J. (2009). *Ranging behaviour and socio-biology of Eurasian otters (Lutra lutra) on lowland mesotrophic river systems.* European Journal of Wildlife Research: 55: 363-370.

RPA (2008). *Environmental Impact Statement – Metro North.*

Scott Cawley Ltd. (2017). *Natura Impact Statement – Information for Stage 2 Appropriate Assessment Proposed Residential Development, St. Paul's College, Sybil Hill, Raheny, Dublin 5.*

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

South Dublin County Council (2020). *Connecting with Nature: Draft Biodiversity Action Plan for South Dublin County 2020-2026*

South Dublin County Council (2022). *South Dublin County Council Development Plan 2022-2028.*

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

Svensson (2010). *Collins Bird Guide 2nd Edition.* HarperCollins Publishers, UK.

TII (2020). *The Management of Invasive Alien Plant Species on National Roads – Technical Guidance.*

Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., McCarthaigh, M., Craig, M. and Quinn, R. (2005). *Water Quality in Ireland, 2001-2003.* Environmental Protection Agency, Co. Wexford, Ireland.

Waterways Ireland (2019a). *Ecological Assessment: Survey of the Grand Canal from Ringsend to Clondalkin, Co. Dublin. Habitat Mapping and Ecological Survey.*

Waterways Ireland (2019b). *Ecological Assessment: Survey of the Royal Canal from Spencer Dock to Blanchardstown, Co. Dublin. Habitat mapping and Ecological Survey.*

6. Appendices

Appendix A

The Qualifying Interests (QIs) and Special Conservation Interests (SCIs) of the European sites in the vicinity of the proposed development site (see Figure 5)

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
Special Area of Conservation (SAC)	
<p>Rockabill to Dalkey Island SAC [003000] Annex I Habitats: Reefs [1170]</p> <p>Annex II Species: Harbour porpoise <i>Phocoena phocoena</i> [1351]</p> <p>Source: <i>Conservation Objectives: Rockabill to Dalkey Island SAC 003000</i>. Version 1. (NPWS, 2013i). <i>S.I. No. 94/2019 - European Union Habitats (Rockabill to Dalkey Island Special Area of Conservation 003000) Regulations 2019.</i></p>	<p>c. 9km east of proposed Project as the crow flies</p>
<p>Rogerstown Estuary SAC [000208] Annex I Habitats: Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> <p>Source: <i>Conservation Objectives: Rogerstown Estuary SAC 000208</i>. Version 1. (NPWS, 2013j). <i>S.I. No. 286/2018 - European Union Habitats (Rogerstown Estuary Special Area of Conservation 000208) Regulations 2018.</i></p>	<p>c. 2.5km north-east of proposed Project as the crow flies</p>
<p>Lambay Island SAC [000204] Annex I Habitats: Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]</p> <p>Annex II Species: Grey seal <i>Halichoerus grypus</i> [1364] Harbour seal <i>Phoca vitulina</i> [1365]</p> <p>Source: <i>Conservation Objectives: Lambay Island SAC 000204</i>. Version 1. (NPWS, 2013k). <i>S.I. No. 294/2019 - European Union Habitats (Lambay Island Special Area of Conservation 000204) Regulations 2019.</i></p>	<p>c. 11.5km north-east of proposed Project as the crow flies</p>
<p>Malahide Estuary SAC [000205] Annex I Habitats: Mudflats and sandflats not covered by seawater at low tide [1140] <i>Salicornia</i> and other annuals colonising mud and sand [1310]</p>	<p>c. 370m downstream of the Broadmeadow River proposed crossing point</p> <p>or</p>

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p><i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320] ²⁵</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritim</i>) [1410]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> <p>Source: <i>Conservation Objectives: Malahide Estuary SAC 000205</i>. Version 1. (NPWS, 2013a).</p> <p><i>S.I. No. 91/2019 - European Union Habitats (Malahide Estuary Special Area of Conservation 000205) Regulations 2019.</i></p>	<p>c. 235m east of proposed Project as the crow flies</p>
<p>Baldoyle Bay SAC [000199]</p> <p>Annex I Habitats:</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Salicornia and other annuals colonizing mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritim</i>) [1410]</p> <p>Source: <i>Conservation Objectives: Baldoyle Bay SAC 000199</i>. Version 1. (NPWS, 2012a).</p> <p><i>S.I. No. 472/2021 - European Union Habitats (Baldoyle Bay Special Area of Conservation 000199) Regulations 2021.</i></p>	<p>c. 8.6km downstream of the nearest proposed crossing point, <i>i.e.</i>, at the Sluice River</p> <p>or</p> <p>c. 6km east of proposed Project as the crow flies</p>
<p>Ireland's Eye SAC [002193]</p> <p>Annex I Habitats:</p> <p>Perennial vegetation of stony banks [1220]</p> <p>Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]</p> <p>Source: <i>Conservation Objectives: Ireland's Eye SAC 002193</i>. Version 1. (NPWS, 2017b).</p> <p><i>S.I. No. 501/2017 - European Union Habitats (Ireland's Eye Special Area of Conservation 002193) Regulations 2017.</i></p>	<p>c. 10.7km east of proposed Project as the crow flies</p>
<p>Howth Head SAC [000202]</p> <p>Annex I Habitats:</p> <p>Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]</p> <p>European dry heaths [4030]</p> <p>Source: <i>Conservation Objectives: Howth Head SAC 000202</i>. Version 1. (NPWS, 2016).</p> <p><i>S.I. No. 524/2021 - European Union Habitats (Howth Head Special Area of Conservation 000202) Regulations 2021.</i></p>	<p>c. 10.7km east of proposed Project, as the crow flies</p>
<p>North Dublin Bay SAC [000206]</p> <p>Annex I Habitats:</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p><i>Salicornia</i> and other annuals colonizing mud and sand [1310]</p>	<p>c. 6.1km downstream of the nearest proposed crossing point, <i>i.e.</i>, at the River Liffey</p>

²⁵ 1320 *Spartina* swards (*Spartinion maritimae*) habitat is included within the conservation objectives document for Malahide Estuary SAC, but not within the Statutory Instruments document. This is likely because *Spartina* is an invasive alien species in Ireland.

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes") [2120] Fixed coastal dunes with herbaceous vegetation ("grey dunes") [2130] Humid dune slacks [2190]</p> <p>Annex II Species: Petalwort <i>Petalophyllum ralfsii</i> [1395]</p> <p>Source: <i>Conservation Objectives: North Dublin Bay SAC 000206</i>. Version 1. (NPWS, 2013b). <i>S.I. No. 524/2019 - European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019</i>.</p>	<p>or</p> <p>c. 5km east of proposed Project as the crow flies</p>
<p>South Dublin Bay SAC [000210]</p> <p>Annex I Habitats: Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] <i>Salicornia</i> and other annuals colonising mud and sand [1310] Embryonic shifting dunes [2110]</p> <p>Source: <i>Conservation Objectives: South Dublin Bay SAC 000210</i>. Version 1. (NPWS, 2013c). <i>S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019</i>.</p>	<p>c. 5.6km downstream of the nearest proposed crossing point, <i>i.e.</i>, at the River Liffey</p> <p>or</p> <p>c. 2.8km east of proposed Project as the crow flies</p>
<p>Glenasmole Valley SAC [001209]</p> <p>Annex I Habitats: Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]</p> <p>Source: <i>Conservation Objectives: Glenasmole Valley SAC 001209</i>. Version 1. (NPWS, 2021b). <i>S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021</i>.</p>	<p>c. 10.7km south of proposed Project as the crow flies</p>
<p>Wicklow Mountains SAC [002122]</p> <p>Annex I Habitats: Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Calaminarian grasslands of the <i>Violetalia calaminariae</i> [6130] Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130]</p>	<p>c. 10.2km south of proposed Project as the crow flies</p> <p>or</p> <p>c. 18.6km upstream of the proposed Tara Street station via the River Liffey, river Dodder and Owendoher River</p>

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p>Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladanii</i>) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</p> <p>Annex II Species: Otter <i>Lutra lutra</i> [1355]</p> <p>Source: <i>Conservation Objectives: Wicklow Mountains SAC 002122</i>. Version 1. (NPWS, 2017a). <i>S.I. No. 586/2012 – European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040)) Regulations 2012.</i></p>	
<p>Knocksink Wood SAC [000725]</p> <p>Annex I Habitats: Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] Oak sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> <p>Source: <i>Conservation Objectives: Knocksink Wood SAC 000725</i>. Version 1. (NPWS, 2021c). <i>S.I. No. 93/2019 - European Union Habitats (Knocksink Wood Special Area of Conservation 000725) Regulations 2019.</i></p>	c. 13.4km south-east of proposed Project as the crow flies
<p>Ballyman Glen SAC [000713]</p> <p>Annex I Habitats: *Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] Alkaline fens [7230]</p> <p>Source: <i>Conservation Objectives: Ballyman Glen SAC 000713</i>. Version 1. (NPWS, 2019c). <i>S.I. No. 92/2019 - European Union Habitats (Ballyman Glen Special Area of Conservation 000713) Regulations 2019.</i></p>	c. 14.8km south-east of proposed Project as the crow flies
<p>Rye Water Valley/Carton SAC [001398]</p> <p>Annex I Habitats: *Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]</p> <p>Annex II Species: Narrow-mouthed Whorl Snail <i>Vertigo angustior</i> [1014] Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i> [1016]</p> <p>Source: <i>Conservation Objectives: Rye Water Valley/Carton SAC 001398</i>. Version 1. (NPWS, 2021d). <i>S.I. No. 494/2018 - European Union Habitats (Rye Water Valley/Carton Special Area of Conservation 001398) Regulations 2018.</i></p>	c. 13.6km west of proposed Project as the crow flies
Special Protection Area (SPA)	
<p>Rockabill SPA [004014]</p> <p>Annex I Birds Purple Sandpiper <i>Calidris maritima</i> [A148] [breeding]</p>	c. 14km north-east of the proposed Project as the crow flies

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p>Roseate Tern <i>Sterna dougallii</i> [A192] [breeding] Common Tern <i>Sterna hirundo</i> [A193] [breeding] Arctic Tern <i>Sterna paradisaea</i> [A194] [breeding]</p> <p>Source: <i>Conservation Objectives: Rockabill SPA 004014</i>. Version 1. (NPWS, 2013m). <i>S.I. No. 94/2012 - European Communities (Conservation of Wild Birds (Rockabill Special Protection Area 004014)) Regulations 2012</i>.</p>	
<p>Skerries Islands SPA [004122] Annex I Birds Cormorant <i>Phalacrocorax carbo</i> [A017] [breeding] Shag <i>Phalacrocorax aristotelis</i> [A018] Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046] [wintering] Purple Sandpiper <i>Calidris maritima</i> [A148] [wintering] Turnstone <i>Arenaria interpres</i> [A169] [wintering] Herring Gull <i>Larus argentatus</i> [A184]</p> <p>Source: <i>Conservation objectives for Skerries Islands SPA [004122]</i>. Generic Version 9.0. (NPWS, 2022e). <i>S.I. No. 245/2010 - European Communities (Conservation of Wild Birds (Skerries Islands Special Protection Area 004122)) Regulations 2010</i>.</p>	<p>c. 13km north-east of the proposed Project as the crow flies</p>
<p>Rogerstown Estuary SPA [004015] Annex I Birds: Greylag Goose <i>Anser anser</i> [A043] [wintering] Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046] [wintering] Shelduck <i>Tadorna tadorna</i> [A048] [wintering] Shoveler <i>Anas clypeata</i> [A056] [wintering] Oystercatcher <i>Haematopus ostralegus</i> [A130] [wintering] Ringed Plover <i>Charadrius hiaticula</i> [A137] [wintering] Grey Plover <i>Pluvialis squatarola</i> [A141] [wintering] Knot <i>Calidris canutus</i> [A143] [wintering] Dunlin <i>Calidris alpina</i> [A149] [wintering] Black-tailed Godwit <i>Limosa limosa</i> [A156] [wintering] Redshank <i>Tringa totanus</i> [A162] [wintering]</p> <p>Habitats: Wetland and Waterbirds [A999]</p> <p>Source: <i>Conservation Objectives: Rogerstown Estuary SPA 004015</i>. Version 1. (NPWS, 2013g). <i>S.I. No. 271/2010 - European Communities (Conservation of Wild Birds (Rogerstown Estuary Special Protection Area 004015)) Regulations 2010</i>.</p>	<p>c. 3km north-east of the proposed Project as the crow flies</p>
<p>Lambay Island SPA [004069] Annex I Birds: Fulmar <i>Fulmarus glacialis</i> [A009] [breeding] Cormorant <i>Phalacrocorax carbo</i> [A017] [wintering] Shag <i>Phalacrocorax aristotelis</i> [A018] Greylag Goose <i>Anser anser</i> [A043] [wintering] Lesser Black-backed Gull <i>Larus fuscus</i> [A183] [breeding]</p>	<p>c. 11.5km north-east of the proposed Project as the crow flies</p>

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p>Herring Gull <i>Larus argentatus</i> [A184] Kittiwake <i>Rissa tridactyla</i> [A188] [breeding] Guillemot <i>Uria aalge</i> [A199] [breeding] Razorbill <i>Alca torda</i> [A200] [breeding] Puffin <i>Fratercula arctica</i> [A204] [breeding]</p> <p>Source: <i>Conservation objectives for Lambay Island SPA [004049]</i>. Generic Version 9.0. (NPWS, 2022d). <i>S.I. No. 242/2010 - European Communities (Conservation of Wild Birds (Lambay Island Special Protection Area 004069)) Regulations 2010.</i></p>	
<p>Malahide Estuary SPA [004025]</p> <p>Annex I Birds: Great Crested Grebe <i>Podiceps cristatus</i> [A005] [wintering] Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046] [wintering] Shelduck <i>Tadorna tadorna</i> [A048] [wintering] Pintail <i>Anas acuta</i> [A054] [wintering] Goldeneye <i>Bucephala clangula</i> [A067] [wintering] Red-breasted Merganser <i>Mergus serrator</i> [A069] [wintering] Oystercatcher <i>Haematopus ostralegus</i> [A130] [wintering] Golden Plover <i>Pluvialis apricaria</i> [A140] [wintering] Grey Plover <i>Pluvialis squatarola</i> [A141] [wintering] Knot <i>Calidris canutus</i> [A143] [wintering] Dunlin <i>Calidris alpina</i> [A149] [wintering] Black-tailed Godwit <i>Limosa limosa</i> [A156] [wintering] Bar-tailed Godwit <i>Limosa lapponica</i> [A157] [wintering] Redshank <i>Tringa totanus</i> [A162] [wintering]</p> <p>Habitats: Wetland and Waterbirds [A999]</p> <p>Source: <i>Conservation Objectives: Malahide Estuary SPA 004025</i>. Version 1. (NPWS, 2013e). <i>S.I. No. 285/2011 - European Communities (Conservation of Wild Birds (Malahide Estuary Special Protection Area 004025)) Regulations 2011.</i></p>	<p>c. 750m downstream of the proposed crossing point on the Broadmeadow River</p> <p>or</p> <p>c. 490m east of proposed Project as the crow flies</p>
<p>Baldoyle Bay SPA [004016]</p> <p>Annex I Birds: Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046] [wintering] Shelduck <i>Tadorna tadorna</i> [A048] [wintering] Ringed Plover <i>Charadrius hiaticula</i> [A137] [wintering] Golden Plover <i>Pluvialis apricaria</i> [A140] [wintering] Grey Plover <i>Pluvialis squatarola</i> [A141] [wintering] Bar-tailed Godwit <i>Limosa lapponica</i> [A157] [wintering]</p> <p>Habitats: Wetlands & Waterbirds [A999]</p> <p>Source: <i>Conservation Objectives: Baldoyle Bay SPA 004016</i>. Version 1. (NPWS, 2013d).</p>	<p>c. 8.6km downstream of the nearest proposed crossing point, <i>i.e.</i>, at the Sluice River</p> <p>or</p> <p>c. 6km east of proposed Project as the crow flies</p>

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p><i>S.I. No. 275/2010 - European Communities (Conservation of Wild Birds (Baldoyle Bay Special Protection Area 004016)) Regulations 2010.</i></p> <p>Ireland's Eye SPA [004117] Annex I Birds: Cormorant <i>Phalacrocorax carbo</i> [A017] [breeding] Herring Gull <i>Larus argentatus</i> [A184] Kittiwake <i>Rissa tridactyla</i> [A188] [wintering] Guillemot <i>Uria aalge</i> [A199] [breeding]/[wintering] Razorbill <i>Alca torda</i> [A200] [breeding]/[wintering]</p> <p>Source: <i>Conservation objectives for Ireland's Eye SPA [004117].</i> Generic Version 9.0. (NPWS, 2022c). <i>S.I. No. 240/2010 - European Communities (Conservation of Wild Birds (Ireland's Eye Special Protection Area 004117)) Regulations 2010.</i></p>	<p>c. 10.4km east of the proposed Project as the crow flies</p>
<p>Howth Head Coast SPA [004113] Annex I Birds: Kittiwake <i>Rissa tridactyla</i> [A188] [breeding]</p> <p>Source: <i>Conservation objectives for Howth Head Coast SPA [004113].</i> Generic Version 9.0. (NPWS, 2022b). <i>S.I. No. 185/2012 - European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012.</i></p>	<p>c. 12.5km east of the proposed Project as the crow flies</p>
<p>North Bull Island SPA [004006] Annex I Birds: Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046] [wintering] Shelduck <i>Tadorna tadorna</i> [A048] [wintering] Teal <i>Anas crecca</i> [A052] [wintering] Pintail <i>Anas acuta</i> [A054] [wintering] Shoveler <i>Anas clypeata</i> [A056] [wintering] Oystercatcher <i>Haematopus ostralegus</i> [A130] [wintering] Golden Plover <i>Pluvialis apricaria</i> [A140] [wintering] Grey Plover <i>Pluvialis squatarola</i> [A141] [wintering] Knot <i>Calidris canutus</i> [A143] [wintering] Sanderling <i>Calidris alba</i> [A144] [wintering] Dunlin <i>Calidris alpina</i> [A149] [wintering] Black-tailed Godwit <i>Limosa limosa</i> [A156] [wintering] Bar-tailed Godwit <i>Limosa lapponica</i> [A157] [wintering] Curlew <i>Numenius arquata</i> [A160] [wintering] Redshank <i>Tringa totanus</i> [A162] [wintering] Turnstone <i>Arenaria interpres</i> [A169] [wintering] Black-headed Gull <i>Croicocephalus ridibundus</i> [A179] [wintering]</p> <p>Habitats: Wetlands & Waterbirds [A199]</p> <p>Source: <i>Conservation Objectives: North Bull Island SPA 004006.</i> Version 1. (NPWS, 2015b). <i>S.I. No. 211/2010 - European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006)) Regulations 2010.</i></p>	<p>c. 6.5km downstream of the nearest proposed crossing point, <i>i.e.</i>, at the River Tolka</p> <p>or</p> <p>c. 5km east of proposed Project as the crow flies</p>

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p>South Dublin Bay and River Tolka Estuary SPA [004024]</p> <p>Annex I Birds:</p> <p>Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046] [wintering]</p> <p>Oystercatcher <i>Haematopus ostralegus</i> [A130] [wintering]</p> <p>Ringed Plover <i>Charadrius hiaticula</i> [A137] [wintering]</p> <p>Grey Plover <i>Pluvialis squatarola</i> [A140] [wintering]</p> <p>Knot <i>Calidris canutus</i> [A143] [wintering]</p> <p>Sanderling <i>Calidris alba</i> [A144] [wintering]</p> <p>Dunlin <i>Calidris alpina</i> [A149] [wintering]</p> <p>Bar-tailed Godwit <i>Limosa lapponica</i> [A157] [wintering]</p> <p>Redshank <i>Tringa totanus</i> [A162] [wintering]</p> <p>Black-headed Gull <i>Croicocephalus ridibundus</i> [A179] [wintering]</p> <p>Roseate Tern <i>Sterna dougallii</i> [A192] [concentration]</p> <p>Common Tern <i>Sterna hirundo</i> [A193] [concentration]</p> <p>Arctic Tern <i>Sterna paradisaea</i> [A194] [concentration]</p> <p>Habitats:</p> <p>Wetlands & Waterbirds [A999]</p> <p>Source: <i>Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024</i>. Version 1. (NPWS, 2015c).</p> <p><i>S.I. No. 212/2010 - European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024)) Regulations 2010.</i></p>	<p>c. 3.2km downstream of the nearest proposed crossing point, <i>i.e.</i>, at the River Tolka</p> <p>or</p> <p>c. 2.1km east of proposed Project as the crow flies</p>
<p>Dalkey Islands SPA [004172]</p> <p>Annex I Birds:</p> <p>Roseate Tern <i>Sterna dougallii</i> [A192] [breeding]</p> <p>Common Tern <i>Sterna hirundo</i> [A193] [breeding]</p> <p>Arctic Tern <i>Sterna paradisaea</i> [A194] [breeding]</p> <p>Source: <i>Conservation Objectives for Dalkey Islands SPA [004172]</i>. Generic Version 9.0. (NPWS, 2022a).</p> <p><i>S.I. No. 238/2010 - European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172)) Regulations 2010.</i></p>	<p>c. 12.1km east of proposed Project as the crow flies</p>
<p>The Murrough SPA [004186]</p> <p>Annex I Birds</p> <p>Red-throated Diver <i>Gavia stellata</i> [A001]</p> <p>Greylag Goose <i>Anser anser</i> [A043]</p> <p>Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A046]</p> <p>Wigeon <i>Anas penelope</i> [A050]</p> <p>Teal <i>Anas crecca</i> [A052]</p> <p>Black-headed Gull <i>Chroicocephalus ridibundus</i> [A179]</p> <p>Herring Gull <i>Larus argentatus</i> [A184]</p> <p>Little Tern <i>Sterna albifrons</i> [A195]</p> <p>Habitats:</p> <p>Wetland and Waterbirds [A999]</p>	<p>c. 28.7km south-east of proposed Project as the crow flies</p>

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Project Site
<p>Source: <i>Conservation objectives for The Murrrough SPA [004186]</i>. Generic Version 9.0. (NPWS, 2022f).</p> <p><i>S.I. No. 298/2011 - European Communities (Conservation of Wild Birds (The Murrrough Special Protection Area 004186)) Regulations 2011.</i></p>	

Appendix B

SCI wintering bird species recorded during the 2018-2019, 2019-2020 and 2020-2021 wintering bird surveys.

Common Name	Latin name	Conservation Status ²⁶
Black-headed gull	<i>Chroicocephalus ridibundus</i>	Amber
Black-tailed godwit	<i>Limosa limosa</i>	Red
Common gull	<i>Larus canus</i>	Amber
Coot	<i>Fulica atra</i>	Amber
Cormorant	<i>Phalacrocorax carbo</i>	Amber
Curlew	<i>Numenius arquata</i>	Red
Golden plover	<i>Pluvialis apricaria</i>	Red
Herring gull	<i>Larus argentatus</i>	Amber
Kingfisher	<i>Alcedo atthis</i>	Amber
Lesser black-backed gull	<i>Larus fuscus</i>	Amber
Light-bellied brent goose	<i>Branta bernicla hrota</i>	Amber
Little grebe	<i>Tachybaptus ruficollis</i>	Green
Mallard	<i>Anas platyrhynchos</i>	Amber
Oystercatcher	<i>Haematopus ostralegus</i>	Red
Teal	<i>Anas crecca</i>	Amber
Tufted duck	<i>Aythya fuligula</i>	Amber
Whooper swan	<i>Cygnus cygnus</i>	Amber

²⁶ Gilbert, G., Stanbury, A. & Lewis, L. (2021) Birds of Conservation Concern in Ireland 4: 2020-2026. Irish Birds 43: 1-22.

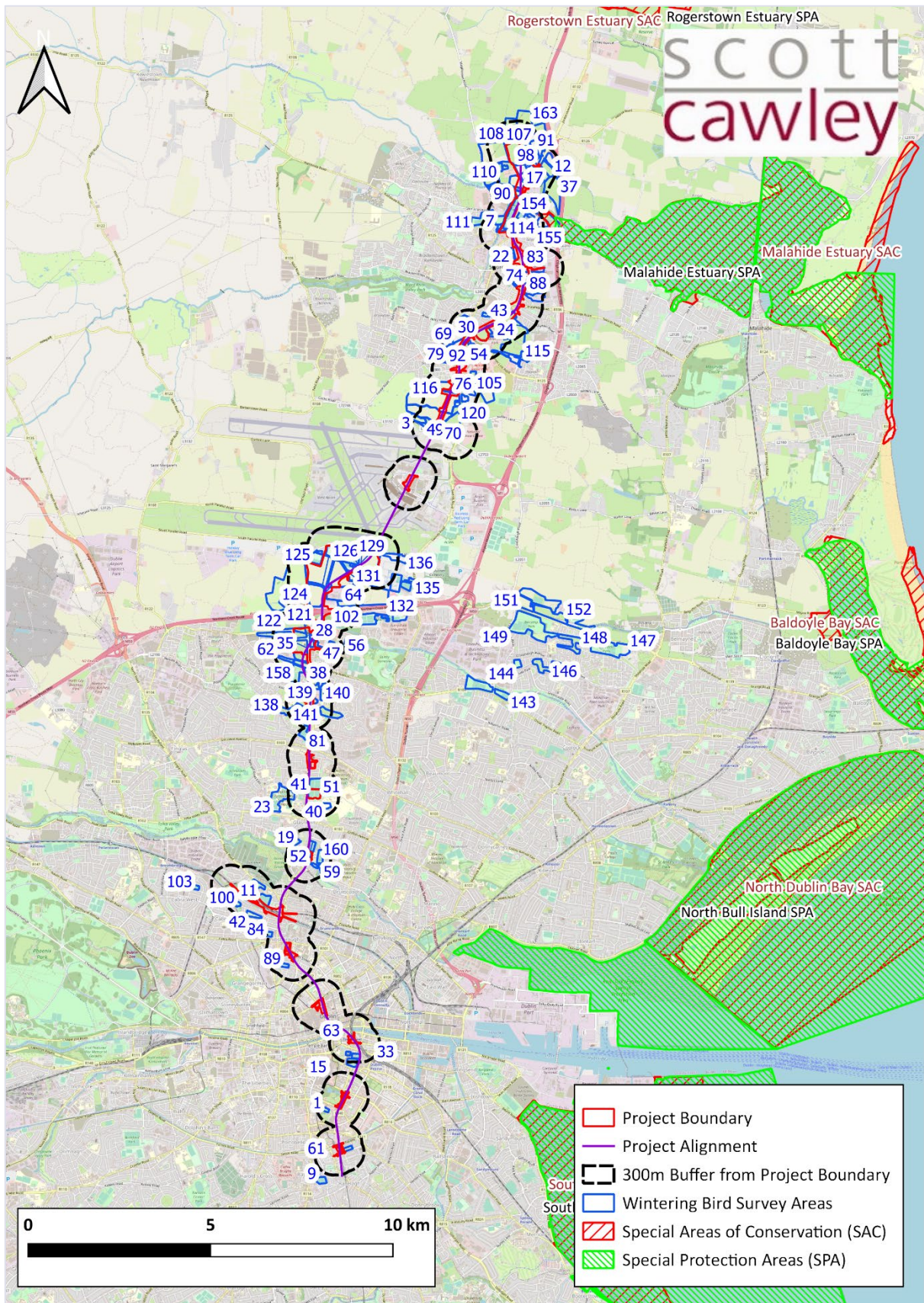


Figure 9: Wintering bird survey areas in the context of the proposed Project boundary. Lands within 300m of the project boundary were surveyed.

Appendix C

SCI breeding bird species recorded during the 2018, 2019 and 2020 breeding bird surveys

Common Name	Latin name	Conservation Status ²⁷
Coot	<i>Fulica atra</i>	Amber
Cormorant	<i>Phalacrocorax carbo</i>	Amber
Herring gull	<i>Larus argentatus</i>	Amber
Kingfisher	<i>Alcedo atthis</i>	Amber
Lesser black-backed gull	<i>Larus fuscus</i>	Amber
Mallard	<i>Anas platyrhynchos</i>	Amber
Tufted duck	<i>Aythya fuligula</i>	Amber

²⁷ Gilbert, G., Stanbury, A. & Lewis, L. (2021) Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds* 43: 1-22.

Appendix D

Records of fauna listed under the Habitats and Birds Directives from the desktop study in the vicinity of the study area

Name/ Scientific Name	Legal Status ²⁸	Red-List Status ²⁹	Source/ Location
Mammals (Terrestrial)			
Otter <i>Lutra lutra</i>	HD II & IV, WA	Least concern	NBDC online database record Within the vicinity of the proposed Project (2018)
Marine Mammals			
Common Porpoise <i>Phocoena phocoena</i>	WA, HD II, IV	N/A	NBDC online database record Within the vicinity of the proposed Project (2017)
Grey Seal <i>Halichoerus grypus</i>	WA, HD II, V	Least Concern	NBDC online database record Within the vicinity of the proposed Project (2019)
Birds			
Arctic Tern <i>Sterna paradisaea</i>	WA, BD I	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Barnacle Goose <i>Branta leucopsis</i>	WA, BD I	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2015)
Bar-tailed Godwit <i>Limosa lapponica</i>	WA, BD I	Red Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Black-headed Gull <i>Larus ridibundus</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2020)
Black-legged Kittiwake <i>Rissa tridactyla</i>	WA, OSPAR	Red listed	NBDC online database record Within the vicinity of the proposed Project (2018)
Black-tailed Godwit <i>Limosa limosa</i>	WA	Red listed	NBDC online database record Within the vicinity of the proposed Project (2012)
Brent Goose <i>Branta bernicla</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2020)
Common Coot <i>Fulica atra</i>	WA, BD II, III	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2021) The presence of coot in Darndale Park was noted by Dublin City Council during the biodiversity meeting held on 21st May 2020 with DCC (which included the attendance of the DCC Biodiversity Officer).

²⁸. HDII/IV/V = Habitats Directive Annexes II/IV/V; WA = Wildlife Acts; BD_I/II/III = Birds Directive Annex I/II/III; OSPAR = Convention for the protection of the marine environment of the North-east Atlantic 1992.

²⁹. Mammals from Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals.

Birds from Gilbert, G., Stanbury, A. & Lewis, L. (2021) Birds of Conservation Concern in Ireland 4: 2020-2026. Irish Birds 43: 1-22.

Butterflies from Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010) Ireland Red List No. 4 – Butterflies.

Name/ Scientific Name	Legal Status ²⁸	Red-List Status ²⁹	Source/ Location
Common Goldeneye <i>Bucephala clangula</i>	WA, BD II	Red listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Common Guillemot <i>Uria aalge</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2009)
Common Gull <i>Larus canus</i>	WA	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2019)
Common Kingfisher <i>Alcedo atthis</i>	WA, BD I	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Common Redshank <i>Tringa tetanus</i>	WA	Red Listed	NBDC online database record Within the vicinity of the proposed Project (2017)
Common Shelduck <i>Tadorna tadorna</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2012)
Common Tern <i>Sterna hirundo</i>	WA, BD I	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2017)
Corncrake <i>Crex crex</i>	WA, BD I	Red listed	NBDC online database record Within the vicinity of the proposed Project (1991)
Dunlin <i>Calidris alpina</i>	WA, BD I	Red listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Eurasian Curlew <i>Numenius arquata</i>	WA, BD II	Red listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Eurasian Oystercatcher <i>Haematopus ostralegus</i>	WA	Red listed	NBDC online database record Within the vicinity of the proposed Project (2017)
Eurasian Teal <i>Anas crecca</i>	WA, BD II	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2017)
Eurasian Wigeon <i>Anas penelope</i>	WA, BD II	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
European Golden Plover <i>Pluvialis apricaria</i>	WA, BD I	Red listed	NBDC online database record Within the vicinity of the proposed Project (2011)
European Shag <i>Phalacrocorax aristotelis</i>	WA	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (1994)
Gadwall <i>Anas strepera</i>	WA, BD II	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Great Cormorant <i>Phalacrocorax carbo</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Great Crested Grebe <i>Podiceps cristatus</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Greater Scaup <i>Aythya marila</i>	WA, BD II	Red Listed	NBDC online database record Within the vicinity of the proposed Project (2017)
Great Northern Diver <i>Gavia immer</i>	WA, BD I	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Grey Plover <i>Pluvialis squatarola</i>	WA	Red listed	NBDC online database record Within the vicinity of the proposed Project (2011)

Name/ Scientific Name	Legal Status ²⁸	Red-List Status ²⁹	Source/ Location
Greylag Goose <i>Anser anser</i>	WA, BD II	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2020)
Hen Harrier <i>Circus cyaneus</i>	WA, BD I	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2016)
Herring Gull <i>Larus argentatus</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2020)
Lesser Black-backed Gull <i>Larus fuscus</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Little Grebe <i>Tachybaptus ruficollis</i>	WA	Green listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Mallard <i>Anas platyrhynchos</i>	WA, BD II, III	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Manx Shearwater <i>Puffinus puffinus</i>	WA	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (1994)
Northern Lapwing <i>Vanellus vanellus</i>	WA, BD II	Red Listed	NBDC online database record Within the vicinity of the proposed Project (2017)
Northern Shoveler <i>Anas clypeata</i>	WA, BD II	Red Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Northern Gannet <i>Morus bassanus</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (1994)
Peregrine Falcon <i>Falco peregrinus</i>	WA, BD I	Green Listed	NBDC online database record Within the vicinity of the proposed Project (2016)
Red-breasted Merganser <i>Mergus serrator</i>	WA, BD II	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Red Knot <i>Calidris canutus</i>	WA	Red Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Red-throated Diver <i>Gavia stellata</i>	WA, BD I	Red listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Ringed Plover <i>Charadrius hiaticula</i>	WA	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Tufted Duck <i>Aythya fuligula</i>	WA, BD II,III	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Turnstone <i>Arenaria interpres</i>	WA	Amber Listed	NBDC online database record Within the vicinity of the proposed Project (2011)
Whooper Swan <i>Cygnus cygnus</i>	WA, BD I	Amber listed	NBDC online database record Within the vicinity of the proposed Project (2021)
Invertebrates			
Marsh Fritillary <i>Euphydryas aurinia</i>	HD II	Vulnerable	NBDC online database record Within the vicinity of the proposed Project (2020)

Appendix E

Records of Invasive Species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 in the vicinity of the study area ³⁰

Common Name/ Scientific Name	Impact Status 31	Source/ Location
Japanese Knotweed <i>Reynoutria japonica</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2021)
Giant Knotweed <i>Fallopia sachalinensis</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2017)
Brazilian Giant-rhubarb <i>Gunnera manicata</i>	Medium Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2019)
Giant-rhubarb <i>Gunnera tinctoria</i>	Medium Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2020)
Giant Hogweed <i>Heracleum mantegazzianum</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2021)
Curly Waterweed <i>Lagarosiphon major</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (1999)
New Zealand Pigmyweed <i>Crassula helmsii</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2009)
Parrot's-feather <i>Myriophyllum aquaticum</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2009)
Water Fern <i>Azolla filiculoides</i>	Medium Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (1999)
Spanish Bluebell <i>Hyacinthoides hispanica</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2021)
American Skunk-cabbage <i>Lysichiton americanus</i>	Medium Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2019)
Three-cornered Garlic <i>Allium triquetrum</i>	Medium Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2021)
Rhododendron <i>Rhododendron ponticum</i>	High Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2004)

³⁰ S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011.

³¹ Impact status is based on 2013 Invasive Species in Ireland risk assessment: Kelly, J., O'Flynn, C. and Maguire C. (2013) Risk analysis and prioritisation for invasive and non-native species in Ireland and Northern Ireland.

Common Name/ Scientific Name	Impact Status 31	Source/ Location
Sea-buckthorn <i>Hippophae rhamnoides</i>	Medium Impact Invasive Species	NBDC online database record Within the vicinity of the proposed Project (2021)