Comhairle Contae Chorcaí
Cork County Council

ARUP

# N25 Little Island Pedestrian and Cyclist Bridge

## Environmental Impact Assessment Report

## Volume 2
Main Chapters

September 2023

# Preface

# Preface - Volume 2

The structure of this Environmental Impact Assessment Report (EIAR) for the N25 Little Island Pedestrian and Cyclist Bridge (hereafter referred to as the Proposed Development) is summarised as follows:

**Volume 1: Non-Technical Summary**

Volume 1 provides a non-technical summary of the information contained in Volume 2 of the EIAR.

**Volume 2: Main Environmental Impact Assessment Report**

Volume 2 provides a general introduction, outlines the environmental impact assessment process, describes the scope of the Proposed Development, presents the consideration of reasonable alternatives and describes the environmental impacts specific to the Proposed Development.

**Volume 3: Figures**

Volume 3 provides drawings and large format images (labelled as 'Figures') that illustrate the information detailed in Volume 2 of the EIAR.

**Volume 4: Appendices**

Volume 4 provides documentation and data that is supplemental to the information provided in Volume 2 of the EIAR.

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# Glossary

# Glossary of Terminology, Abbreviations and Acronyms

| Abbreviation | Description |
|---|---|
| AA | Appropriate Assessment |
| AADT | Average Annual Daily Traffic |
| ABP | An Bord Pleanála |
| ACA | Architectural Conservation Areas |
| ACM | Asbestos-containing Materials |
| AIA | Arboricultural Impact Assessment |
| AOD | Above Ordnance Datum |
| AQS | Air Quality Standards |
| ASI | Archaeological Survey of Ireland |
| BBS | Breeding Bird Survey |
| BRE | British Research Establishment |
| CAT | Cable Avoidance Tool |
| CAP | Climate Action Plan |
| CBC | Common Bird Census |
| CCC | Cork County Council |
| CCDP | Cork County Development Plan |
| CCNP | Cork Cycle Network Plan |
| C&D | Construction and Demolition |
| CEMP | Construction Environmental Management Plan |
| CESSM | Civil Engineering Standard Method of Measurement |
| CFA | Continuous Flight Auger |
| CFRAM | Catchment Flood Risk Assessment and Management |
| CFRAMS | Catchment Flood Risk Assessment and Management Study |
| CGS | County Geological Sites |
| CIEEM | Chartered Institute of Ecology and Environmental Management |
| CIRIA | Construction Industry Research and Information Association |
| CMA | Cork Metropolitan Area |
| CMATS | Cork Metropolitan Area Transportation Strategy |
| COMAH | Control of Major Accident Hazards involving Dangerous Substances |
| CoR | Certificates of Registration |

| Abbreviation | Description |
|---|---|
| CRWMP | Construction Resource and Waste Management Plan |
| CSM | Conceptual Site Model |
| CTMP | Construction Traffic Management Plan |
| DaS | Dumping at Sea |
| DBH | Diameter at Breast Height |
| DECC | Department of Environment, Climate and Communication |
| DHPLG | Department of Housing, Planning and Local Government |
| DTTAS | Department of Transport, Tourism and Sport |
| EC | European Commission |
| EIA | Environmental Impact Assessment |
| EMS | Environmental Management System |
| EPA | Environmental Protection Agency |
| EIAR | Environmental Impact Assessment Report |
| ETS | Emissions Trading Scheme |
| FRA | Flood Risk Assessment |
| GEP | Good Ecological Potential |
| GES | Good Ecological Status |
| GHG | Green House Gases |
| GLVIA | Guidelines for Landscape and Visual Impact Assessment |
| GPR | Ground Penetrating Radar |
| GS & W | Great Southern and Western Railway line |
| GSI | Geological Survey Ireland |
| GWP | Global Warming Potential |
| HDV | Heavy Duty Vehicles |
| HSA | Health and Safety Authority |
| IAQM | Institute of Air Quality Management |
| IBA | Important Bird and Biodiversity Area |
| IED | Industrial Emissions Directive |
| IEMA | Institute of Environmental Management and Assessment |
| ICE | Inventory of Carbon and Energy |
| ICPSS | Irish Coastal Protection Strategy Study |
| IFS | Irish Forest Soils |

| Abbreviation | Description |
| --- | --- |
| IFI | Inland Fisheries Ireland |
| IPPC | Integrated Pollution Prevention and Control |
| ISA | International Society of Arboriculture |
| LiDAR | Light Detection and Ranging |
| LoW | List of Waste |
| LISTI | Little Island Sustainable Transport Interventions |
| LITM | Little Island Traffic Model |
| LITS | Little Island Transportation Study |
| MAPP | Major Accident Prevention Policy |
| MRF | Material Recovery Facility |
| MASP | Metropolitan Area Strategic Plans |
| NBDC | National Biodiversity Data Centre |
| NDP | The National Development Plan |
| NHA | Natural Heritage Area |
| NNSS | Non-Native Species Secretariat |
| NPWS | National Parks and Wildlife Service |
| NIS | Natura Impact Statement |
| NIAH | National Inventory of Architectural Heritage |
| NPF | National Planning Framework |
| NRA | National Roads Authority |
| NRMM | Non-Road Mobile Machinery |
| NSO | National Strategic Outcomes |
| NSS | National Spatial Strategy |
| NTA | National Transport Authority |
| OD | Ordnance Datum |
| OEE | Office of Environmental Enforcement |
| OPW | Office of Public Works |
| ORS | Old Red Sandstone |
| OSI | Ordnance Survey Ireland |
| PA | Planning Authority |
| RBMP | River Basin Management Plan |
| PFRA | Preliminary Flood Risk Assessment Mapping |
| RM | Resource Manager |

| Abbreviation | Description |
|---|---|
| RMP | Record of Monuments and Places |
| RPA | Root Protection Area |
| RPG | Regional Planning Guidelines |
| PS | Protected Structures |
| RSES | Regional Spatial and Economic Strategy |
| RWMO | Regional Waste Management Offices |
| RWMPO | Regional Waste Management Planning Offices |
| SAC | Special Areas of Conservation |
| SCI | Special Conservation Interest |
| SDR | Strategy Design Report |
| SEA | Strategic Environmental Assessment |
| SEAI | Sustainable Energy Authority Ireland |
| SMR | Sites and Monuments Register |
| SR | Southern Region |
| SUDS | Sustainable Drainage Systems |
| SUMP | Sustainable Urban Mobility Plan |
| SWMP | Surface Water Management Plan |
| TFS | Transfrontier Shipment |
| TII | Transport Infrastructure Ireland |
| TPO | Tree Preservation Order |
| TRL | Transport Research Laboratory |
| WFD | Water Framework Directive |
| WFP | Waste Facility Permit |
| WHO | World Health Organisation |
| WWDA | Wastewater Discharge Authorisations |
| VMS | Variable Message Signs |
| ZAP | Zone of Archaeological Potential |

# Chapter 01

# Introduction

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# 1. Introduction

## 1.1 Introduction

Ove Arup & Partners Ireland Ltd (Arup) has been appointed by Cork County Council (CCC) to prepare this Environmental Impact Assessment Report (EIAR). CCC, the National Transport Authority (NTA) and Arup have identified the benefits associated with the provision of a new pedestrian and cyclist bridge to enhance sustainable transport and active transport within the Eastgate Business Park and the surrounding area. The proposed bridge will cross the N25 and connect the Little Island Train Station, the L3004 Glounthaune Road and the future greenway to the Eastgate Business Park in Little Island, Cork. The objective of the proposed bridge is to provide efficient pedestrian and cycle connectivity between the Little Island Train Station and the Eastgate Business Park and to promote sustainable transport modes while minimising impacts on the surrounding area and environment.

For ease of reference, the proposed new pedestrian and cycle bridge is referred to as the '*Proposed Development*' in this chapter and throughout the EIAR.

This chapter outlines the background to the Proposed Development and summarises the required statutory consent procedure. This chapter also describes the methodology used to prepare this EIAR, provides details on competent experts and the consultation process that has been carried out to date.

This EIAR has been prepared in accordance with Article 5 of Council Directive 2011/92/EU as amended by Directive 2014/52/EU on the assessment of effects of certain public and private projects on the environment ('The EIA Directive').

## 1.2 Overview of the Proposed Development

The Proposed Development includes the construction of a new pedestrian and cyclist bridge and associated ramps over the existing N25. The Proposed Development is located approximately 10km to the east of Cork City and will cross over the N25 and the Cork City to Middleton Cobh railway line, connecting the Little Island Train Station, the Glounthaune Road and the future greenway to the Eastgate Business Park in Little Island, Cork. When operational, it will function as an active travel link for pedestrians and cyclists to travel from the Little Island Train station and surrounds to the Eastgate Business Park and further surrounds of Little Island.

Refer to **Image 1.1** for a site location map.

The Proposed Development consists of a new pedestrian and cyclist bridge that encompasses a segregated footway and cycleway that will be 5m wide. The proposed crossing will be approximately 460m long and will consist of a combination of different structural forms as follows:

- Northern approach ramp: Combination of earthen embankment and elevated ramp structure;
- Irish Rail span: Concrete portal frame structures;
- N25 span: Steel network arch structure; and
- South approach ramp: Combination of elevated ramp structure, at grade sections and earthen embankment.

Refer to **Chapter 4**, *Description of the Proposed Development* for further details.

The construction footprint of the Proposed Development, including the proposed construction compounds and bridge assembly compound is approximately 1.7 hectares. The construction footprint of the final works (excluding planting and minor tie in footpaths in the northern park area) is approximately 0.3 hectares.

The site layout for the Proposed Development is presented in **Figure 4.2** in **Volume 3** of this EIAR.


**Image 1.1: Approximate location of the Proposed Development. Source: OpenStreetMap. Not to scale.**

## 1.3 Planning and EIAR Processes

### 1.3.1 Overview of the Statutory Consent Process

*Roads Act, 1993 as amended*

A review of the Roads Act (1993), as amended, determined that the Proposed Development is considered a "road development" as defined under Section 2 of Roads Act (1993)

A "road" is defined as:

*"(a) any street, lane, footpath, square, court, alley or passage,*

*(b) any bridge, viaduct, underpass, subway, tunnel, overpass, overbridge, flyover, carriageway (whether single or multiple), pavement or footway,*

*(c) any weighbridge or other facility for the weighing or inspection of vehicles, toll plaza or other facility for the collection of tolls, service area, emergency telephone, first aid post, culvert, arch, gulley, railing, fence, wall, barrier, guardrail, margin, kerb, lay-by, hard shoulder, island, pedestrian refuge, median, central reserve, channelliser, roundabout, gantry, pole, ramp, bollard, pipe, wire, cable, sign, signal or lighting forming part of the road, and*

*(d) any other structure or thing forming part of the road and—*

*(i) necessary for the safety, convenience or amenity of road users or for the construction, maintenance, operation or management of the road or for the protection of the environment, or*

*(ii) prescribed by the Minister";*

A "road authority" is defined as:

*"road authority", except in Part V, means the council of a county, the corporation of a county or other borough, or the council of an urban district";*

A "public road" is defined as:

*"public road" means a road over which a public right of way exists and the responsibility for the maintenance of which lies on a road authority.*

The Proposed Development is interpreted to be a "road" development under the legislation and CCC is a "road authority". The proposed construction of the bridge is interpreted as the construction of a "*public road*" under the legislation.

Section 50 (1) of the Roads Act (1993) (as amended by S.I No 279 of 2019) relates to road developments subject to Environmental Impact Assessment (EIA).

The thresholds for mandatory EIA of a road development are set out in Section 50(1)(a) below. The prescribed types of proposed road development for the purposes of Section 50 (1)(a)(iii) are set out in Article 8 of SI 119 of 1994 Roads Regulations and also set out below.

**Roads Act (1993), as amended**

*"50. (1) (a) A road development that is proposed that comprises any of the following shall be subject to an environmental impact assessment:*

*(i) the construction of a motorway;*

*(ii) the construction of a busway;*

*(iii) the construction of a service area;*

*(iv) any prescribed type of road development consisting of the construction of a proposed public road or the improvement of an existing public road.*

**SI 119 of 1994 Roads Regulations. Part V Environmental Impact Assessment**

*"(8). The prescribed types of proposed road development for the purpose of subsection (1)(a)(iv) of section 50 of the Act shall be—*

*(a) the construction of a new road of four or more lanes, or the realignment or widening of an existing road so as to provide four or more lanes, where such new, realigned or widened road would be eight kilometres or more in length in a rural area, or 500 metres or more in length in an urban area;*

*(b) the construction of a new bridge or tunnel which would be 100 metres or more in length"*

Section 50(1)(b) states that where the road authority considers that a proposed road development (other than development as listed in Section 50(1)(a)) consisting of the "*construction of a proposed public road or the improvement of an existing public road*" would be likely to have significant effects on the environment, it shall decide that it will be subject to EIA (i.e., it must carry out EIA Screening).

Section 50(1)(c) states that where a road authority considers that a proposed road development that it proposes (other than development as listed in Section 50(1)(a)) consisting of the "*construction of a proposed public road or the improvement of an existing public road*" would be likely to have significant effects on the environment, it shall inform An Bord Pleanála in writing prior to making an application.

Further, Section 50(1)(d) states that where the construction of a proposed public road is located on a European site (or other important sites as listed in 50(1)(d)), the road authority proposing the development must make an EIA screening determination and it must also make its decision publicly available (Section 50(1)(f)).

Finally, Section 50(1)(e) states that An Bord Pleanála or the road authority shall take into account the relevant selection criteria specified in Annex III (of the EIA Directive) in making its EIA Screening determination.

### 1.3.2 Legislative Context

*EIA*

A European Directive for EIA has been in force since 1985 since the adoption of Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

The EIA Directive of 1985 has been amended three times by Council Directives 97/11/EC, 2003/35/EC and 2009/31/EC. It was ultimately codified and repealed by Council Directive 2011/92/EU on 13 December 2011. This Directive was further amended in 2014 by Council Directive 2014/52/EU which sets out the current provisions for member states on the assessment of the effects of certain public and private projects on the environment.

Pursuant to the EIA Directive, the competent authority may consider and take account of the EIAR for certain public and private projects that might have significant effects on the environment as part of the consent decision making process. In Ireland, the EIA content in relation to planning consents is set forth in Part X of the Planning and Development Acts 2000 to 2018 and in Part 10 of the Planning and Development Regulations 2001 to 2018.

This EIAR has been prepared in accordance with the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No 296 of 2018), the EIA Directive and also all Irish law and requirements under the Planning Act and Planning Regulations in respect of EIA.

*EIAR under Section 172 of the Planning and Development Acts 2000 to 2018*

Section 172(1) of Part X of the Planning and Development Acts 2000 to 2018 provides as follows:

*(1) An environmental impact assessment shall be carried out by the planning authority or the Board, as the case may be, in respect of an application for consent for Proposed Development where either—*

*(a) the Proposed Development would be of a class specified in—*

*(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either—*

*(I) such development would equal or exceed, as the case may be, any relevant quantity, area or other limit specified in that Part, or*

*(II) no quantity, area or other limit is specified in that Part in respect of the development concerned, or*

*(ii) Part 2 of Schedule 5 of the Planning and Development Regulations 2001 and either—*

*(I) such development would equal or exceed, as the case may be, any relevant quantity, area or other limit specified in that Part, or*

*(II) no quantity, area or other limit is specified in that Part in respect of the development concerned, or*

*(b) (i) the Proposed Development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations 2001 but does not equal or exceed, as the case may be, the relevant quantity, area or other limit specified in that Part, and*

*(ii) the planning authority or the Board, as the case may be, determines that the Proposed Development would be likely to have significant effects on the environment.*

*Schedule 5 of Planning and Development Regulations, as amended*

The prescribed classes of development and thresholds that may trigger an EIA are set out in Schedule 5 of the Planning and Development Regulations as amended.

A review of the classes of development listed under Part 1 and Part 2 of Schedule 5 of the Planning and Development Regulations 2001 as amended was therefore carried out to determine whether the Proposed Development might be considered to fall into any of the development classes which require an EIA.

Typically, a local authority development which requires an EIA (i.e., of a class listed in Schedule 5 of the Planning and Development Regulations 2001, as amended, which list projects requiring EIA), must be submitted to An Bord Pleanála for approval under Section 175 of the Planning and Development Act (2000), as amended. However, subsection 14 of Section 175 specifically excludes road developments: *"(14) This section shall not apply to proposed road development within the meaning of the Roads Act, 1993, by or on behalf of a road authority*."

*Assessment for EIA Requirement*

The proposed N25 Pedestrian and Cycle Bridge "road" development is neither a motorway, busway nor service area, but it does consist of the construction of a bridge approximately 460m in total length and exceeds the thresholds outlined in Section 50(1)(a) of the Roads Act 1993, as amended, and Article 8 of the Roads Regulations 1994. Therefore, the Proposed Development triggers the need for a mandatory EIA.

CCC, as the competent authority, considered the EIA Screening Report prepared for the development and determined that an EIA was required. In accordance with Section 50(1)(c) of the Roads Act (1993), as amended, CCC notified An Bord Pleanála, in writing, of this decision and made the decision publicly available.

This EIAR has been prepared to provide the relevant information to the consent authority to enable it to undertake the EIA. The EIAR accompanies the statutory approval application for the Proposed Development which is being submitted to An Bord Pleanála. The EIA for the purposes of statutory consent will be undertaken by An Bord Pleanála.

The EIA must identify, describe and assess the direct and indirect significant effects of the project on specified environmental factors.

*Definition of EIA*

EIA supports the decision-making process as it is integrated into consenting processes for new development projects. This ensures that consent decisions are made in the knowledge of the environmental consequences of the project. Article 1(2)(g) of the 2014 EIA Directive states that:

*"environmental impact assessment" means a process consisting of:*

*(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*

*(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*

*(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;*

*(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, considering the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and*

*(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."*

For the purpose of this EIAR, CCC is the *'developer'* of the Proposed Development, while An Bord Pleanála is the '*competent authority'* responsible for undertaking the EIA and integrating its reasoned conclusion in this regard into the consent decision for the Proposed Development.

#### *Appropriate Assessment*

EU member states are required to establish a network of Natura 2000 sites under the obligations of Council Directive 92/43/EEC (Habitats Directive) and Council Directive 79/409/EEC (Birds Directive), as amended and codified in Council Directive 2009/147/EC.

The Habitat and Birds Directives require that the likely significant effects of any plan or project, alone, or in combination with, other plans or projects, on the Natura 2000 site network (i.e., European designated sites), should be assessed before any decision is made to allow that plan or project to proceed. This process, known as Appropriate Assessment (AA), comprises a number of steps and tests in place that should be undertaken sequentially and documented by competent authorities in making decisions related to the approval or denial of a plan or project that may impact on European designated sites) in accordance with Part XAB of the Planning Acts, which transposes the Birds and Habitats Directives.

An Appropriate Assessment Screening Report (AA Screening Report) was prepared for the Proposed Development. This report concluded that *"The proposed N25 Pedestrian and Cycle Bridge, Little Island, Cork, either alone or in-combination with other plans and / or projects, does not have the potential to significantly affect any European Site, in light of their conservation objectives"*. It was therefore concluded that *"a Stage 2 Appropriate Assessment is deemed not to be required does require"* for the Proposed Development.

The AA Screening Report has been submitted with the application for approval, so as to enable the Board, as competent authority, to carry out the assessments required pursuant to Article 6(3) of Council Directive 92 / 43 / EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (*'the Habitats Directive')*.

### 1.3.3 Guidance

This EIAR has been prepared with due regard to the following overarching guidance on EIA:

- Department of the Environment, Community and Local Government (2013) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
- Department of Housing, Planning, Community and Local Government (2017) Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems;
- Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 - Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) And Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
- European Commission (1999) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions;
- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment;
- European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
- Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter referred to as *'the EPA Guidelines'*); and

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

Additional topic-specific guidance used to undertake assessments is identified in **Chapters 7 – 20**, as appropriate.

### 1.3.4 Rating and Significance of Effects

The EIAR has determined likely significant effects and the description of likely significant effects in accordance with the EPA guidelines. Likely effects are those which are planned to take place and those which can be reasonably foreseen to be inevitable consequences of normal construction and operation of the Proposed Development. Significance of effects is understood to mean the importance of the outcome of the effect (i.e., consequence of change) and is determined by a combination of objective (scientific, often quantitative) and subjective (social, often qualitative) concerns.

The EPA's description of effects (as outlined in **Table 1.1)** has been used where practicable to ensure a robust assessment and a consistent approach to the description of effects within the EIAR. Where assessments are making use of standard, topic-specific guidelines and descriptions of effects, this has been identified in **Chapters 7 - 20** of this EIAR.

**Table 1.1: Description of effects as per Table 3.4 of the EPA Guidelines (EPA, 2022)**

| Nature | Description | Definition |
|---|---|---|
| **Quality of effects** | Positive effect | A change which improves the quality of the environment (for example, by increasing species diversity; or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities). |
| | Neutral effect | No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. |
| | Negative / adverse effect | A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance). |
| **Significance of effects** | Imperceptible effect | An effect capable of measurement but without significant consequences |
| | Not significant effect | An effect which causes noticeable changes in the character of the environment but without significant consequences |
| | Slight effect | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| | Moderate effect | An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. |
| | Significant effect | An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| | Very significant effect | An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment. |
| | Profound effect | An effect which obliterates sensitive characteristics. |
| **Extent and context of effects** | Extent | Describe the size of the area, the number of sites, and the proportion of a population affected by an effect. |
| | Context | Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?). |
| **Probability of effects** | Likely effect | The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented. |
| | Unlikely effect | The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented. |
| **Duration and frequency of effects** | Momentary effect | Effect lasting from seconds to minutes. |
| | Brief effect | Effect lasting less than a day. |

| Nature | Description | Definition |
| --- | --- | --- |
| | Temporary effect | Effect lasting less than one year. |
| | Short-term effect | Effect lasting one to seven years. |
| | Medium-term effect | Effect lasting seven to fifteen years. |
| | Long-term effect | Effect lasting fifteen to sixty years. |
| | Permanent effect | Effect lasting over sixty years. |
| | Reversible effect | Effects that can be undone, for example through remediation or restoration. |
| | Frequency of effects | Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually). |
| **Type of effects** | Indirect effect | Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway. |
| | Cumulative effect | The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. |
| | Do-nothing effect | The environment as it would be in the future should the subject project not be carried out. |
| | Worst-case effect | The effects arising from a project in the case where mitigation measures substantially fail. |
| | Indeterminable effect | When the full consequences of a change in the environment cannot be described. |
| | Irreversible effect | When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost. |
| | Residual effect | The degree of environmental change that will occur after the proposed mitigation measures have taken effect. |
| | Synergistic effect | Where the resultant effect is of greater significance than the sum of its constituents, (e.g., combination of SOx and NOx to produce smog). |

### 1.3.5 Structure of the EIAR

This EIAR has been prepared to provide information on the likely significant effects of the project on the environment as per Schedule 6 of the European Union (Planning and development) (Environmental Impact Assessment) Regulations 2018, S.I. No. 296 of 2018. The following has been included:

- A description of the Proposed Development comprising information on the site, design, size and other relevant features of the Proposed Development;
- A description of the potential effects on the environment of the Proposed Development;
- A description of the features, if any, of the Proposed Development and the measures, if any, envisaged to avoid, prevent or reduce and, if possible, offset potential adverse effects on the environment of the development;
- A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the Proposed Development on the environment; and
- A non-technical summary of the information referred to in the above four points.

This EIAR comprises the following elements:

- The Non-Technical Summary. This summarises the findings of the EIAR in a clear, accessible format that uses non-technical language and supporting graphics. The non-technical summary describes the Proposed Development, existing environment, effects and mitigation measures and relevant aspects of the EIAR in a manner that can be easily understood by the general public;
- The substantive EIAR chapters include introductory chapters in addition to 'assessment' chapters for each environmental aspect in accordance with Article IV of the EIA Directive. The front-end chapters (**Chapters 1 – 6**) provide the relevant project context, whilst the assessment chapters (**Chapters 7 - 20**) provide a description of the relevant environmental aspects and likely significant effects with summary chapters provided thereafter (**Chapter 21 and 22**); and
- The technical documents that support the EIAR are cross-referenced in the main EIAR chapters to appendices. The appendices include other relevant drawings, modelling outputs, background reports and / or supporting documents and are included after the EIAR chapters.

## 1.4 Project Team

The engineering design team has been led by Arup on behalf of CCC.

This EIAR has been prepared by a multi-disciplinary consultancy team of competent experts, led by Arup.

Arup has been awarded an EIA Quality Mark by the Institute of Environmental Management and Assessment in recognition of its excellence in EIA activities. Further, all technical leads are deemed to be qualified and competent experts in their fields in accordance with Article 5(3) of the EIA Directive, given their academic qualifications, professional affiliations and professional experience on other EIARs for similar projects. Refer to **Table 1.2** for details on the competent experts that have prepared this EIAR.

**Table 1.2 Competent experts undertaking EIAR**

| Topic | Responsible competent expert – competency details |
|---|---|
| Chapter 1 (Introduction) | **Sinead Whyte, MSc CMIWEM, Arup**<br>Sinead Whyte is an Associate Director with Arup and has over 18 years' experience as an Environmental Consultant. She holds a MSc in Experimental Physics and is Chartered for over 16 years with the Institute of Water and Environmental Management. She has prepared numerous Air Quality and Climate Impact Assessments for infrastructural developments including DART Underground, M20 Cork to Limerick Motorway, M7 Osberstown Interchange and R407 Sallins Bypass and N9/N10 Kilcullen to Powerstown. Sinead presented expert witness evidence at the An Bord Pleanála oral hearings into these developments. |
| | **Simon Grennan, BA (Mod.), MSc, Arup**<br>Simon Grennan is a Senior Environmental Consultant with Arup and has over 8 years' experience in the environmental sector. Simon holds an MSc in environmental Sciences from Trinity College Dublin. Simon has a wide range of experience in the environmental field, with specific experience in EIA coordination and preparation and waste management consultancy work. Simon has experience preparing and coordinating EIARs in a number of areas including residential/commercial developments, transport developments and industrial/manufacturing. Example projects include the BusConnects Tallaght/Clondalkin to City Centre EIAR, the Ticknick Park EIAR, the Greenlink Interconnector EIAR, the Arklow Flood Relief Scheme EIAR and the Arklow Wastewater Treatment Plant EIAR. |
| | **Alice Halpenny, MSc, Arup**<br>Alice Halpenny is a Graduate Environmental Consultant with Arup. Alice holds an MSc in Environmental Leadership from National University of Ireland, Galway. Alice has experience in EIAR preparation and waste management report preparation. Example projects include the preparation of BusConnects EIAR and the One Adelaide Road CDRWMP preparation. |
| Chapter 2 (Background and Need for the Proposed Development) | **Sinead Whyte**<br>See above |
| | **Simon Grennan**<br>See above |
| | **Alice Halpenny**<br>See above |
| Chapter 3 (Alternatives Considered) | **Eddie Feely, BSc, MIES, CEnv, Arup**<br>Eddie is an Associate with Arup and has over 21 years' experience as an Environmental Consultant. He holds a BSc in Environmental Pollution Science from the University of Glamorgan, UK and is a Member of the Institution of Environmental Sciences and is a Chartered Environmentalist. Eddie has managed the preparation of Environmental Impact Assessment Reports Statements for a number of infrastructure projects including High Speed Two Phase 2a (West Midlands to Crewe) in the UK, Curragh Racecourse Redevelopment, DART Underground, Dublin Airport Visual Control Tower and Wicklow Port Access and Town Relief Road. Eddie presented expert witness evidence at the DART Underground and Wicklow Port Access and Town Relief Road oral hearings. |
| | **Simon Grennan** |

| Topic | Responsible competent expert – competency details |
|---|---|
| | See above |
| | **Alice Halpenny**<br>See above |
| Chapter 4 (Description of the Proposed Development) | **Eddie Feely**<br>See above |
| | **Tim O' Sullivan Glynn, BE MSc CEng MIEI MICE, Arup**<br>Tim is a Senior Bridge Engineer with Arup and has over 9 years' experience as a bridge designer and project manager. Tim holds an M.Sc. in structural engineering and is a chartered engineer with the Institute of Civil Engineers for over 5 years. Tim has work experience with major consultants in the UK and New Zealand before moving to Arup and has been part of the design and project management team for numerous bridge and civil structural projects from design through to construction including the Christchurch Footbridge Reading, the Wichelstowe Footbridge Swindon, Springhead Bridge Ebbsfleet, Omaroro Reservoir strengthening peer review NZ, Edenderry Pedestrian and Cycle Bridge concept design and options assessment as well as numerous other projects. |
| | **Simon Grennan**<br>See above |
| Chapter 5 (Construction Strategy) | **Eddie Feely**<br>See above |
| | **Tim O'Sullivan Glynn**<br>See above |
| | **Simon Grennan**<br>See above |
| Chapter 6 (Planning and Policy) | **Sinead Whyte**<br>See above |
| | **Simon Grennan**<br>See above |
| | **Alice Halpenny**<br>See above |

| Topic | Responsible competent expert – competency details |
| --- | --- |
| Chapter 7 (Traffic and Transportation) | **Gerna Van Jaarsveld, MSc, Arup**<br><br>Gerna is an Associate with Arup and has more than 22 years' experience as a Transport Planner, of which she has spent over 10 years in Ireland. She holds a Town and Regional Planning degree with a masters in Transport Planning and has experience in delivering a wide range of transport planning projects in the public and private sector. She has prepared a number of Traffic Impact Assessments for Environmental Impact Assessments in Ireland including Arklow Wind Farm, Lower Lee Flood Relief Scheme and North Irish Sea Array (NISA). |
| | **Pedram Zand, MSc, Arup**<br><br>Pedram Zand is a Senior Transport Planner and has more than 12 years' experience in the field. Pedram holds a MSc in Urban Management and development from Erasmus University of Rotterdam. He has ample experience in managing projects and delivering high quality results. The projects he managed include transport strategies at different levels, the interaction between built environment and transport, works on the most important improvements to various aspects of public transport services, residential and commercial parking, CCAM (Connected, Cooperative and Automated Mobility) and the impact of its extensive use. These are some of the Projects he managed over the last years: Traffic Impact Statements for Mercy University Hospital, Cork- Moate First Masterplan, Moate-Smarte: The most effective improvements to shift more people to rail transport in Brussels & Flanders, Belgium- PPART: studying and preparing plans for residential parking spaces in several neighbourhoods in Brussels, Belgium- SUMI: Optimising public transport network design in order to enhance its use in Flanders, Belgium |
| Chapter 8 (Landscape and Visual) | **David Bosonnet, BAgSc, MILI, CMLI, Brady Shipman Martin**<br><br>David Bosonnet is a Senior Landscape Architect and Partner with Brady Shipman Martin. David qualified from UCD in 1995 with a B.Ag.Sc. (Land Hort) and from TCD in 2000 with Dip. Information Systems. He is a Member of Irish Landscape Institute and Chartered Member of the Landscape Institute (UK). He has over 25 years' experience in preparing landscape and visual assessments and has prepared over 120no. LVIA reports for inclusion in EIA documents for a wide range of project types. David has extensive experience in landscape design/mitigation and implementation. He is co-author of TII's '*Standards and Technical Guidance for Landscape Character Assessment and Landscape and Visual Assessment of Transport Infrastructure*'. |
| | **George Dundon, BA, MLA, MLI, Brady Shipman Martin**<br><br>George Dundon is a Senior Landscape Architect with Brady Shipman Martin. George qualified from NUI Maynooth in 1995 with a B.A. (Sociology & Modern History) and from Edinburgh College of Art & Design, Heriott-Watt University in 1998 with Master Landscape Architecture (MLA). He is a Member of the Landscape Institute (UK) since 2002. He has over 25 years' experience in landscape architecture including landscape and visual appraisal, assessment, and preparation of LVIA reports for inclusion in EIA documents for a wide range of project types. George has extensive development master planning experience using context and environment led design with integrated landscape design/mitigation and enhancement. |
| Chapter 9 (Biodiversity) | **Carl Dixon, MSc, DixonBrosnan**<br><br>Carl Dixon holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. He is a senior ecologist who has over 25 years' experience in ecological assessment. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included REPS planning for landowners and ecological assessments. Carl has particular experience in freshwater ecology, including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to Badgers and bats. Other competencies include surveys for invasive species and bird surveys. Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has experience in large-scale industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include gas pipelines, incinerators, electrical cable routes, oil refineries and quarries. |

| Topic | Responsible competent expert – competency details |
|---|---|
| | **Sorcha Sheehy, PhD, DixonBrosnan**<br><br>Sorcha Sheehy PhD (Ecology/ornithology) is an ecologist and ornithologist who has worked for 15 years in environmental consultancy. She has worked on Screening / NISs for a range of small and large-scale projects with expertise in assessing impacts on birds. Sorcha's PhD research focused on bird behaviour at airports, where she studied bird avoidance behaviour and collision risk to aircraft. Her research involved field observations, post-mortem analysis and radar surveys. Sorcha has worked on bird collision risk assessments at airports throughout Ireland including Dublin airport, Cork airport, Shannon airport and Kerry airport. During her consultancy work Sorcha carried out field-based surveys and environmental reports including NIS, AA screening and EIARs. Notable projects include the Arklow Bank Wind Park, Indaver Ireland Waste Management Facility at Ringaskiddy, Irving Oil Whitegate Refinery (IOWR), Shannon LNG and Greenlink Interconnector. |
| Chapter 10 (Noise and Vibration) | **Sinead Whyte**<br><br>See above |
| | **Dean Redmond, BSc, Arup**<br><br>Dean Redmond is a Graduate Acoustician with Arup. He holds a BSc in Physics from University College Dublin. He has previously worked on noise and vibration assessments for infrastructural developments, industrial developments and commercial developments including DART+ Coastal North, The North Irish Sea Array (NISA) offshore wind energy project EIAR, IDL Midleton distillery expansion EIAR, Irish Cement noise improvements for EPA licencing along with several due diligence assessments for confidential clients for work on data centres. |
| Chapter 11 (Air Quality) | **Sinead Whyte**<br><br>See above |
| | **Simon Grennan**<br><br>See above |
| Chapter 12 (Climate) | **Sinead Whyte**<br><br>See above |
| | **Simon Grennan**<br><br>See above |
| Chapter 13 (Archaeology, Architectural and Cultural Heritage) | **Avril Purcell, MA, MIAI, Lane Purcell**<br><br>Avril is a consultant archaeologist with over 20 years' experience in commercial archaeology. She has been company principle of Lane Purcell Archaeology for the last 14 years and before that worked for Sheila Lane & Associates, which developed into Lane Purcell Archaeology. Avril has extensive experience in all aspects of archaeological consultancy from preplanning stage right through resolution through archaeological excavation. She has carried out a number of large scale excavation projects in advance of re-development most recently in Cork city on the North Main Street. Avril has compiled a large number of archaeological and cultural heritage sections of EIARs and given expert witness evidence at oral hearings. |

| Topic | Responsible competent expert – competency details |
|---|---|
| | Avril has a BA in Archaeology and History and MA in Archaeology both from UCC and is a member of the Institute of Archaeologists of Ireland. |
| | **Musetta O'Leary, BA, MA, Lane Purcell**<br><br>Musetta O'Leary has over 15 years of experience in all aspects of archaeological consultancy. Musetta primarily manages the archaeological and cultural heritage components of projects at the pre-planning consultancy stage and has co-ordinated and written the Cultural Heritage section of a large number of diverse EIAR/EIS projects for road construction, industrial, residential and sporting developments, energy delivery and quarrying. Musetta has presented expert witness evidence at the An Bord Pleanála oral hearings. Some of the various projects include the M20 Cork to Limerick Motorway; Belvelly Port Facility, Marino Point, Co. Cork; Horizon Mall, Parkway, Co. Limerick; Horgan's Quay, Mixed Use Development, Cork City, Shannon LNG Terminal, Co. Kerry, Shronagree Windfarm, Ballydehob and Coolbane Quarry, Co. Cork. |
| Chapter 14 (Population and Human Health) | **Simon Grennan**<br><br>See above |
| | **Alice Halpenny**<br><br>See above |
| Chapter 15 (Resources and Waste) | **Janet Lynch, BEng, MCTWM, MIEI CEng, Arup**<br><br>Janet Lynch is an Associate with Arup with over 20 years' experience in circular economy, resource and waste management, EIAR and Industrial Emissions Licensing. Skills include Construction and operational resource and waste management strategies and plans, material reuse, recycling and disposal technologies. Planning and EIA project management includes energy, renewables, industrial and infrastructure Projects; Industrial Emissions (IE) License applications & review includes waste, biomass, oil and gas, energy, cement and the pharmaceutical sector. Janet holds an honours degree in Civil and Environmental Engineering from University College Cork, a FETAC Certificate in Waste Facility Management and a Certificate in Applied Project Management from the IEI and University Limerick. She is a Chartered member of the Chartered Institution of Wastes Management (MCTWM) and a Chartered Member of Engineers Ireland. |
| | **Simon Grennan**<br><br>See above |
| Chapter 16 (Water) | **Mesfin Desta, PhD, FIEI, Arup**<br><br>Mesfin Desta is a Principal Hydrologist with Arup and has over 17 years of experience as a hydrologist. He holds a PhD in Civil Engineering from UCD and MSc in Engineering Hydrology from NUI Galway. He is a chartered member and Fellow of Engineers Ireland. He was responsible for the preparation of Water/Hydrology Chapters of EIAR's for various projects including Galway Bus Connect, N24 Waterford to Cahir, NISA Offshore Windfarm, and various Strategic Housing Developments. |
| Chapter 17 (Land, Soils, Geology and Hydrogeology) | **Marie Fleming BSc (Hons), MSc. Arup**<br><br>Marie is an Associate working in the Ground Engineering team in Arup and has a Bachelor of Science (Earth Sciences) honours degree from University College Cork and a Master's Degree in Engineering Geology from Imperial College London. Marie has over 18 years professional experience on large infrastructure projects and is a Professional Geologist (PGeo) with the Institute of Geologists of Ireland (IGI), a Chartered European Geologist (EurGeol) with the European |

| Topic | Responsible competent expert – competency details |
|---|---|
| | Federation of Geologists and a Fellow of the Geological Society of London (GSL). She has prepared numerous Land, Soils, Geology & Hydrogeology Impact Assessments for infrastructural developments including DART Underground, the M7 Osberstown Interchange, the R407 Sallins Bypass and the North Irish Sea Array (NISA) offshore windfarm. |
| | **Sarah Ryan, BE (Civil), MIEI, Arup**<br>Sarah is a Senior Ground Engineer with Arup and has over 10 years' experience in the ground engineering sector. Sarah holds a BE in civil engineering from University College Dublin. Sarah has a wide range of experience across, ground investigation, geotechnical risk management, design and construction which she draws on when preparing EIA. Sarah has prepared numerous land soils, geology and hydrogeology chapters often in parallel to carrying out the preliminary geotechnical design for the same project. Example EIAs for which Sarah contributed to the Land, soils, geology and hydrogeology assessment / chapter include all 12 BusConnects Dublin EIARs, BusConnects Galway Cross City Link EIAR, Kenmare WWTP EIAR and the National Maternity Hospital EIAR. |
| Chapter 18 (Material Assets) | **Simon Grennan**<br>See above |
| | **Alice Halpenny**<br>See above |
| Chapter 19 (Risk of Major Accidents and / or Disasters) | **Simon Grennan**<br>See above |
| | **Alice Halpenny**<br>See above |
| Chapter 20 (Cumulative and Interactive Impacts) | **Simon Grennan**<br>See above |
| | **Alice Halpenny**<br>See above |
| Chapter 21 (Summary of Mitigation and Monitoring Measures) | **Simon Grennan**<br>See above |
| | **Alice Halpenny**<br>See above |

| Topic | Responsible competent expert – competency details |
| --- | --- |
| Chapter 22 (Summary of Residual Impacts) | **Simon Grennan**<br>See above |
| | **Alice Halpenny**<br>See above |

## 1.5 Consultation Undertaken

### 1.5.1 Overview

Extensive consultation has been undertaken with a range of stakeholders during the development of the EIAR and statutory consent application to:

- Provide information on the Proposed Development;
- Ascertain and understand the views of stakeholders; and
- Seek input from stakeholders on the design, construction and assessment aspects of the Proposed Development.

It should be noted that this section describes project-wide consultation that has been undertaken. Where appropriate, **Chapters 7-20** identify specific consultation that has been undertaken to support individual assessments and assessment chapters.

### 1.5.2 Consultation with relevant stakeholders

During the preparation of this EIAR, several statutory and non-statutory bodies were consulted to ensure that issues relating to the Proposed Development were addressed. The parties consulted are detailed in **Table 1.3**.

**Table 1.3: Relevant stakeholders**

| Stakeholder | |
|---|---|
| An Taisce | Gas Networks Ireland |
| Bat Conservation Ireland | Geological Survey of Ireland |
| Birdwatch Ireland | Health and Safety Authority |
| Department of Agriculture, Food and the Marine | Health Service Executive |
| Department of Enterprise, Trade and Employment | Heritage Council |
| Department of Rural and Community Development | Inland Fisheries Ireland |
| Department of the Environment, Climate and Communications | Irish Raptor Study Group |
| Department of Housing, Local Government and Heritage - Development Applications Unit | Irish Wildlife Trust |
| EirGrid | Office of Public Works |
| Environmental Protection Agency | Transport Infrastructure Ireland |
| Fáilte Ireland | |

A high-level summary of the responses received are outlined in **Table 1.4**.

**Table 1.4: Consultation responses**

| Stakeholder | Response |
|---|---|
| An Taisce | No response |
| Bat Conservation Ireland | Bat Conservation Ireland acknowledged receipt of the request for consultation but noted that they did not have the capacity to comment on planning issues. |
| Birdwatch Ireland | No response |
| Department of Agriculture, Food and Marine | No response |

| Stakeholder | Response |
|---|---|
| Department of Enterprise, Trade and Employment | No response |
| Department of Rural and Community Development | No response |
| Department of the Environment, Climate and Communications | The Department of the Environment, Climate and Communications acknowledged receipt of the request for consultation. No response received was received, however. |
| Department of Housing, Local Government and Heritage - Development Applications Unit | The Development Applications Unit noted that a number of invasive plant species are known to occur in the general area and otters have also been recorded and have been found dead on the adjacent road. The Department recommended that these factors should be included in the EIAR. |
| Eirgrid | No response |
| Environmental Protection Agency | The Environmental Protection Agency acknowledged receipt of the request for consultation. No response received was received, however. |
| Fáilte Ireland | No response |
| Gas Networks Ireland | No response |
| Geological Survey of Ireland | No response |
| Health and Safety Authority | No response |
| Health Service Executive | The HSE welcomed the Proposed Development as it will support objectives of the Healthy Ireland Strategy and other Health Strategies that encourage physical exercise and sustainable transport. It noted specific EIA published guidance that should be followed for the EIAR and identified appropriate methodology to assess the potential human health impacts arising from the Proposed Development. The HSE also suggested that a Construction Environmental Management Plan be prepared as part of the EIAR that addresses a range of topics, including dust, pest control, interruption to services, waste routes and collection, a waste management plan for the Construction Phase and servicing of the temporary construction compounds. |
| Heritage Council | No response |
| Inland Fisheries Ireland | No response |
| Irish Raptor Study Group | No response |
| Irish Wildlife Trust | IWT acknowledged receipt of the request for consultation and noted that they did not have the staff capacity to respond to the consultation but would endeavour to respond if possible. No response received was received, however. |
| Office of Public Works | The OPW recommended that a flood risk assessment be carried out in accordance with the guidelines, “The Planning System and Flood Risk Management” in support of the Proposed Development. |
| Transport Infrastructure Ireland | Transport Infrastructure Ireland acknowledged receipt of the request for consultation. No response received was received, however. |

### 1.5.3 Landowners

Ongoing engagement took place with landowners, and / or anyone with an interest in potentially impacted properties or lands within the footprint of the Proposed Development as the design development progressed.

Privately owned lands within the footprint of the Proposed Development will be acquired by CCC. The private landowners that have been consulted with by CCC are:

- Irish Rail;
- Radisson Blu Hotel & Spa, Little Island;
- Private owner of land to south of N25; and
- O'Flynn Developments.

Over the course of the engagements, affected property owners had the opportunity to discuss, among other things, the following aspects with CCC:

- Development proposals and potential impacts;
- Timelines for the design development and associated EIAR assessment;
- Procedural matters such as planning and CPO process; and
- Specific details of the impact of the Proposed Development on landowner property, including approximate extent of encroachment.

## 1.6 Difficulties Encountered during the Preparation of the EIAR

No difficulties were encountered during the preparation of this EIAR that were considered to have a material impact on the EIAR.

## 1.7 References

Cork County Council (2022) Cork County Development Plan (2022-2028).

Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 -Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) And Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

Department of Housing, Planning, Community and Local Government (2017) Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems.

Department of Housing, Planning, Community and Local Government (2018) Circular PL 1/2017 - Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive): Advice on the Administrative Provisions in Advance of Transposition.

Department of the Environment, Community and Local Government (2013) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (codified version of Directive 79/409/EEC as amended) (The Birds Directive).

Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports.

European Commission (1999) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

European Commission (2012) Interpretation suggested by the Commission as regards the application of the EIA Directive to ancillary/associated works.

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

European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report.

European Communities (Birds and Natural Habitats Regulations; S.I. No. 477 of 2011)

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

Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018).

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

Planning and Development Regulations, 2001 (S.I. 600 of 2001) as amended.

Roads Act (1993), as amended, National Roads Authority.

## Chapter 02

# Background and Need for the Proposed Development

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# 2. Background and Need for the Proposed Development

## 2.1 Introduction

This chapter of the EIAR provides a summary of the background and context to the Proposed Development. It also outlines the need for the Proposed Development and its alignment with objectives outlined in current national, regional and local transport and planning policy.

## 2.2 Background

Cork County Council (CCC) undertook the Little Island Transportation Study in 2017 to identify the existing transport issues in Little Island and to explore potential solutions which would ensure an integrated and balanced approach to transport for the Little Island area in the future. The findings of the study were published in the 'Little Island Transportation Study - Final Strategy Development Report' in 2018 (CCC, 2018) and the 'Little Island Transportation Study – Strategy Design Report' in 2019 (CCC, 2019). The study is generally consistent with the Cork Metropolitan Area Transportation Strategy (CMATS) 2040 (NTA, 2020). A Strategic Environmental Assessment of the Little Island Transport Study was undertaken, while the study was also subject to Appropriate Assessment Screening and a Natura Impact Statement was prepared.

Further details related to the Little Island Transport Study Strategy Design Report and the CMATS are included in **Chapter 6**, *Planning and Policy*.

Support for the Little Island Transport Study Strategy Design Report was received from the elected members of the CCC Cobh Municipal District in February 2019.

On foot of this support, Arup was commissioned to design the short-term interventions identified in the Little Island Transport Study. This project, titled the Little Island Sustainable Transport Interventions (LISTI), comprises a series of measures which may be implemented to achieve an immediate improvement in the transport issues in Little Island. The N25 Pedestrian and Cyclist Bridge (i.e., the Proposed Development) is one of these measures.

## 2.3 Need for the Proposed Development

The Proposed Development will cross the N25 and connect the Little Island train station, the L3004 Glounthaune Road and the Dunkettle to Carrigtwohill pedestrian and cycle route to the Eastgate Business Park in Little Island, Cork. The objective of the Proposed Development is to provide efficient pedestrian and cycle connectivity between Little Island train station and Eastgate Business Park and to promote sustainable transport modes, while minimising impacts on the surrounding area and environment.

In recent years, there has been a major shift towards sustainable transport which is reflected in a number of transport and planning policy documents at a national, regional and local level. The changing demographics in our society whereby population is migrating to metropolitan areas to avail of employment opportunities, education and improved living conditions necessitates the promotion of a wholly sustainable transportation network. Our metropolitan areas are undergoing fundamental change as they strive to become living spaces for an increased population which is concentrated in a smaller tighter space. Key to a thriving urban experience is the ability to navigate a metropolitan area at leisure, whether as a pedestrian or a cyclist. Therefore, the shift from private vehicles and public transport to other modes of transport is key to creating a more people friendly environment and improved metropolitan areas.

The Proposed Development supports the need for a shift towards sustainable transport and will provide additional cycling and walking facilities in the Cork metropolitan area which will foster sustainable and healthy behaviours.

## 2.4 Relevant Policy

As outlined in the following sections of this chapter, the Proposed Development is congruent with the objectives of current national, regional and local transport and planning policy, as set out in the various relevant planning and policy documents referenced herein.

Further details have also been included in **Chapter 6**, *Planning and Policy.*

### 2.4.1 National Planning Policy and Guidance

#### *2.4.1.1 Project Ireland 2040 - National Planning Framework*

The Department of Housing, Planning and Local Government published Project Ireland 2040: National Planning Framework (NPF) in February 2018 (DHLGH, 2018). The NPF represents the overarching national planning policy document, of direct relevance to the planning functions of regional and planning authorities, including An Bord Pleanála, and from the 16th of February 2018, it replaced the National Spatial Strategy (NSS).

The NPF, which provides the framework for future development and investment in Ireland, is fully supported by the Government's investment strategy for public capital investment and investment by the State sector in general. It is the overall Plan from which other, more detailed plans will take their lead, including city and county development plans and regional strategies, hence the title, National Planning 'Framework'.

The goals of the NPF are expressed as National Strategic Outcomes and are illustrated in **Image 2.1**.


**Image 2.1: National Strategic Outcomes**

Section 3.4 of the NPF focuses on the southern region of Ireland. Cork Metropolitan Area lies within the south-west regional area of the southern region, and it is within this area that the Proposed Development is located.

The NPF states that Cork and its Metropolitan Area "*focus on more balanced and compact, connected growth. This means that housing development should be based on employment growth, higher densities, access to amenities and sustainable transport modes, in order to avoid long-distance commuting patterns and quality of life impacts"*. The NPF states that strategies will be developed deliver *"improved public spaces and enhanced public transport as well as safe and pleasant options for walking and cycling"*.

'Key future growth enablers' set out for Cork include:

- The development of a much-enhanced public transport system; and
- Improving sustainable transport links.

The Proposed Development is wholly compliant with these key growth enablers and will assist in meeting the objectives of the NPF, as:

- It will contribute to the wider growth of the Southern Region;
- It is located on an existing public transport corridor and will maximise the potential of this public transport service;
- It will link transportation and employment areas to pedestrian routes and a strategic cycleway network; and
- It will provide an enhanced public realm and amenity area.

#### *2.4.1.2 National Development Plan 2021-2030*

The National Development Plan (NDP) 2021-2030 (Government of Ireland, 2021) is the national plan setting out investment priorities to guide national, regional and local planning and investment decisions over the timeframe of the plan. The priorities of the plan are stated as National Strategic Outcomes (NSO). Refer to **Image 2.1.**

NSO 2 focuses on enhanced regional accessibility. With respect to transport, the NDP aims to implement measures to "*enhance intra-regional accessibility through improving transport links between key urban centres of population and their respective regions, as well as improving transport links between the regions themselves*."

NSO 4 focuses on sustainable mobility and recognises that the implementation of an environmentally sustainable public transport system will meet the increase in travel demands and address urban congestion while contributing towards the *"national policy vision of a low-carbon economy. Furthermore, the provision of safe alternative active travel options such as segregated cycling and walking facilities can also help alleviate congestion and meet climate action objectives…"*.

NSO 7 focuses on enhanced amenity and heritage. Cultural heritage is recognised as a key component and contributor to the attractiveness and sustainability of cities. In addition, *"all elements of living space including streets, public spaces, built heritage and natural amenity areas, cultural and sporting opportunities and sustainable transport networks, all of which play a central part in defining the character and attractiveness of places"*.

The Proposed Development complements the NDP as it will provide additional sustainable travel options and encourage a significant modal shift in transport. In addition to providing segregated cycle and walking facilities, the Proposed Development will also assist in providing an enhanced public realm and amenity area which will add to the attractiveness of the area.

#### *2.4.1.3 Climate Action Plan 2023*

The first Climate Action Plan was prepared by the Government of Ireland in 2019, with an updated version published in 2023 (DECC, 2023). The purpose of the Action Plan is to identify actions to be put in place for each sector with the objective of reducing Ireland's greenhouse gas emissions and thereby achieving EU targets of economy-wide carbon budgets and sectoral emissions ceilings. The sectors identified as having a high carbon footprint include agriculture, electricity, buildings, industry, transport and waste management.

In relation to the transport sector, the Climate Action Plan seeks to provide good public transport, cycling and walking infrastructure, improve the energy efficiency of vehicles, and adopt the "Avoid-Shift-Improve" approach to reduce the need for travel and the use of encourage sustainable travel modes.

The Proposed Development supports the principles of the Climate Action Plan in so far as it will encourage people to choose alternative modes of transport (walking and cycling). Every shift, however small, from the private vehicle to public transport, walking or cycling is positive and is a gain in terms of climate action.

An assessment of the impact of the Proposed Development under the heading of climate is included in **Chapter 12**, *Climate*.

#### *2.4.1.4 Smarter Travel: A Sustainable Transport Future 2009-2020*

'Smarter Travel – A Sustainable Transport Future' (Department of Transport, 2009) is a policy framework which sets out how the vision of a sustainable travel and transport system can be achieved. The objective of the policy framework is to reduce the demand for private car travel: *"To support sustainable travel, future population and employment growth will have to predominantly take place in sustainable compact urban areas or rural areas, which discourage dispersed development and long commuting".*

Chapter 5 of the Smarter Travel Policy document identifies actions to deliver alternative ways of travelling. The policy recognises that to successfully promote cycling and walking as realistic alternatives to the private car, a safe and pleasant experience must be provided.

Action 7 of the Smarter Travel Policy document identifies the requirement to *"implement safe walking and cycling routes to and from schools and other educational institutions*" and Action 16 recognises the "*strong convergence between walking as a tourism asset and walking as recreational activity for local residents*".

The Proposed Development aligns with the Smarter Travel Policy document both at a national and local level by encouraging people to move from private vehicle use to alternative modes of transport. The alternative transport modes of cycling and walking directly contribute to the sustainable transport future envisioned within the Smarter Travel Policy document.

#### *2.4.1.5 Achieving Effective Workplace Travel Plans: Guidance for Local Authorities*

The National Transport Authority (NTA) published the document 'Achieving Effective Workplace Travel Plans: Guidance for Local Authorities' (NTA, 2013) to assist local authorities in implementing workplace travel plans into the development plan process and the development management process.

The guidance recommends that consideration should be given to the location and scale of development, the precise nature of the uses proposed and the anticipated impact on the surrounding area regarding trip volume and congestion. 'Standard' workplace travel plans should be required if an existing or Proposed Development has the potential to employ over 100 people.

The Proposed Development aligns with the guidance by facilitating the active travel of employees to their place of work at a number of businesses and industries within the Cork Metropolitan Area.

#### *2.4.1.6 Spatial Planning and National Roads: Guidelines for Planning Authorities*

'Spatial Planning and National Roads: Guidelines for Planning Authorities' (Department of Environment, Community and Local Government, 2012) sets out planning policy considerations relating to developments affecting national primary and secondary roads, including motorways and associated junctions, outside the 50-60km/h zones for cities, towns and villages.

The guidelines aim to achieve and maintain a safe and efficient network of national roads within the broader context of sustainable development and transportation strategies. The Proposed Development directly facilitates this by providing an accessible and active travel alternative for pedestrians and cyclists within the region.

### 2.4.2 Regional Planning Policy

#### *2.4.2.1 Southern Regional Assembly: Regional Spatial and Economic Strategy*

The Regional Spatial and Economic Strategy (RSES) for the Southern Region (Southern Regional Assembly, 2020) sets out a 12-year strategic development framework. The RSES includes Metropolitan Area Strategic Plans (MASPs) to guide the future development of the Region's three main cities and metropolitan areas – Cork, Limerick-Shannon, and Waterford.

The purpose of the RSES is to support the implementation of the NPF while facilitating choices that reflect the differing needs of the regions. The strategies are proposed in the context of a renewed focus on "Regional Parity" in the NPF, being promoted to address anti-competitive pressures on Dublin by offering more sustainable choices and options for people, businesses and communities that can positively influence more sustainable patterns of living and working which benefit our entire society and make our economy more equitable and resilient.

As noted in Section 2.4.1.1, the Proposed Development is wholly compliant with the objectives of the NPF and by extension, directly aligns with the objectives of the Southern Region's RSES.

#### *2.4.2.2 Southwest Regional Planning Guidelines*

The Southwest Regional Planning Guidelines (Southwest Regional Authority, 2010) were implemented to fulfil the southern region's obligations to prepare regional planning guidelines (RPGs) under the Planning and Development Act, 2000.

A key component of the RPGs is to drive the sustainable growth and prosperity of the region. The RPGs contain statements and analysis of key economic objectives with a set of planning guidelines to be incorporated within the development plans of all local authorities within the region. Development priorities in these RPGs that are listed that relate specifically to the Greater Cork Area (including Little Island) include:

- Realignment and reinforcement of spatial planning and land use policies;
- Plan for an increase in the population and employment of the Cork Gateway;
- Refocusing of economic and investment strategy; and
- Front-loading of infrastructure investments for the Cork Docklands.

There are also a number of infrastructural provisions and upgrades for the Cork Greater Area that have been prioritised that include:

- Upgrading of N25 Cork-Waterford;
- Dunkettle Interchange; and
- The N25 flyovers within Cork.

The RPGs directly reference upgrade works to the N25, of which the Proposed Development is directly enabling. The Proposed Development will provide an accessible travel alternative for pedestrians and cyclists from Little Island Train Station to Little Island over the N25. This benefit will enable the sustainable delivery of the key economic objectives outlined for the local area (refer to Section 2.3.3).

### 2.4.3 Local Planning and Transport Policy

#### *2.4.3.1 Cork County Development Plan 2022 – 2028*

The Cork County Development Plan 2022 – 2028 (CCC, 2022) sets out how the County will develop until 2028, while also considering a long-term vision for 2040. The Plan sets out the County's approach to creating vibrant, liveable, climate resilient, and sustainable communities, consistent with the National Planning Framework 2018.

One of the goals of the Plan is to support the delivery of an efficient transport system and to "*make sustainable travel modes an attractive and convenient choice for as many people as possible in order to deliver economic, social, health, wellbeing, environmental and climate action benefits*". These goals are expected to be achieved by:

- Implementing the Avoid-Shift-Improve Framework (to encourage active travel and improve energy efficiency of sustainable transport modes);
- Increasing funding for active travel projects within Cork County; and
- Implementing the Little Island Transport Strategy.

The Proposed Development represents an active travel project that will encourage a model shift to sustainable travel modes, while it will also form a critical element of the Little Island Transport Strategy.

#### *2.4.3.2 Cork Metropolitan Area Transport Strategy 2040*

The Cork Metropolitan Area Transport Strategy (CMATS) (NTA, 2020) has been published in the context of the NPF which envisages that Cork will become the fastest growing city region in Ireland in the coming years. Cork's population is estimated to result in a projected 50% to 60% increase in the period up to 2040. This projected population and associated economic growth will result in a significant increase in the demand for travel. This demand needs to be managed and planned for carefully to safeguard and enhance Cork's attractiveness to live, work, visit and invest in.

The Strategy will provide a coherent transport planning policy framework and implementation plan around which other agencies involved in land use planning, environmental protection, and delivery of other infrastructure such as housing and water can align their investment priorities. CMATS will inform the development of regional and local planning, and associated investment frameworks.

The CMATS contains a number of guiding principles across a number of transport modes including the following:

- **Principle 1**: 'To support the future growth of the CMA through the provision of an efficient and safe transport network';
- **Principle 2**: 'To prioritise sustainable and active travel and reduce car dependency within the CMA'; and
- **Principle 3**: 'To provide a high level of public transport connectivity to key destinations within high demand corridors'.

The Proposed Development achieves the principles listed within the CMATS, particularly those relating to sustainable and active travel. In providing the residents, visitors and employees of Little Island with accessible pedestrian and cyclist access to the Little Island area and the Little Island train station, the Proposed Development will enable sustainable transportation alongside a rapidly growing environment.

CMATs identifies two new crossings of the N25 which are identified as primary cycle routes. The first of these crosses the N25 to the east of the Proposed Development and forms part of the Dunkettle Scheme which is currently under construction. The other primary crossing identified is to the east of Junction 2 Little Island Interchange, close to the location of the proposed crossing which is the subject of this assessment. Therefore, the Proposed Development directly aligns with the CMATs proposal.

#### *2.4.3.3 Cork Cycle Network Plan*

The Cork Cycle Network Plan (CCNP) (CCC, 2017) has been prepared for the Cork Metropolitan Area and surrounding towns to provide a clear path for the future development of the cycle network within the region. Development of the CCNP has been driven by the need to respond to national targets for sustainable transport. The Plan identified the modal share for cycling within the Cork Metropolitan Area as 1.7% in 2017 and set a target for this to increase to 10% in 2020.

The purpose of the CCNP is limited purely to recommendations for cycling infrastructure and the development of an integrated and coherent cycling network. The CCNP details that the areas of Glanmire, Glounthaune and Little Island are proposed areas for new cycle infrastructure. There is currently a general lack of access routes to Little Island. Dedicated cycling facilities currently exist along the Dunkettle Q-link Road to Little Island. However, these facilities lack continuity at junctions and major crossing points. The CCNP identifies two new crossings of the N25 which are identified as primary cycle routes. The first of these crosses the N25 to the east of the Proposed Development and forms part of the Dunkettle Scheme which is currently under construction. The other primary crossing identified is to the east of Junction 2 Little Island Interchange, close to the location of the proposed crossing which is the subject of this assessment.

The Proposed Development is directly aligned with the objectives of the CCNP which includes the provision of a high-quality direct cycle link between the Tivoli area of Cork City and Little Island. Furthermore, the Proposed Development will enhance the accessibility of the region to vulnerable users by removing the need for travel via the Dunkettle overbridge.

#### *2.4.3.4 Cork 2050: Cork's Submission to the NPF*

'Cork 2050: Cork's Submission to the NPF' (Cork 2050) (CCC and Cork City Council, 2017) is a joint submission by Cork County and City Councils to the NPF as part of the consultation process for a new framework. Cork 2050 establishes a strategic vision for the growth of the 'whole of Cork' which is focused on future sustainable development.

The submission outlines the region's approach to maximising the potential of Cork by building on strengths and addressing issues that limit opportunities. A key component of the submission outlines the capacity of Cork to relieve pressure on Dublin and drive the growth in the southern region to support a stronger national economy. The East-West Metropolitan Growth Corridor is identified within Cork 2050 and incorporates Little Island. The Little Island Train Station and the N25 are noted as being part of the strategic transport corridor which is vital for the future growth of the region.

The Proposed Development directly supports Cork 2050 by delivering on the targets to develop sustainable infrastructure within an area identified as a key Growth Corridor. In providing alternative means of sustainable transport to Little Island from the region, the Proposed Development provides an active transport route that satisfies the objective of Cork 2050.

#### *2.4.3.5 Little Island Transportation Study – Final Strategy Development Report*

CCC commissioned the Little Island Transportation Study (LITS) (CCC, 2018) to identify existing transportation issues within Little Island and to explore potential solutions. The LITS aims to determine what transport infrastructure improvements and policy measures are required to alleviate severe peak hour traffic congestion. Among the measures proposed, increasing active travel and public transport use are promoted which will improve the environment for general traffic, cyclists, pedestrians, and public transport vehicles.

A public questionnaire was conducted as part of the plan preparation which noted that better quality walking and cycling links from the Railway Station to Little Island was the top reason to encourage people to use the train to travel to Little Island. Additionally, 77% of respondents rated the general traffic conditions in Little Island as very poor with 35% and 67% stating that pedestrian and cyclist infrastructure respectively was very poor. The LITS determined that pedestrian volume was highest in the PM peak at the N25 overbridge with 249 pedestrians travelling towards Little Island train station.

The Proposed Development will satisfy the objectives of the LITS by providing a necessary upgrade to the pedestrian and cycling infrastructure within Little Island. In turn, this will drive a necessary reduction in vehicle movements within Little Island which is a key objective in the overarching regional and local policy and planning frameworks listed above.

#### *2.4.3.6 Little Island Transportation Study – Strategy Design Report (2019)*

The 'Little Island Transportation Study – Strategy Design Report' (SDR) (CCC, 2019) provides additional detail in relation to the design of the proposed infrastructure and policy measures to be implemented in Little Island over a 20-year period. The SDR should be read in conjunction with the LITS (refer to Section 2.4.3.5) as it focuses on the key elements of the transport strategy developed for Little Island.

The SDR categorised the implementation of required measures to achieve the objectives for the region into three delivery streams:

- Short-term (2018-2023) strategy measures;
- Medium-term (2023-2030) strategy measures; and
- Long-term (2030-2040) strategy measures.

The SDR recommended that the transport strategy proposals aimed at increasing the mode share for sustainable modes are frontloaded in the implementation plan. As a result, the following short-term strategy measure was incorporated within the report:

> *The mobility hub at the Little Island Train Station, incorporating the pedestrian/cycle footbridge should be prioritised within the first five years of the strategy. It is recommended that a masterplan for the mobility hub, including the pedestrian/cycle footbridge, is commenced on completion of the Little Island Transportation Study, and that it is delivered prior to the delivery of the N25 Interchange to Ballytrasna Park Junction bus priority scheme.*

The Proposed Development provides the pedestrian / cyclist footbridge outlined as a required measure within the SDR. Therefore, the SDR, in conjunction with the LITS, demonstrate the need for the Proposed Development in enhancing the uptake of active travel modes within Little Island and the surrounding region.

## 2.5 Conclusion

The Proposed Development will support the need for a shift towards sustainable transport and the provision of an efficient pedestrian and cycle connectivity between the Little Island Train Station and the Eastgate Business Park.

The Proposed Development is considered to align with the national, regional and local policies summarised above.

## 2.6 References


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## Chapter 03

# Alternatives Considered

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# 3. Alternatives Considered

## 3.1 Introduction

This chapter presents the alternative options of the Proposed Development that were considered prior to deciding upon the final Proposed Development design and presents an indication of the main reasons for selecting the current design.

A detailed options selection process for the Proposed Development was completed in accordance with the NTA Project Approval Guidelines (NTA, 2020), the Department of Transport Common Appraisal Framework Qualitative Appraisal Criteria (DoT, 2021) and Transport Infrastructure Ireland's Technical Approval Guidance (TII, 2019). Considering all of these requirements, a multi criteria assessment was completed to determine the preferred option which is now the design being considered. This chapter presents a summary of the options considered in this process.

For clarity, the Do-Nothing Scenario (i.e., a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline thereof without implementation of the Proposed Development, as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge) is provided in a number of chapters of the EIAR.

## 3.2 Legislative Framework

### 3.2.1 Background

Article 5(1)(d) of Directive 2011/92/EU, as amended by Directive 2014/52/EU ("the EIA Directive") requires that an EIAR contains *'a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and the main reasons for the option chosen, taking into account the effects of the project on the environment'*.

In addition, Annex IV to the EIA Directive provides that the EIAR shall include:

*"A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

In addition, given the proposed road development for which approval is sought in this instance, section 50(2)(b)(iv) of the Roads Act 1993, as amended ("the Roads Act") states that that the EIAR shall contain the following information:

"*…a description of the reasonable alternatives studied by the road authority or the Authority, as the case may be, which are relevant to the proposed road development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed road development on the environment*."

Section 50(2)(b)(vi) of the Roads Act also requires that "*any additional information specified in Annex IV* [as quoted above] *that is relevant to the specific characteristics of the particular proposed road development or type of proposed road development and to the environmental features likely to be affected*" also be included in the EIAR.

Thus, these are reasonable alternatives which are relevant to the project and its specific characteristics and must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment and may relate to matters such as project design, technology, location, size and scale.

The amended EIA Directive requires that the environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the prescribed environmental factors which include:

- Population and human health;
- Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
- Land, soil, water, air and climate;
- Material assets, cultural heritage and the landscape; and
- The interaction between the factors.

These prescribed factors in relation to the Proposed Development are considered in each of the relevant chapters of this EIAR, as appropriate.

This chapter of the EIAR has been prepared in accordance with the above legislative framework.

Moreover, it has similarly been prepared in accordance with a suite of guidance documents at national and European level aimed at assisting in the interpretation of the amended EIA Directive and the new transposing regulations as detailed in full below and pertaining to the assessment of alternatives that may be considered as reasonable.

### 3.2.2 Guidance documents

In carrying out an assessment of reasonable alternatives relevant to the Proposed Developments, a systematic and stringent approach has been adopted with a view to fulfilling the legislative obligations as described above and in order that the requirements therein are adhered to in full.

In this regard, consideration was given to a number of guidance documents in the preparation of this chapter of the EIAR, including the following:

- Department of Housing, Planning and Local Government (2018). Circular PL 05/2018 -Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) And Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
- Department of Housing, Planning, Community and Local Government (2017). Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems;
- Department of Housing, Planning, Community and Local Government (2017). Circular PL 1/2017 - Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive): Advice on the Administrative Provisions in Advance of Transposition;
- Environmental Protection Agency (2022). Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- European Commission (2017). Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report; and
- Government of Ireland (2018). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

All such guidance and documentation have informed the assessment of reasonable alternatives as carried out and detailed in this chapter of the EIAR.

### 3.2.3 Examination of alternatives

Taking into account the above guidance framework, it is important to highlight what is underscored therein regarding the interpretation to be applied as to what constitutes a reasonable alternative in practice, the selection of alternatives in terms of feasibility and the requisite level of detail to be provided in the assessment of any reasonable alternatives to the Proposed Developments to be carried out.

There is limited European and national guidance on what constitutes a 'reasonable alternative'. It is noteworthy however, that the aforementioned European Commission guidance document (2017) states that reasonable alternatives:

*"Reasonable Alternatives must be relevant to the proposed Project and its specific characteristics, and resources should only be spent assessing these Alternatives. In addition, the selection of Alternatives is limited in terms of feasibility. On the one hand, an Alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer.*

*At the same time, if an Alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible Alternative… Ultimately, Alternatives have to be able to accomplish the objectives of the Project in a satisfactory manner, and should also be feasible in terms of technical, economic, political and other relevant criteria'.*

The European Commission guidance also states that:

*"The feasibility of the Alternatives proposed can be determined on a case-by-case basis. The final set of reasonable Alternatives identified will then undergo a detailed description and assessment in the EIA Report…. It should be noted that each Project and each EIA is different, and there can be no definitive list prescribing how Alternatives are to be identified and assessed….*

*In some cases, Alternatives will have been developed at the plan stage (e.g., a plan for the transport sector, a regional development plan, or a spatial plan) or by the Developer during the Project's initial design. In such cases, some Alternatives may have already been excluded, in which case, it would likely be unnecessary to consider them again".*

Pursuant to the EPA guidance, the consideration of alternatives also needs to be cognisant of the fact that:

*"in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'…"*

Taking the foregoing guidance and legislative framework into account, the alternatives in relation to this Proposed Development are considered in terms of a 'do-nothing' alternative (Section 3.3), alternative site locations (Section 3.4), alternative bridge alignments (Section 3.5), alternative structural options for the bridge (Section 3.6) and alternative structural options for the approach ramp structures (Section 3.7).

## 3.3 Do-Nothing Alternative

The 'Do-Nothing' alternative refers to what would happen if the Proposed Development was not implemented. As outlined in **Chapter 2**, *Background and Need for the Proposed Development* the need for the Proposed Development has been documented at a national, regional and local level to address the transport issues currently experienced in County Cork.

The 'Do-Nothing' alternative comprised an examination of the existing cycle and pedestrian infrastructure and its ability to meet future growth demands, in the absence of any upgrade works and additional infrastructure. The study found that the existing infrastructure and pedestrian crossing facilities in this area would have insufficient capacity to meet the growing demand for active transport modes in the future without further investment in dedicated pedestrian and cycle infrastructure.

In this instance, the 'Do-Nothing' alternative would miss the opportunity to provide dedicated and safe pedestrian and cycle infrastructure linking busy commuters and residents to the industrial park, natural amenities and the Little Island train station.

The assessment for the 'Do-Nothing' alternative concluded that:

- Key objectives of the Little Island Transport Strategy (CCC, 2018; 2019) which identify improvements for the pedestrian and cycle network in Little Island, Cork would not be achieved;
- The existing infrastructure is not sufficient to cater for the predicted growth in pedestrian and cycle movements; and

- An opportunity to support the reduction of greenhouse gas emissions through promotion of sustainable transportation modes would be missed.

For these reasons, the 'Do-Nothing' alternative was not considered further.

## 3.4 Alternative Site Locations

As part of the background studies which informed the bridge options selection process and the environmental impact assessment of the preferred option, several potential bridge landing points were considered in the Little Island Sustainable Transport Interventions (LISTI) feasibility report – refer to **Image 3.1**.

These potential landing points were considered in the Little Island / Eastgate areas. Initial examination based on the locations of the options and their walking catchments resulted in two of these options being removed at an early stage; namely locations 1 and 4. For either of these locations to be viable, it was determined that it would require a relocation of the Little Island train station. Cork County Council held initial discussions with Irish Rail, during which the feasibility of relocating the station was discussed. Irish Rail indicated that it could be feasible to relocate the station, hence options 1 and 4 were considered. However, when comparing the advantages and disadvantages of relocating the train station against retaining its current location, it was considered that a relocation of the station would not provide sufficient benefits to justify the capital expenditure. Therefore, options 1 and 4 were not considered further at that stage for the feasibility report.

Landing locations 2 and 3 (refer to **Image 3.1**) were considered further through a bridge feasibility report and options selection report / structures options report, with the preferred bridge alignment and landing location subsequently selected based on a multi criteria assessment. These reports are included as **Appendix 3.1** and **Appendix 3.2**, respectively, in **Volume 4** of this EIAR.


**Image 3.1: Landing options considered in the LISTI feasibility report**

## 3.5 Bridge Alignments Options

The feasibility report and an options selection report / structures options report were prepared to identify key constraints associated with the development of a pedestrian and cyclist bridge in this location and to determine if a potential bridge is likely to be feasible. Three bridge alignment options were identified and assessed to determine the preferred option for the proposed crossing.

These alignment options consider the bridge spanning the existing N25 dual carriageway and existing Cork to Middleton railway with connectivity to the Little Island train station via ramped access west of the station and the Eastgate Business Park as per the LISTI options assessment landing points.

The three alignment options are discussed in detail below as well as identifying advantages and disadvantages for each.

### 3.5.1 Bridge Alignment Option 1

Alignment option 1 aims at keeping the proposed bridge as close as possible to the Little Island train station and the existing An Crompán / Little Island Interchange (N25 junction 2). The key considerations of this option have been outlined below.

The overall structure length is approximately 380m.

**Advantages:**

- Shortest distance from the Little Island train station; and
- Provides possibility for multi modal interchange at northern landing (rail, bus, cycling and pedestrian).

**Disadvantages:**

- Highest crossing over N25 due to raised off ramps leading to longer approach ramps than other options;
- Proposed landing point is not towards the Eastgate Business Park (which is the densest employment area). Poor pedestrian and cycle catchment and tie in to Eastgate Business Park from south. Some pedestrians may continue using An Crompán Bridge;
- Length of northern ramp required does not distinguish crossing location greatly from option 2. Due to the proposed location of the crossing, there may be difficulty achieving the length required for the northern habitat;
- Tree felling and site clearance required for northern and southern ramps, resulting in potential habitat disturbance;
- More difficult to construct and maintain southern ramp within wooded area; and
- Layout of northern ramp not preferred for cyclists.

Further to the feasibility assessment review of this option and further assessment at the options selection stage, this option was not deemed to meet the basis requirements of encouraging active travel between Little Island train station and Eastgate Business Park and environs, as it was deemed to be off the desire line and would not provide a significantly different route to that already available via An Crompán Bridge.

Additionally, following review of the topographical survey information and consultation with Transport Infrastructure Ireland (TII) and Irish Rail, it is clear that to achieve a sufficient ramp length on the northern approach, the main crossing location would be very similar to that of alignment option 2. In this case, there would not be an obvious advantage in terms of cost, buildability, statutory consents or desire lines for proceeding with alignment option 1 over alignment option 2. Therefore, alignment option 1 was not considered further.

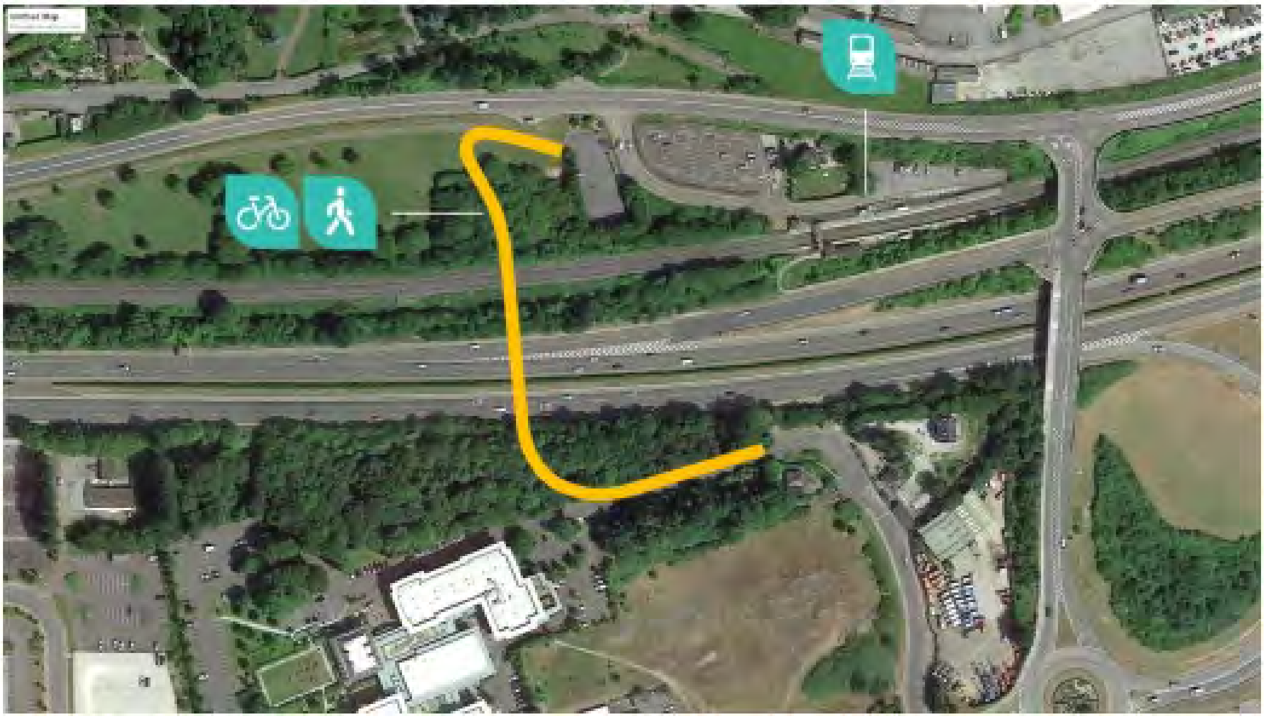
Image 3.2: Bridge alignment option 1

### 3.5.2 Bridge alignment option 2

Alignment option 2 moves further west from the Little Island train station. However, the landing point of the bridge is towards the hub of Eastgate Business Park. Due to the required length of ramps, the northern approach ramp still lands close to the Little Island train station. The key considerations of this option have been outlined below.

The overall structure length is approximately 350m.

**Advantages:**

- Landing points link Little Island train station to Eastgate Business Park, providing a better desire line;
- Has been positioned so as not to affect gantry sight lines i.e., does not require gantries to be moved;
- Shorter sections of straight ramps may aid in slowing cyclist speeds;
- Shortest overall structure length. Lower structure relative to option 1 over N25. Avoids rising section of N25 off ramp. Can potentially utilise higher length of cheaper embankment on southern approach;
- Least interference with internal Eastgate Business Park roads and infrastructure. Uses currently unused wooded area for southern approach instead;
- Not expected to require gantries to be moved; and
- Provides possibility for multi modal interchange at northern landing (rail, bus, cycling and pedestrian).

**Disadvantages:**

- Tree felling and site clearance required for southern ramp. Potential habitat disturbance;
- More difficult to construct and maintain southern ramp within wooded area;
- Secondary approach ramp / embankment required between Radisson Blu Hotel carpark and Eastgate Business Park; and
- Utility diversions may be necessary.


Image 3.3: Bridge alignment option 2

### 3.5.3 Bridge alignment option 3

Alignment option 3 is the furthest west of the options from the Little Island train station. However, the landing point of the bridge is towards the hub of Eastgate Business Park. The key considerations of this option have been outlined below.

The overall structure length is approximately 390m.

**Advantages:**

- Minimises tree felling and potential habitat disturbance;
- Access for construction will be easier; and
- Lower structure relative to option 1 over N25 as avoids rising section of N25 off ramp.

**Disadvantages:**

- Long straight southern ramp due to internal road crossing. Large amount of Eastgate Business Park land taken up along existing internal road, footway and cycle tracks which would require additional Compulsory Purchase Order (CPO);
- Landing points connect Eastgate Business Park to Little Island train station. However, the base of the northern ramp is approximately 170m from the station car park. This would lead to poorer connectivity;
- Located within gantry sight lines. Will likely need to relocate the cantilever gantry;
- Northern abutment and ramp close to existing Bord Gais Energy gas line. Utility diversion may be required;
- Bridge elevation obscured on eastern approach by portal gantry. Will affect aesthetics of the bridge, regardless of the bridge structural form;
- Southern ramp crossing Uisce Eireann premises which is currently in operation; and
- Straight ramps sections encourage faster cycling speeds.

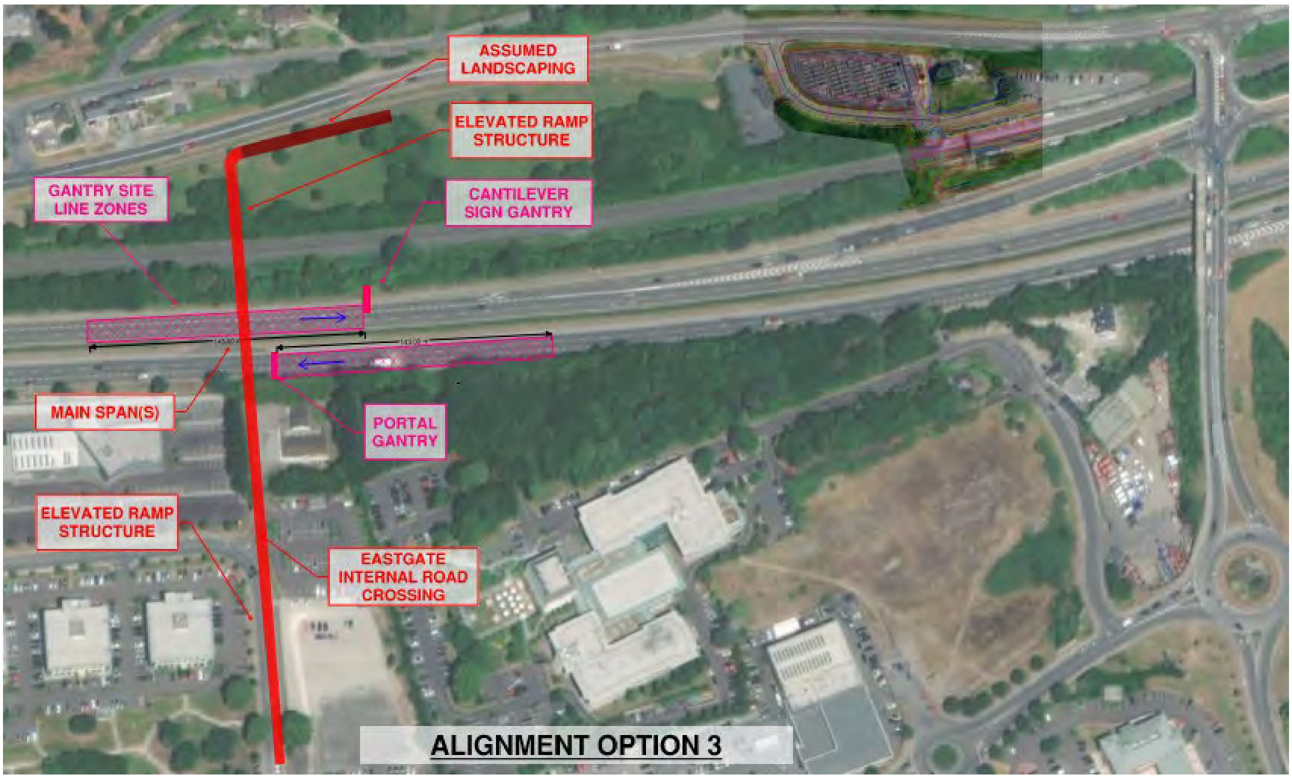


**Image 3.4: Bridge alignment option 3**

### 3.5.4 Preferred bridge alignment

Based on the assessments carried out in the feasibility report and the options selection report / structures options report, alignment option 2 (refer to **Image 3.3**) was taken forward as the preferred alignment option for consideration of bridge structural options. The primary distinguishing factors which lead to the selection of alignment option 2 are summarised below.

- This option presents the most direct route of options considered along the primary desire line from Little Island train station to Eastgate Business Park;
- The southern tie in of this option services the largest working population as per the Little Island Sustainable Transport Improvements Planning Report. This option also services the Radisson Blu Hotel directly through the intermediate landing near the existing car park area;
- This option is placed at the bottom of the east bound off ramp to minimise the vertical elevation of the bridge, while achieving the required clearances to the N25. This has an impact on minimising the length of ramping and the overall environmental impact on the area;
- This option minimises disruption to existing developments, for example the Uisce Eireann building to the south of the N25. It also allows for tie in on the north and south which do not cross other roads, thereby minimising the overall ramp length;
- This option can tie in with proposed LISTI works in the Eastgate Business Park without disrupting current proposals; and
- This option provides sufficient distance to the east of the existing TII Variable Message Signs (VMS) gantries to ensure adequate recognition time of the existing portal gantry signage on the westbound approach.

All alignments options were considered for their environmental constraints and effects. All alignments were in a relatively small study area and were located a similar distance from environmental receptors. They also generally crossed the same obstacles, and all had effects on tree removal, in particular. All options were greater than 100m in length and therefore required the preparation and submission of an EIAR. This has been noted with further detail provided in the options selection report / structures options report as **Appendix 3.2** in **Volume 4** of this EIAR.

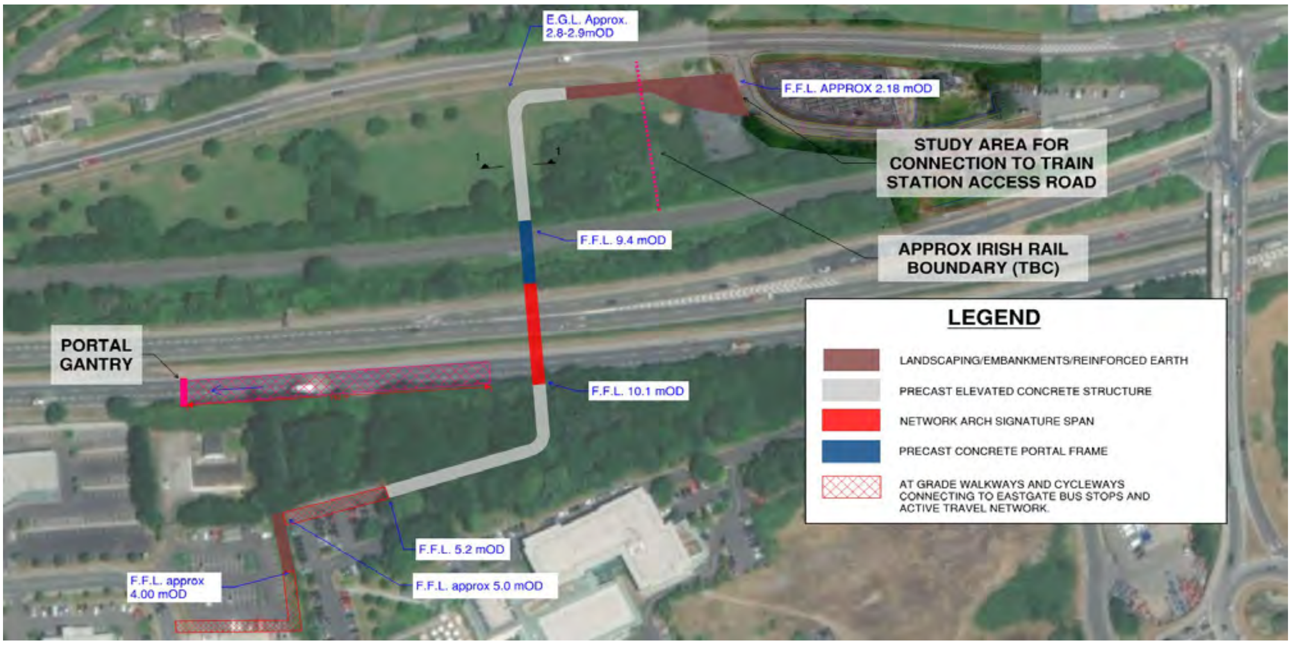


Image 3.5: Preferred alignment. Design for consideration further developed in planning drawings.

## 3.6 Structural Options for Bridge over Irish Rail Line and N25

Three potential bridge structure options over the N25 and Irish Rail line have been considered. The evaluation of options is limited to these spans only with the approach spans considered separately. A significant constraint is the constructability of the bridge and the need to construct the bridge quickly to avoid major traffic disruption. As a result, all options considered for the N25 bridge are assumed to be constructed off-site and installed over a weekend overnight road closure. The following bridge options were assessed in the structures options report (refer to **Appendix 3.2** in **Volume 4** of this EIAR) to identify the preferred option.

### 3.6.1 Bridge option 1 – single span steel through truss

Structural option 1 consists of a single span steel through truss structure crossing both the N25 and the Irish Rail line in a single span. The structure, shown in **Image 3.6**, is an arched steel Howe truss structure. The span of this structure will be approximately 82m. **Image 3.7** gives an indicative example of a similar structure, while **Image 3.8** gives an indicative example of a similar structure with a higher aesthetic quality.

Foundations for this option will be set back from the highway on the south of the N25 and to the north of the Irish Rail track. Foundations are anticipated to be of reinforced concrete piled construction.

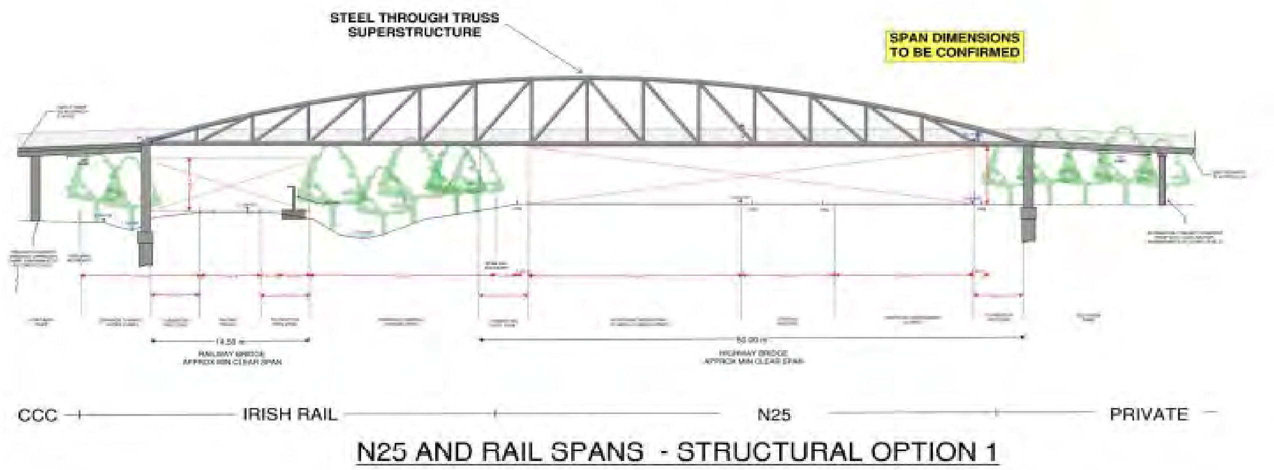


Image 3.6: Structural option 1 indicative elevation with N25 span, Irish Rail span start of approach ramps

Image 3.7: Example of through truss pedestrian and cycle bridge

### 3.6.2 Bridge option 2 – two span steel through truss

Structural option 2 consists of a 2-span steel through truss structure crossing the N25 and the Irish Rail line in separate spans. The structures shown in **Image 3.8** are arched steel Howe truss structures. The spans of these structures will be approximately 50m (N25) and 30m (Irish Rail).

Foundations for this option will be set back from the highway on both sides and to the north of the Irish Rail track. Foundations are anticipated to be of reinforced concrete piled construction.

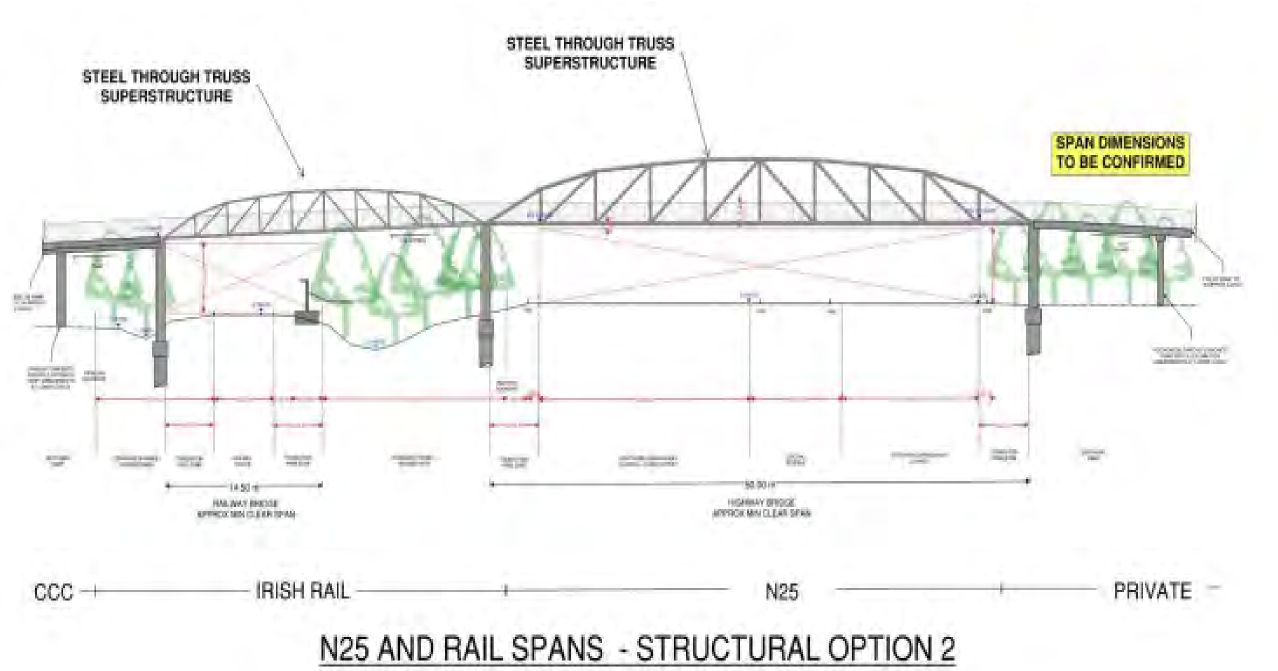


Image 3.8: Structural option 2 indicative elevation with N25 span, Irish Rail span start of approach ramps

Image 3.9: Example of multi span through truss footbridge structure

Image 3.10: Example of shorter span steel through truss over road

### 3.6.3 Bridge option 3 – steel network arch N25 span with reinforced concrete portal frame over rail

Structural option 3 consists of a single span steel network arch structure over the N25 and a 2-span precast segmental portal frame structure over the Irish Rail track and adjacent land to the south. The spans of these structures will be approximately 49m (N25) and 2x15m (Irish Rail).

Foundations for the N25 structure will be set back from the highway on both sides and are expected to be of reinforced concrete piled construction. Foundations for the portal frame structures are proposed to be within the Irish Rail land, as shown in **Image 3.11**.

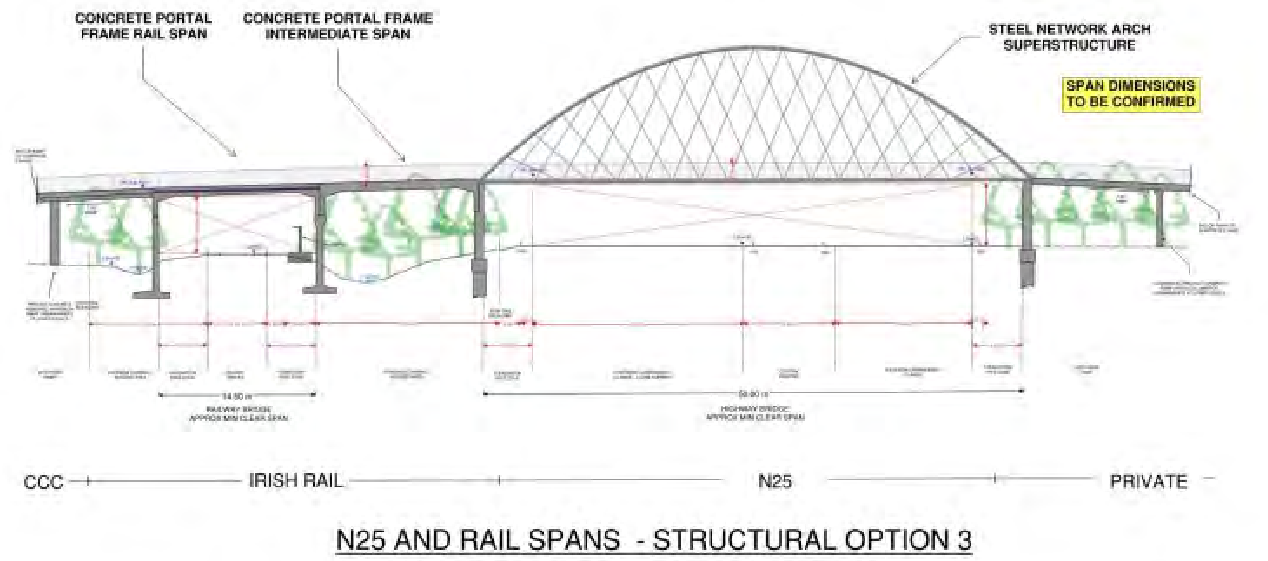


**Image 3.11: Structural option 3 indicative elevation with N25 span, Irish Rail span, and start of approach ramps**

**Image 3.12: Example of steel network arch pedestrian and cycle bridge with concrete deck**

**Image 3.13: Example of segmental precast reinforced concrete porta frame structure over rail**

### 3.6.4 Conclusions on bridge options

Based on the multi criteria assessment contained within the options selection report / structures options report, structural option 3 emerged as the preferred structural option for this bridge. This option consists of a steel network arch structure with a concrete deck over the N25, and segmental precast concrete portal frame structures over the Irish Rail line. It is anticipated that foundations will be of piled construction.

The bridge deck will have an effective width of 5m, as outlined in the alignment and width options assessment (refer to **Appendix 3.2** in **Volume 4** of this EIAR). The structural width will be approximately 6m to allow for parapets and fixings.

A multi criteria assessment (MCA) is presented in the options selection report / structures options report (refer to **Appendix 3.2** in **Volume 4** of this EIAR) which aided with the selection of the preferred structural form. From an environmental assessment perspective, as all structural options were assessed on the preferred alignment, there were no major distinctions between the structural forms considered and the bridge structural options scored neutral in the MCA with regard to environmental constraints.

Further details on the proposed design are provided in **Chapter 4**, *Description of the Proposed Development*.

## 3.7 Structural Options for Approach Ramp Structures

Due to the requirements for adequate clearance over the N25 and the Irish Rail line, and the required gradient for approach ramps, ramp structures for this crossing will be significant. A ramp gradient of 1 in 22 is proposed. This leads to elevated ramped approaches to reach the existing ground level of approximately 160m to the north and 130m to the south, in addition to lengths of at grade walkways / cycleways to tie in to end points of the crossing at Little Island train station and Eastgate Business Park.

Ramp structures will consist of a combination of elevated structure, embankments, landscaping and at grade sections. The following sections outline feasible structural forms considered for elevated sections of the approach ramps. Ramped structures are considered independently to the main crossings of the N25 and Irish Rail line as the considerations and constraints differ.

The northern elevated ramp section will be a prominent feature and visible from the underside by users of the northern park amenity area, the adjacent road and the Dunkettle to Carrigtwohill pedestrian and cycle route. Therefore, the aesthetic quality of this structure from deck level and from below should be considered strongly. By comparison, the southern elevated ramp section will travel through a heavily wooded area that is not currently accessible by the public. For this structure, the importance is more so on the user experience from the deck, rather than from the underside. This gives opportunities for a more economic structure to be used in this section.

For the north approach ramp, it is proposed that the lower ramp section is to be an embankment. This is consistent with recommendations in the TII Standard TII-STR-03005 Design Criteria for Footbridges (TII, 2004) to avoid confined crawl spaces under elevated structures.

The southern ramp section between the Radisson Blu Hotel car park and the N25 bridge tie in is proposed as an elevated structure due to the fall off in levels to the north and east of the Radisson Blu Hotel car park. A retained embankment is also proposed on the west side tie into the Radisson Blu Hotel car park.

### 3.7.1 Elevated ramp structure option 1: steel elevated ramp

This option considers the use of a steel elevated ramp structure. Steelwork can easily achieve the required span lengths for the approach ramps in a relatively lightweight form. This has advantages for construction and lifting of components. Steelwork sections can also come prefabricated with parapets included prior to being lifted into place and generally require less on-site construction works.

As there are no specific headroom requirements under the elevated ramp sections, the main structural elements can be placed under the deck, allowing for a more open parapet / edge of the structure for the user in comparison to a truss. For this reason, two structural forms are considered for this option; namely, a spine beam structure with single piers for the northern elevated ramp section and a more economical edge beam design with two column piers and crossheads for the southern ramp sections.

Refer to **Image 3.14** for indicative cross sections of both structural forms. Both options would allow for a consistent deck aesthetic for the user.

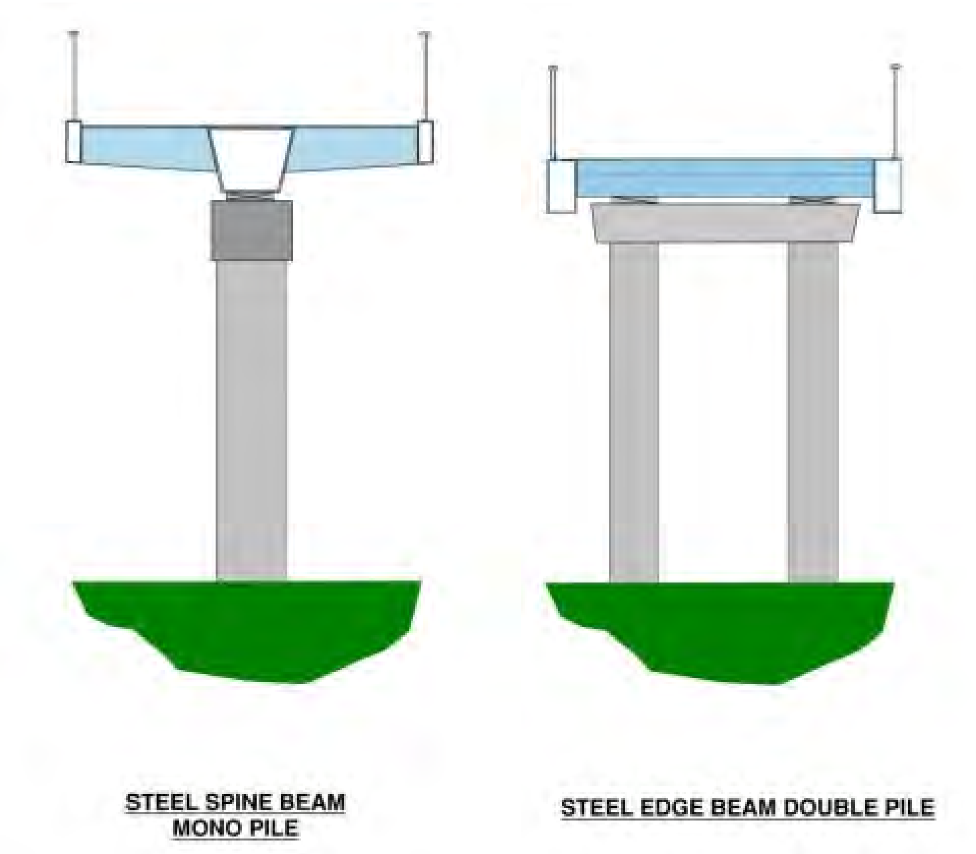


Image 3.14: Indicative cross sections of steel elevated ramp structural forms

Image 3.15: Example of steel elevated ramp / cycleway structure with spine beam and monopiles / columns

Image 3.16: Steel edge beam bridge

### 3.7.2 Elevated ramp structure option 2: concrete structure

This option considers the use of a concrete spans. Precast concrete systems are widely available in Ireland and can easily reach the spans required. They are also extremely durable once constructed and require very low or no maintenance over their required design life of 120 years.

As there are no specific headroom requirements under the elevated ramp sections, the main structural elements can be placed under the deck, allowing for a more open parapet / edge of the structure for the user. For this reason, two structural forms are considered for this option; namely, a bespoke concrete structure with single piers for the northern elevated ramp section and a more economical precast prestressed bridge beam bridge design with 2 column piers and crossheads for the southern ramp sections.

Precast bridge beams such as MY bridge beams are available in single beams with spans of 15-25m, leading to flexibility in design and construction. Once placed on the southern ramp structure, works on the in-situ deck section are possible from the deck. Where access is easier in the northern park amenity area, a more bespoke architectural design is possible. Major strides have also been made in concrete mixes which allow for lower carbon forms of concrete to be used which can reduce the overall carbon footprint of the structure. Refer to **Image 3.17** for indicative cross sections of both structural forms. Both options would allow for a consistent deck aesthetic for the user.

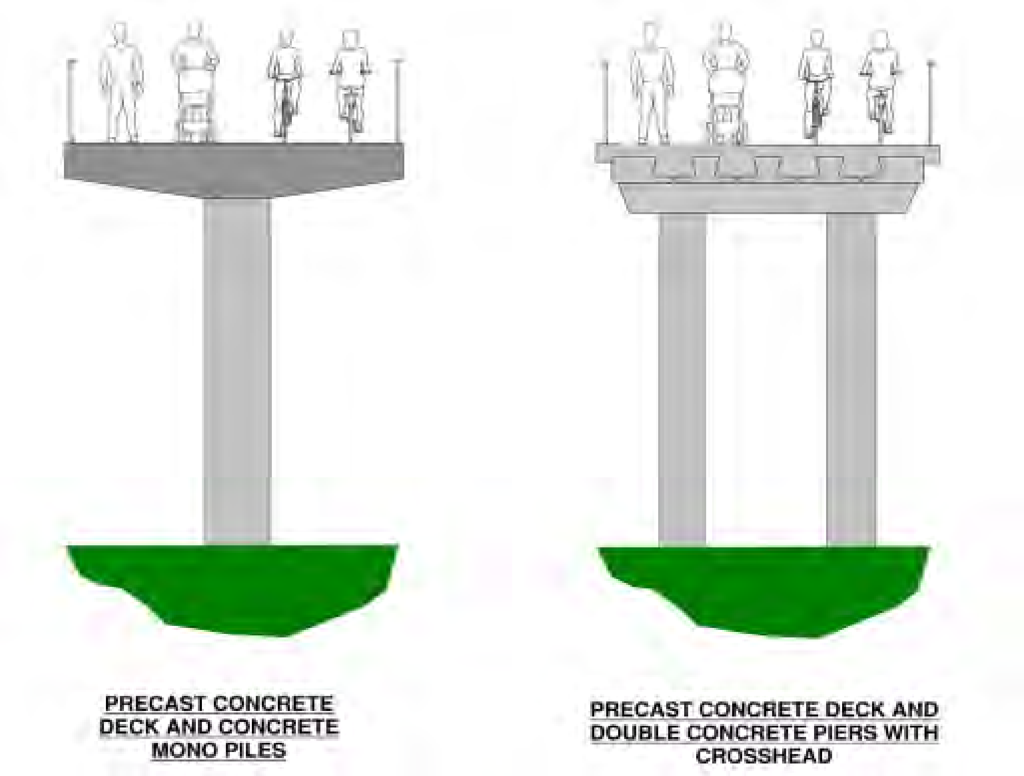


**Image 3.17: Indicative cross section for reinforced concrete structural forms for elevated ramp structure**

**Image 3.18: Example of reinforced concrete elevated ramp structure with monopiles / columns (northern approach ramp)**

**Image 3.19: Economical precast prestressed concrete bridge beam option for approach ramp elevated structure (southern approach ramp)**

### 3.7.3 Conclusions on approach ramp structural form

Considering the technical, economic, aesthetic, durability and maintenance, hydraulic, environmental and safety assessment criteria, the preferred approach ramp option was determined to be option 2 – precast prestressed concrete ramps. This option was proposed primarily to provide an economic, low maintenance and durable structures, given the location of the approach ramps close to the ocean and within a moist and vegetated wooded environment.

A MCA is presented in the options selection report / structures options report (refer to **Appendix 3.2** in **Volume 4** of this EIAR) which aided with the selection of the preferred structural form. From an environmental assessment perspective, as all structural options were assessed on the preferred alignment, there were no major distinctions between the structural forms considered other than the reduced maintenance requirements for concrete construction over the lifetime of the structure, which would lead to reduced access requirements into the wooded areas.

## 3.8 Conclusion

The emerging preferred option for the proposed bridge was selected following an evaluation of potential constraints. Bridge types were analysed through early screening processes (stage 1 options assessment) to reduce the number of feasible options.

The process of choosing the preferred alignment and layout from the chosen bridge type was an iterative process, whereby technical, economic, aesthetic, durability and maintenance, hydraulic, environmental, health and safety, construction and buildability were all comprehensively evaluated. Inputs were received from environmental specialists, project team workshops and stakeholder commentary. The process focused on minimising effects on stakeholders and the environment and refining the layout in order to improve pedestrian and cyclist flows. It also considered the technical requirements of providing a durable, economical, efficient and appealing structure to ensure the design would meet its service life requirements and encourage the modal shift to public and active travel modes.

Finally, through further optimisation and mitigation and avoidance of effects, the preferred bridge option, alignment, ramps and structure were determined, as set out in this chapter.

The preferred options and a full overview of the Proposed Development is provided in **Chapter 4**, *Description of the Proposed Development.*

## 3.9 References


CCC (2018). Little Island Transportation Study – Final Strategy Development Report.

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NTA (2020). Project Approval Guidelines.

TII (2004). Design Criteria for Footbridges. TII-STR-03005.

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## Chapter 04

# Description of the Proposed Development

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# 4. Description of the Proposed Development

## 4.1 Introduction

This chapter provides a description of the site of the Proposed Development, neighbouring land uses and activities, and includes an overview of the main features of the Proposed Development. The Proposed Development will enhance sustainable transport and active transport between Little Island train station, the Dunkettle to Carrigtwohill pedestrian and cycle route and surrounds and the Eastgate Business Park and Little Island surrounding area.

Construction aspects associated with the Proposed Development are described separately in **Chapter 5**, *Construction Strategy*.

The description of the Proposed Development is supported by a series of drawings (listed in **Table 4.1**), which are contained in **Volume 3** of this EIAR, and these should be read in conjunction with this chapter.

**Table 4.1: List of relevant drawings**

| Drawing Reference Number | Description |
|---|---|
| LIPB-ARUP-ZZ-XX-DR-CB-0003 | Proposed Site Layout |
| LIPB-ARUP-ZZ-XX-DR-CB-0004 | Bridge Elevation and Sections – Sheet 1 |
| LIPB-ARUP-ZZ-XX-DR-CB-0005 | Bridge Elevation and Sections – Sheet 2 |
| LIPB-BSM-ZZ-XX-DR-L-0001 | Landscape Masterplan |
| LIPB-BSM-ZZ-XX-DR-L-0002 | Landscape Sections |

## 4.2 Site Description

The site of the Proposed Development is located in Little Island, Co. Cork, approximately 10km to the east of Cork City. The Proposed Development is a pedestrian and cyclist bridge that will function as an active travel link for pedestrian and cyclists to travel from the Little Island Train station and the Dunkettle to Carrigtwohill pedestrian and cycle route and surrounds to the Eastgate Business Park and further surrounds of Little Island.

Refer to **Image 4.1** for a site location map.

An extract of the site layout for the Proposed Development is presented in **Image 4.2**.


Image 4.1: Site location. Not to scale. Source: OpenStreetMap. Not to scale.

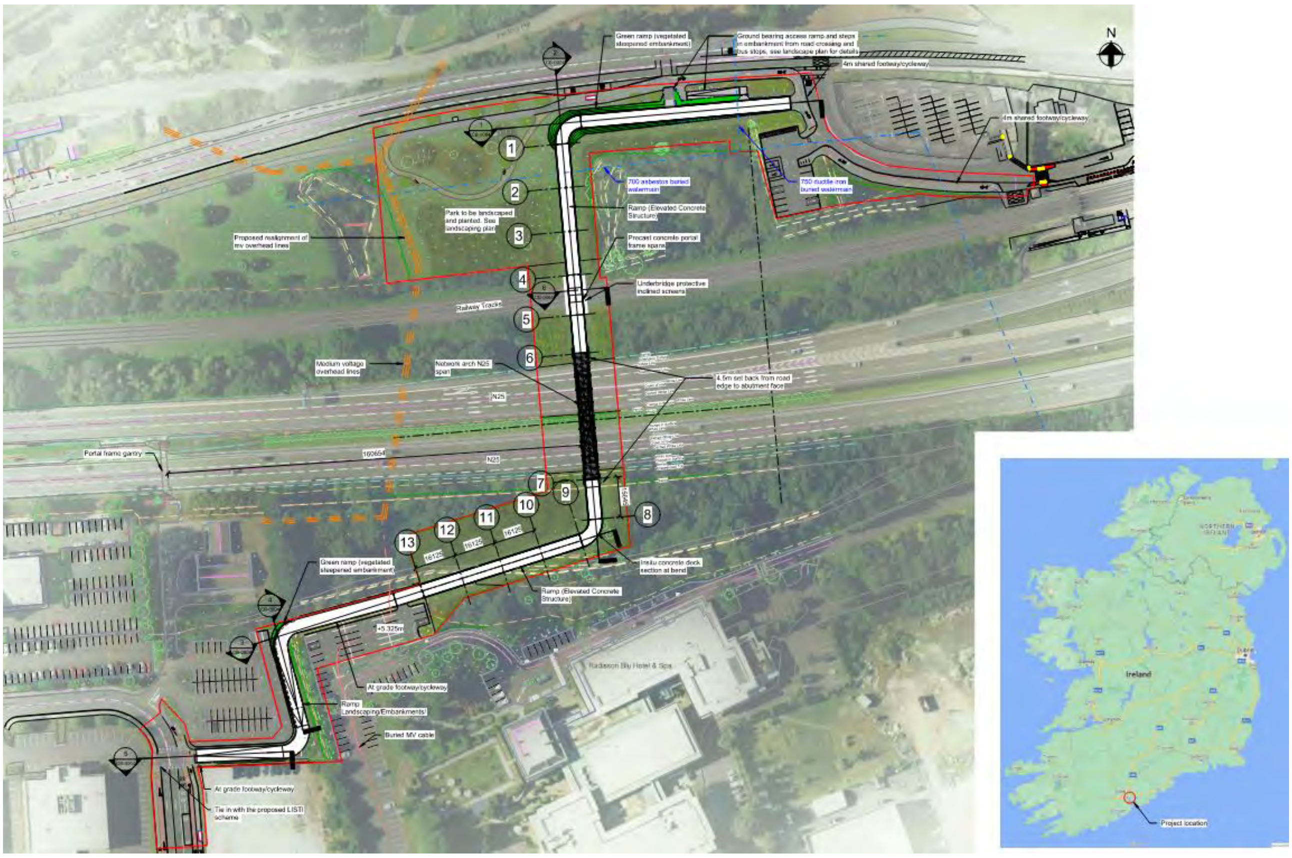


Image 4.2: Site layout map. Not to scale. Extract from site layout plan drawing – refer to Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0003 in Volume 3 of this EIAR.

## 4.3 Neighbouring Land Uses

The site of the Proposed Development is bounded by the L3004 Glounthaune Road to the north and the Eastgate Business Park to the south. The Proposed Development will cross the following areas from north to south:

- Northern amenity park area;
- Cork City to Midleton / Cobh Irish Rail line;
- N25 national road dual carriageway;
- Wooded area, south of the N25; and
- Radisson Blu Hotel and Eastgate Business Park car parks.

Refer to **Image 4.3** for a map illustrating the neighbouring land uses.

The Proposed Development will connect with the following elements of active and public transport infrastructure:

- Little Island train station;
- Dunkettle to Carrigtwohill pedestrian and cycle route;
- New bus stops on the L3004 Glounthaune Road;
- Improved pedestrian footpath and cycle path infrastructure within Little Island. These are being developed as part of the Little Island Sustainable Transport Interventions (LISTI) project being delivered by Cork County Council (CCC);
- Bus stops within the Eastgate Business Park; and
- Pedestrian and cycle access to the Radisson Blu Hotel.

Refer to **Image 4.4** for a graphic illustrating the approximate locations of the images following in this section.

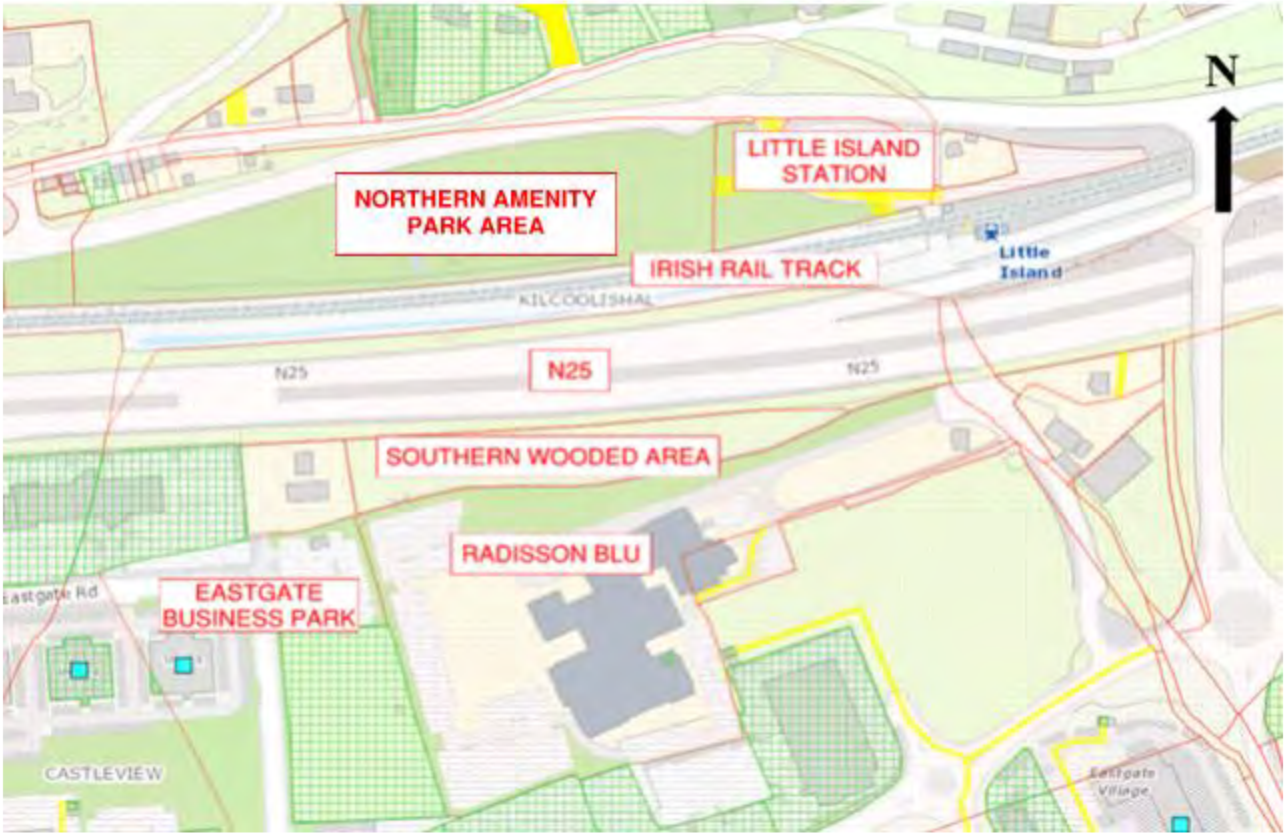


Image 4.3: Neighbouring land uses. Not to scale.

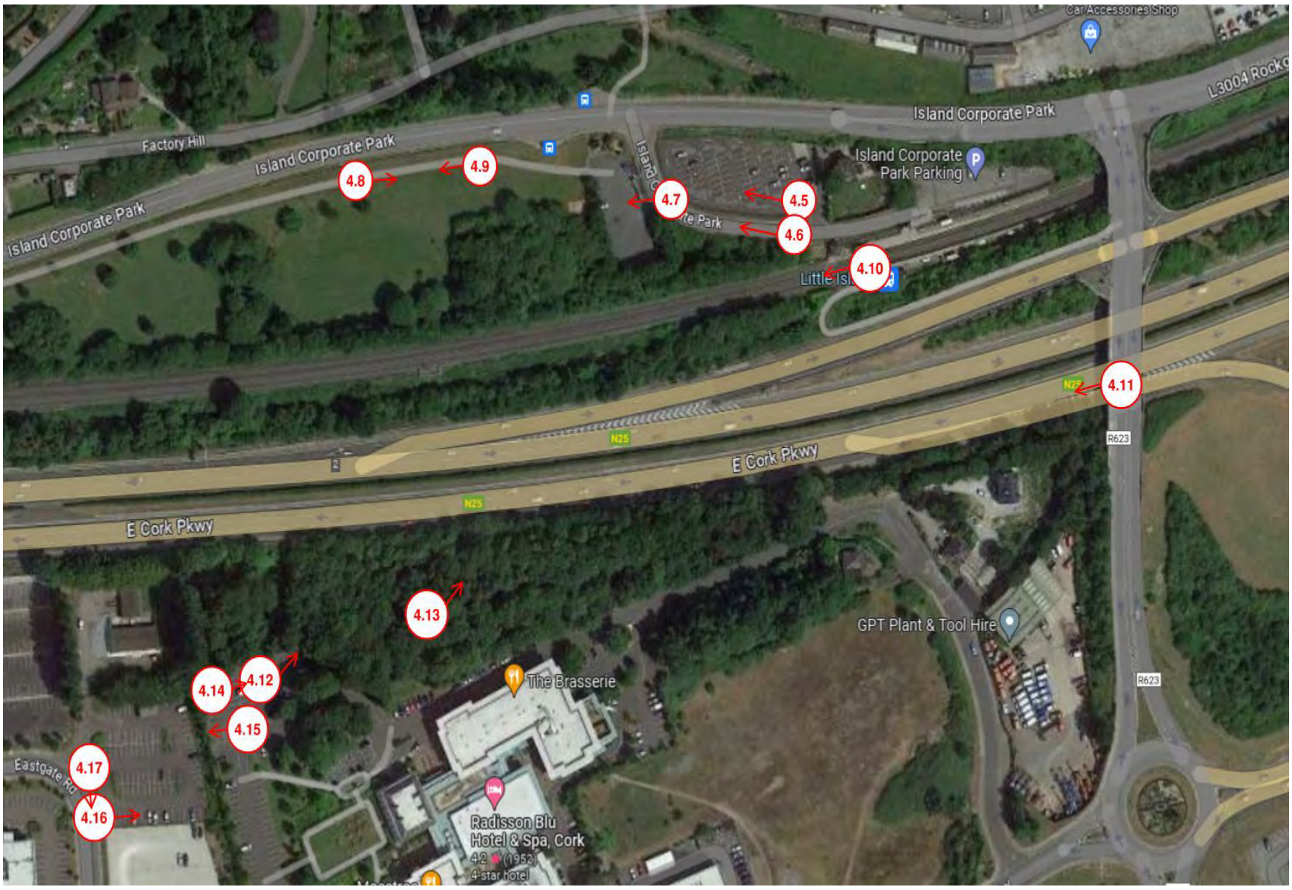


Image 4.4: Approximate site image locations (Image 4.5 to Image 4.17, below)

### 4.3.1 Little Island train station area

The Little Island train station area is located to the northeast of the Proposed Development site. Irish Rail lands encompass the Irish Rail train station, access road, car park and a car park currently being used as a recycling depot. Refer to **Image 4.5, Image 4.6** and **Image 4.7**. Works in this area include the end sections of the northern ramp embankment and link footway / cycleways to connect to the Little Island train station and the Dunkettle to Carrigtwohill pedestrian and cycle route.

**Image 4.5: Little Island station car park - looking west**

**Image 4.6: Little Island train station approach - looking west**


**Image 4.7: Entrance to car park adjacent to north amenity park**

### 4.3.2 Northern amenity park area

The northern amenity park area, located at the north of the Proposed Development site, between the L3004 Glounthaune Road and the Irish Rail tracks, is a parkland amenity area bounded by trees that mostly comprises grassed areas. Refer to **Image 4.8** and **Image 4.9**. Works proposed in this area include the ramped embankment, elevated ramped structure, link footpaths and landscaping.

Image 4.8: Northern amenity park area - looking east

Image 4.9: Northern amenity park area - looking west

### 4.3.3 Irish Rail track area

**Image 4.10** illustrates the twin track Irish Rail tracks to the west of Little Island train station. The track area is approximately 5.5m wide. However, the Irish Rail land surrounding the tracks extends to the northern amenity park area to the north and the boundary with the N25 highway to the south. The overall width of Irish Rail land is approximately 35m. At the location of the proposed crossing over the rail line there is an existing signal which will be spanned over.

**Image 4.10: Irish Rail tracks – looking west from Little Island station**

### 4.3.4 N25 dual carriageway

The N25 dual carriageway running from the Dunkettle junction to Little Island N25 junction 2 at the location of the Proposed Development is illustrated in **Image 4.11**. The proposed crossing location is at the end of the eastbound off ramp, as illustrated on the right of **Image 4.11**. The width of the N25 construction boundary is approximately 50m at the location of the proposed crossing.

**Image 4.11: N25 dual carriageway – looking west from junction 2 overbridge**

### 4.3.5 Southern wooded area

**Image 4.12** illustrates the entry location of the proposed southern elevated ramp section into the southern wooded area from the Radisson Blu Hotel car park. **Image 4.13** illustrates the dense vegetation and the mesh link fence delineating the boundary between the Radisson Blu Hotel land and other private lands.

Image 4.12: Southern wooded area – looking east from Radisson Blu Hotel car park

Image 4.13: Southern wooded area, illustrating dense vegetation and mesh link fence

### 4.3.6 Radisson Blu Hotel car park

**Image 4.14** illustrates the Radisson Blu Hotel car park. The image is taken looking east from the northwest corner of the car park. Immediately behind the fence to the north of the car park (to the left of **Image 4.14**) is a steep drop off in level into the wooded area behind, with a slope of approximately 1 in 1. To the west side of this car park, there is a line of trees and vegetation which is proposed to be maintained, with the exception of some trees to be cleared on the footway / cycleway alignment.

Image 4.14: Radisson Blu Hotel car park – looking east along proposed alignment

Image 4.15: Tree and vegetation screening on west side of Radisson Blu Hotel car park

### 4.3.7 Eastgate Business Park car park

The final southern section of  the crossing is proposed to travel through the Eastgate Business Park car park, illustrated in **Image 4.16**, and tie in to the proposed Little Island Sustainable Transport Interventions (LISTI) scheme at the location illustrated in **Image 4.17**. At this location, the footway / cycleway will connect to the wider active travel and public transport infrastructure within Little Island. There is a level difference of approximately 1m between the Eastgate Business Park car park and the Radisson Blu Hotel car park.

**Image 4.16: East gate business park car park at tie in, looking east**

**Image 4.17: Tie in to LISTI scheme, looking south**

## 4.4 Main Features of the Proposed Development

### 4.4.1 Overview

The Proposed Development will consist of a new pedestrian and cyclist bridge that encompasses a segregated footway and cycleway that will be 5m wide (3m two-way cycleway and 2m footway), connecting the Little Island train station and the Dunkettle to Carrigtwohill pedestrian and cycle route with the Radisson Blu Hotel, Eastgate Business Park and the wider surrounds of Little Island. The main elements that will be crossed by the Proposed Development are outlined in Section 4.3. The proposed crossing will be approximately 460m long and will consist of a combination of different structural forms as follows:

- Northern approach ramp: combination of earthen embankment and elevated ramp structure;
- Irish Rail span: concrete portal frame structures;
- N25 span: steel network arch structure; and
- South approach ramp: combination of elevated ramp structure, at grade sections and earthen embankment.

Refer also to the planning drawings in **Volume 3** of this EIAR for further information.

It should be noted that where more than one potential design option has been identified in the sections below, the reasonable worst-case option from an environmental perspective has been assessed throughout this EIAR.

### 4.4.2 Main bridge spans

The proposed main bridge spans (crossing the N25 and Irish Rail line) consist of a single span steel network arch structure over the N25 and a 2-span precast segmental portal frame structure over the Irish Rail track and adjacent land to the south. The spans of these structures will be approximately 49m (N25) and 2x15m (Irish Rail line). **Image 4.18** and **Image 4.19** are included for illustrative purposes and show examples of similar types of structural forms to those proposed in Little Island.

Foundations for the N25 structure will be set back from the highway on both sides and are expected to be of reinforced concrete piled construction. Foundations for the portal frame structures are proposed to be within the Irish Rail land as illustrated in **Image 4.3**. Foundations for the portal frame structure are yet to be defined but may be shallow foundations or reinforced concrete piled foundations. However, for the purpose of the EIAR and to ensure that a reasonable worst-case has been assessed, it is assumed that reinforced concrete piled foundations will be used.

The N25 span is required to provide a clearance envelope of a minimum of 5.7m to the underside of the structure from the carriageway. The Irish Rail spans are required to provide a clearance height of a minimum of 5.3m to the underside of the structure from the top of the rail level. The elevation of the N25 span, Irish Rail span and the start of approach ramps is illustrated in Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0004 and Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0005 in **Volume 3** of this EIAR.

**Image 4.18: Example of steel network arch pedestrian and cycle bridge with concrete deck**

**Image 4.19: Example of segmental precast reinforced concrete porta frame structure over rail**

### 4.4.3 Ramped approaches

Due to the need for adequate clearance over the N25 and the Irish rail track, as well as the required gradient for approach ramps, the ramp structures for this crossing will be sizeable in scale. A maximum ramp gradient of 1 in 22 is proposed. Ramped approaches will be approximately 160m long to the north and 120m long to the south (made up of two separate ramped sections). In addition to the ramp sections, lengths of at grade walkways / cycleways are proposed to tie in to end points of the crossing at the Little Island train station and the Eastgate Business Park.

The ramp structures will consist of a combination of elevated structures, embankments, landscaping and at grade sections. The southern ramp section between the Radisson Blu Hotel car park and the N25 bridge tie in will be an elevated structure due to the fall off in level to the north and east of the Radisson Blu Hotel car park. An earthen embankment is also proposed on the west side tie into the Radisson Blu Hotel car park due to the level difference. For details of proposed makeup of approach ramps, refer to Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0004 and Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0005 in **Volume 3** of this EIAR.

Both elevated ramp structures will use reinforced concrete spans. For the north elevated ramp, a bespoke concrete structure with single piers is proposed. For the southern elevated ramp structure, a precast prestressed bridge beam bridge design with two column piers and crossheads is proposed.

Precast bridge beams such as MY bridge beams are available in single beams with spans of 15-25m, leading to flexibility in design and construction. Once placed on the southern ramp structure, works on the in-situ deck section will be possible from the deck.

Refer to **Image 4.20** for indicative cross sections of both structural forms. **Image 4.21** shows an example of reinforced concrete elevated ramp structure with monopiles / columns (as proposed for the northern approach ramp). **Image 4.22** shows examples of precast prestressed concrete bridge beams for approach ramp elevated structure (as proposed for the southern approach ramp).

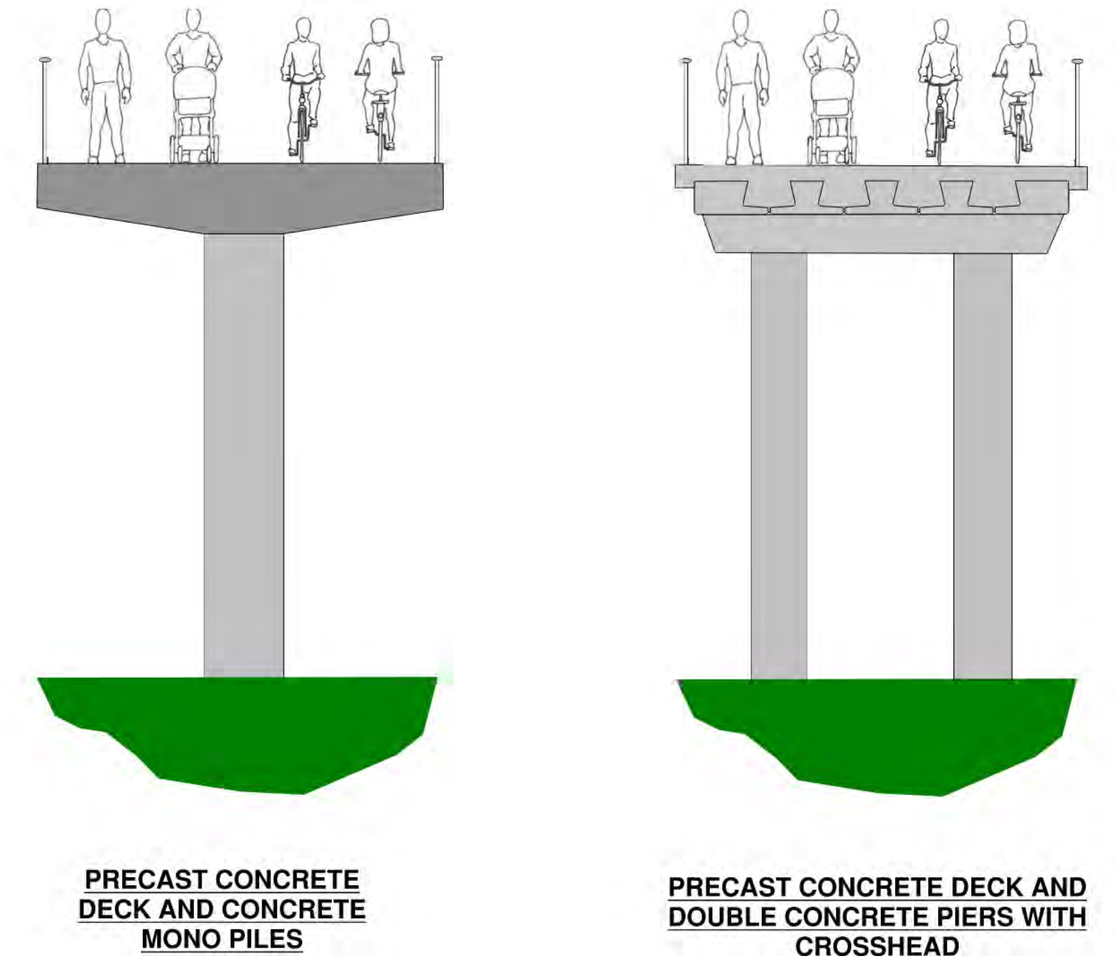


Image 4.20: Indicative cross section for reinforced concrete structural forms for elevated ramp structure

Image 4.21: Example of reinforced concrete elevated ramp structure with monopiles / columns (as proposed for the northern approach ramp)

Image 4.22: Precast prestressed concrete bridge beams for approach ramp elevated structure (as proposed for the southern approach ramp)

Ramp embankments are proposed to consist of steepened slope reinforced earth embankment with a green vegetated finish. Refer to **Image 4.23** and **Image 4.24** for examples of similar forms of embankment. Some sections of embankment will have a slackened slope to allow for softening and to provide informal amenity areas within the northern amenity park area.

Image 4.23: Vegetated green wall retaining solution, prior to vegetation growth

Image 4.24: Vegetated green wall retaining solution, following vegetation growth

### 4.4.4 Parapets

Different parapet types may be utilised for the N25 span and approach ramps and steps. However, any parapet type chosen will meet the requirements of the appropriate design standards. 1.4m high parapets will be required. The parapet type to be used will be confirmed post planning in consultation with CCC, Transport Infrastructure Ireland (TII) and Irish Rail. Two types of steel parapets under consideration are post and rail with steel wire mesh infill (example shown in **Image 4.25**) and vertical post infill at closely spaced centres (example shown **Image 4.26**). The visual impact of both of these parapets is very similar with only infill differing and, as such, they are taken to have similar levels of environmental impact for assessment.

Image 4.25: Parapet type with vertical post and rail and steel mesh infill

Image 4.26: Parapet type with vertical parapet infill

For the span over the Irish Rail track, it is proposed to use the same parapet height (1.4m) and type that will be used elsewhere on the crossing. Using a consistent and open parapet across the structure with adequate levels of lighting will greatly improve the aesthetic experience for the user and help to make the bridge a safe and inviting crossing option. This will in turn encourage greater use and an increased modal shift to sustainable active travel modes.

It is acknowledged that Irish Rail overbridges typically require 1.8m high parapets with the bottom 1.2m having solid infill and the top 0.6m having mesh infill. To mitigate against the reduced height of parapet and 'open' type infill, it is proposed that an ancillary solid inclined underbridge protection screen will be used to shield users from the rail and potential future overhead electrical lines. A kicker plate will also be provided along the base of the parapet to prevent debris being kicked off the bridge.

The design approach of this underbridge screening shield is in keeping with international best practice and has been used recently on similar pedestrian and cyclist bridges in the Netherlands and Denmark. Refer to **Image 4.27** for an example of a recently completed bridge in Odense, Denmark, showing the under-bridge screens.

**Image 4.27: Example of under bridge screening on new pedestrian and cycle bridge in Odense, Denmark with 1.2m high parapets with vertical bar infill**

### 4.4.5 Foundations

Foundations for all structures, except for the embankments, are proposed to be bored reinforced concrete piles. Piling methods such as Continuous Flight Auger Piles are proposed.

### 4.4.6 Substructure

The substructures proposed for each structure type are as follows:

- North elevated ramp: pilecaps and single reinforced concrete column / pile piers;
- Irish Rail span: integral portal frames with reinforced concrete substructures on reinforced concrete piled foundations or on shallow spread foundations;
- N25 span: reinforced concrete abutments supported on reinforced concrete piled foundations; and
- South elevated ramp: two pile / column reinforced piers with reinforced concrete crossheads supported on reinforced concrete piled foundations.

### 4.4.7 Superstructure

The superstructures proposed for each structure type are as follows:

- North elevated ramp: reinforced concrete beam / slab construction. Potential for pre-stressing or post tensioning of structure subject to detailed design. In situ or precast solutions are possible and subject to detailed design;
- Irish Rail span: segmental precast concrete portal frame system with in-situ concrete deck and build up;
- N25 span: steel network arch structure with reinforced concrete or stiffened steel plate deck, subject to detailed design;
- South elevated ramp: precast, pre-stressed concrete beam construction with in-situ reinforced concrete infill. MY bridge beams or similar.

### 4.4.8 Materials

The primary construction materials to be used for the structure will be:

- In situ reinforced concrete piles, pilecaps, substructures and superstructures;
- Precast concrete superstructure elements;
- Reinforced earth embankments with vegetated green finish;
- Structural steel for network arch structure. This will be painted steel or weathering steel, which will be confirmed at detailed design stage with consideration of the chloride content of the local environment; and
- Painted steel or stainless-steel parapets.

### 4.4.9 Deck surfacing

Bridge deck surfacing will typically comprise an approved combined anti slip and bridge deck waterproofing system. This is typical for a steel bridge deck. Concrete components may use the same system or alternatively, asphalt surfacing.

The two-way cycleway will be visually segregated from the footway.

### 4.4.10 Drainage

Subsurface drainage will be implemented in accordance with DN-STR-03012 (TII, 2016). It is proposed that bridge run off will tie into existing drainage networks in the area.

### 4.4.11 Lighting

Lighting of the proposed structure and embankments will be integrated into the parapets. Lighting will be directional, anti-glare and functional to avoid light spill off the structure, while maintaining a safe feel for users. Lighting will be designed to be inspected and maintained from the structure's deck and will not interfere with the adjacent woodland or stream areas. For approach footways / cycleways off the structures and embankments where no parapets are required, lighting will be provided from lighting poles where existing lighting sources are not adequate.

Refer to **Image 4.28** for an example of lighting typology to be used.

**Image 4.28: Example of safety lighting on Mary Elmes footbridge, Cork City**

### 4.4.12 Bridge furniture

Bollards will be provided at bridge entry and exit points to prevent vehicles entering onto the structure. Cycle racks are proposed to be provided at the northeast landing point to the structure. New benches are proposed in the northern amenity park area. Refer to Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR for further details.

## 4.5 Services and Utilities

The following utility connections are required for the Proposed Development:

- Surface water drainage; and
- Electricity.

There is an existing electrical mini pillar at the southern end of the crossing which is anticipated to provide an electrical connection for the bridge lighting and CCTV, if required.

Surface water drainage on the bridge will be carried at surface level along the structure, with minimum gradients for drainage provided. Collection points at landings, abutments and pier locations, as required, will carry surface water to existing drainage networks.

## 4.6 Security Fencing

Mesh link fencing in the southern wooded area will be removed during the Construction Phase and replaced following the completion of the construction works within the works area.

Timber fencing along the north of the northern amenity park area will be removed during the Construction Phase. Sections of timber fencing at the proposed footpath connection will not be replaced as per the landscaping design. However, other sections will be replaced.

## 4.7 Landscaping Strategy

The landscaping strategy is described in more detail in **Chapter 8**, *Landscape and Visual*, while the landscape plan and landscape sections are presented in Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 and Drawing No. LIPB-BSM-ZZ-XX-DR-L-0002, respectively, in **Volume 3** of this EIAR.

Embankments and landscaping will be used on both the northern and southern ramp approaches.

On the southern side of the crossing, the ramp will tie into the car park directly north of the Radisson Blu Hotel. A section of embankment / retaining wall will be required between this car park and the lower Eastgate Business Park car park to the west to tie into the wider LISTI works in Eastgate Business Park.

A green, segmental, reinforced soil retaining structure such as that illustrated in **Image 4.29** and **Image 4.30** is proposed at this location as an environmentally sensitive solution and to minimise land take from the car parks. The same structural form will be used for the embankment forming part of the northern ramp approach. Side slopes on these embankments will be up to 70 degrees. However, sections of these embankments will be provided with less steep slopes to help the embankments soften into the surrounding landscape. Refer to Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0004 and Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0005 in **Volume 3** of this EIAR for further information.

The removal of trees and vegetation will be required as part of the site clearance process to facilitate the construction works. The northern amenity park area and sections of the site which have been cleared will be provided with compensatory planting to mitigate against the environmental and biodiversity loss from this clearance. Refer to **Chapter 8**, *Landscape and Visual*, Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 and Drawing No. LIPB-BSM-ZZ-XX-DR-L-0002 in **Volume 3** of this EIAR for further information.

Image 4.29: Vegetated green wall retaining solution, prior to vegetation growth

Image 4.30: Vegetated green wall retaining solution, following vegetation growth

## 4.8 Safety during Operation

A key objective of the design is to promote use and to help ensure that the crossing feels safe to use and avoids anti-social behaviour, where possible, by design. The following have been incorporated into the design:

- Adequate lighting to ensure feeling of safety for users (refer to Section 4.4.11);
- High aesthetic design to encourage footfall;
- Adequate bins to prevent littering;
- Avoidance of concealed areas, in particular in the northern amenity park area to prevent anti-social behaviour;
- High quality vandal proof parapets;
- Open parapet design to avoid bridge feeling ‘locked in’;
- Kicker plates on the N25 span to avoid falling debris onto the road below; and
- Anti-graffiti paint to allow ease of cleaning and maintenance.

Adequate edge protection will be provided to TII, Irish Rail and Euronorm standards to provide user protection.

## 4.9 Decommissioning

The design life of the proposed new pedestrian and cyclist bridge is 120 years. During the potential future decommissioning works, it is proposed that the bridge will be removed in a reverse fashion to the proposed construction sequence. Refer to **Chapter 5**, *Construction Strategy* for details on the construction sequence.

The main bridge span and approach spans will be decommissioned by cutting the concrete decking and steel spans into a number of large sections. This will be done either *in situ* or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry.

## 4.10 References

Transport Infrastructure Ireland (TII) (2016). DN-STR-03012 - Design for Durability.

# Chapter 05

# Construction Strategy

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# 5. Construction Strategy

## 5.1 Introduction

This chapter provides a description of the general activities associated with the construction of the Proposed Development. The design, operation and decommissioning of the Proposed Development are described separately in **Chapter 4**, *Description of the Proposed Development*.

This chapter of the EIAR has been prepared in accordance with Part 1 of Annex IV of the EIA Directive (2014/52/EU, amending 2011/92/EU). This section therefore provides the following information:

- Description of the construction works associated with the Proposed Development;
- Duration and phasing during the Construction Phase;
- Land use requirements to support the construction of the Proposed Development;
- Likely activities required to prepare the site and undertake the enabling works to support the construction of the Proposed Development;
- An overview of anticipated employment numbers, hours of working and construction safety measures which will be enforced during the construction of the Proposed Development; and
- An overview of typical site, materials and environmental management measures associated with the construction of the Proposed Development.

The Construction Environmental Management Plan (CEMP), which describes the minimum requirements that the Contractors will be required to implement, is provided in **Appendix 5.1** in **Volume 4** of this EIAR.

## 5.2 Overview of Proposed Development

The Proposed Development will function as an active travel link for pedestrian and cyclists to travel from the Little Island train station and surrounds to the Eastgate Business Park and the further surrounds of Little Island. It will also promote the use of sustainable public transport modes by providing a safe and attractive link for people travelling between Little Island train station and the wider Little Island area.

The Proposed Development will cross the following areas from north to south:

- Northern amenity park area;
- Cork City to Midleton / Cobh Irish Rail line;
- N25 national road dual carriageway;
- Wooded area, south of the N25; and
- Radisson Blu Hotel and Eastgate Business Park car parks.

The site is bounded by the L3004 Glounthaune Road to the north. Levels at the tie in to the Little Island train station area are approximately +2.5mOD, while levels at the at tie in to the Radisson Blu Hotel car park are approximately 5.2mOD. On the southwest of the site, there is a 1.1m drop in elevation between the Radisson Blu Hotel car park and the adjacent Eastgate Business Park car park (5.5mOD to 4.4mOD).

The proposed crossing main spans (N25 & Irish Rail) consist of a single span steel network arch structure over the N25 and a 2-span precast concrete segmental portal frame structure over the Irish Rail track and adjacent land to the south. The spans of these structures will be approximately 49m (N25) and 2x15m (Irish Rail).

Access ramps to main spans will consist of a combination of reinforced concrete elevated structures, embankments, landscaping and some at grade sections with minor cut or fill. For the northern approach ramp, the lower ramp section will be a steepened slope green embankment transitioning into a reinforced concrete elevated ramp structure for higher sections in a north / south direction. The southern access ramp section between the Radisson Blu Hotel car park and the N25 bridge tie in is proposed to be an elevated reinforced concrete structure due to the sharp fall off in level to the north and east of the Radisson Blu Hotel car park. A retained embankment is proposed on the west side tie-in to the Radisson Blu Hotel car park from the lower Eastgate Business Park car park.

For the northern elevated ramp, a bespoke architectural concrete structure with single circular piers is proposed as the public will have access below the structure. For the southern elevated ramp, a more economical precast prestressed bridge beam structure with two column piers and crossheads is proposed. Illustrative examples of the types of structures are shown in **Chapter 4**, *Description of the Proposed Development.*

## 5.3 Indicative Construction Phasing

The commencement of construction works for the Proposed Development is subject to obtaining statutory consent, funding and the relevant permits and licences.

Construction is expected to commence in 2025, with the development becoming operational in 2026.

The approach outlined in **Table 5.1** represents an indicative, reasonable scenario as to how the Proposed Development may be constructed with regards to the sequencing and duration of activities. While the general requirements detailed in this section will be followed, the contractor, when appointed, will ultimately be responsible for the sequencing and implementation of the works in a safe and secure manner and in accordance with all statutory requirements.

It should be noted that trees and vegetation will not be removed between 1st March and 31st August to avoid direct impacts on nesting birds. Tree removal will be carried out in accordance with the Arboricultural Impact Assessment report (refer to **Appendix 8.1** in **Volume 4** of this EIAR).

**Table 5.1: Indicative construction phasing for key activities**

| Activities | M 1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tender award | | | | | | | | | | | | | | | | | | |
| Bridge fabrication planning and approval | | | | | | | | | | | | | | | | | | |
| Site access, clearance and tree removal. Set up of construction compounds and construction surfacing. | | | | | | | | | | | | | | | | | | |
| Utility diversion | | | | | | | | | | | | | | | | | | |
| Bridge superstructure fabrication and precast concrete element casting (offsite) | | | | | | | | | | | | | | | | | | |
| Northern approach ramp embankment construction | | | | | | | | | | | | | | | | | | |
| Northern approach elevated ramp foundation construction (piling and substructure) | | | | | | | | | | | | | | | | | | |
| Irish Rail structures construction | | | | | | | | | | | | | | | | | | |
| Northern approach ramp elevated section deck construction | | | | | | | | | | | | | | | | | | |
| Southern approach ramp foundation construction (piling and substructure) | | | | | | | | | | | | | | | | | | |
| Southern approach ramp elevated section deck construction | | | | | | | | | | | | | | | | | | |
| N25 bridge foundation and abutment construction | | | | | | | | | | | | | | | | | | |
| N25 span assembly (offline) | | | | | | | | | | | | | | | | | | |
| N25 span erection | | | | | | | | | | | | | | | | | | |
| Ramp and bridge deck finishing (installation of lights, parapets, handrails, surfacing etc.) | | | | | | | | | | | | | | | | | | |
| Construction of southern embankment ramp | | | | | | | | | | | | | | | | | | |
| Tie in footway / cycleway construction and final landscaping / tree planting | | | | | | | | | | | | | | | | | | |

Note: M1, M2 etc. = Month 1, Month 2, etc.

## 5.4 Land Use Requirements

Construction of the Proposed Development will require temporary land take to accommodate two construction compounds, one bridge assembly area and additional on site activities.

Permanent land take is required for the construction of bridge abutments / piers and embankments in the Little Island train station area, northern amenity park area, Irish Rail tracks and adjacent land, land adjacent to the N25 (north and south), the southern woodland area, the Radisson Blu Hotel car park and the Eastgate Business Park car park.

Privately owned lands within the footprint of the Proposed Development will be acquired by Cork County Council (CCC). The private landowners that have been consulted with by CCC are:

- Irish Rail;
- Radisson Blu Hotel, Little Island;
- Private owner of land to south of N25; and
- O'Flynn Developments.

The construction footprint of the Proposed Development, including the construction compounds and bridge assembly area, is approximately 1.7 hectares. The construction footprint of the final works (excluding planting and minor tie in footpaths in the northern park amenity area) is approximately 0.3 hectares.

### 5.4.1 Construction compounds

Two construction compounds will be provided, one in the northern amenity park / Little Island train station area and one in the Radisson Blu Hotel car park area. Refer to **Image 5.1** for the locations of the proposed construction compounds. Proposed entry / exit points for the compounds and bridge assembly area are also shown.

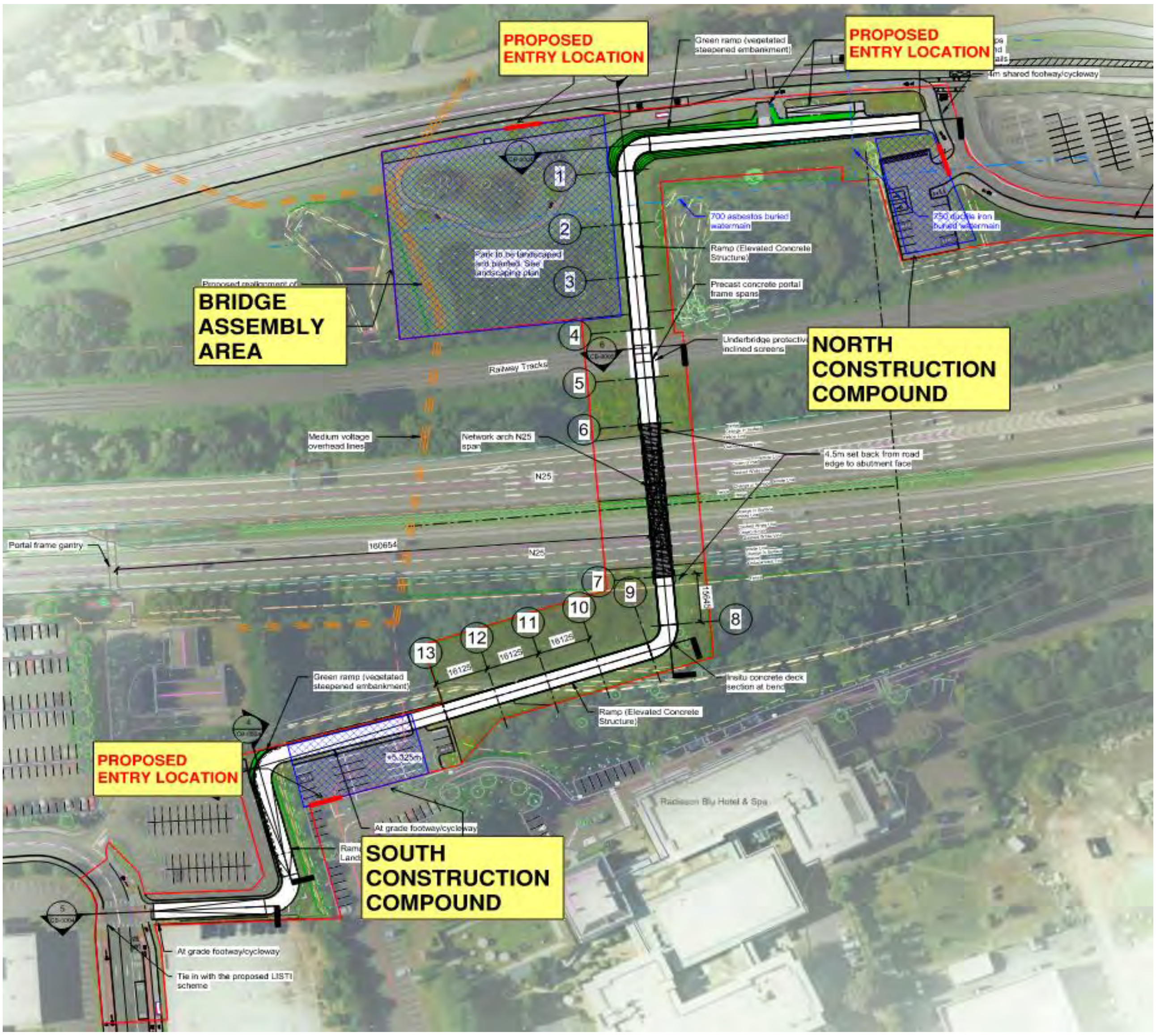


**Image 5.1: Proposed construction compounds and bridge assembly area**

Both construction compounds, the bridge assembly area and the overall site will be safely secured, and a detailed Construction Traffic Management Plan (CTMP) will be put in place by the contractor to facilitate vehicle and pedestrian diversions.

The construction compounds will provide the following:

- Space for materials lay down;
- Wheel wash facilities;
- Construction waste storage;
- Site offices;
- Electricity supplied by mains and /or an onsite generator;
- IT / telecommunication connection;
- Water supplied from the public watermain; and
- Mobile welfare facilities – either mobile welfare vans, towed units or self-contained units will be provided for construction personnel and will be fully bunded with foul sewage removed and disposed of off-site.

A designated bunded refuelling area on an impermeable surface will be provided at the construction compounds. Refuelling of vehicles will be restricted to these designated areas.

Specific controls / mitigation measures will be put in place to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase. These will be outlined in a Surface Water Management Plan (SWMP) that will be prepared and implemented by the contractor as part as part of the CEMP in advance of the commencement of the construction works.

Site drainage will be provided at the construction compounds to collect surface water runoff, which will be directed into the existing local drainage network. Surface water or contaminants within the construction compounds will not be released from the site to any waters or the bed and banks of any waters (including ground water).

Once construction works are complete, structures and facilities will be removed, with the construction compounds reinstated to their original condition.

### 5.4.2 Bridge assembly area

In addition to the construction compounds, a bridge assembly area will be required for assembly and erection works associated with the proposed N25 bridge structure, the northern elevated ramp structure and the precast segmental concrete portal frame structures over the Irish Rail line. This bridge assembly area, which will occupy a section of the northern amenity park area owned by CCC, located off the L3004 Glounthaune Road, will not be used for initial fabrication of the N25 bridge span or casting of precast concrete sections. These operations will occur off site. This area will be used for assembly of elements prior to erection.

As with the construction compounds, the bridge assembly area will be safely secured to prevent public access.

Within the bridge assembly area, the N25 bridge structure will be fully enclosed with a temporary scaffolding enclosure to allow for the assembly of the bridge, the welding of its segments together and potential paint repair of the bridge should it have become damaged in transit.

The bridge assembly area will contain all necessary functions similar to the construction compounds (e.g., bunded oil storage, welfare facilities etc).

Once the Proposed Development has been constructed, all structures and facilities will be removed, with the bridge assembly area landscaped as per the landscape plan (refer to Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR).

The location of the bridge assembly area is illustrated in **Image 5.1**.

## 5.5 Geotechnical Investigation

In order to ascertain the underlying ground conditions onsite, preliminary site investigations were carried out. The results of the site investigations are described in more detail in **Chapter 17**, *Land, Soils, Geology and Hydrogeology* of this EIAR.

## 5.6 Construction Methods

The construction of the Proposed Development will be completed using a combination of construction methods in a number of stages. Construction will be undertaken using internationally accepted methods. The likely stages of construction are as follows:

- Stage 1 – Site clearance, access and construction compounds;
- Stage 2 – Utility diversion;
- Stage 3 – Bridge fabrication;
- Stage 4 – Foundation construction;
- Stage 5 – Bridge transportation;

- Stage 6 – Bridge assembly;
- Stage 7 – Bridge erection; and
- Stage 8 – Completion of works.

It should be noted that where more than one potential construction method has been identified in the sections below, the reasonable worst-case option from an environmental perspective has been assessed throughout this EIAR.

### 5.6.1 Stage 1 – Site Clearance, access and construction compounds

A CEMP has been prepared for the Proposed Development and is included in **Appendix 5.1** in **Volume 4** of this EIAR. Prior to commencement of works, the contractor will further develop the CEMP and agree its content with CCC. Once agreed with CCC, the CEMP will be implemented and site clearance works will be carried out, with fencing also erected along the Proposed Development boundary.

Site clearance including vegetation clearance will be undertaken within the Proposed Development boundary and in accordance with the methodology outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR). Trees and vegetation will not be removed between 1st March and 31st August to avoid direct impacts on nesting birds. Tree removal will be carried out in accordance with the Arboricultural Impact Assessment report (refer to **Appendix 8.1** in **Volume 4** of this EIAR). Trees to be retained will be identified and protected to avoid accidental damage during the construction works.

Site drainage will be provided to collect surface water runoff, which will be directed into a site water treatment facility before being discharged to the local drainage network. Drainage ponds, silt traps and interceptor ditches will be constructed in advance of the main earthworks to collect, treat and discharge all surface water run off during construction. Specific controls / mitigation measures will be put in place to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase. These will be outlined in a SWMP that will be prepared and implemented by the contractor as part as part of the CEMP in advance of the commencement of the construction works.

As mentioned in **Section 5.4**, two construction compounds and one bridge assembly area will be required for the Proposed Development. Hoarding or fencing (2.4 metres in height as a minimum), which will remain in-situ for the duration of the works, will be erected around the construction compounds and the bridge assembly area. Site offices and welfare facilities will be installed within the construction compounds.

#### *5.6.1.1 Access to foundations in Irish Rail land*

To facilitate the construction of the precast concrete portal frame structures across Irish Rail land and the northern abutment of the N25 bridge span, access will be required to Irish Rail land. This access will be obtained in agreement with Irish Rail. Access is proposed to be from the northern amenity park area and via the N25 hard shoulder for site clearance. The train line service will remain unaffected by the works, with safe working areas and appropriate protection in line with Irish Rail requirements being set up along the track zone.

Access for the construction of the span crossing the railway line will take place during a temporary track closure in agreement with Irish Rail. This is anticipated to be a weekend closure during the Christmas or Easter downtime periods.

#### *5.6.1.2 Access to foundations adjacent to the N25*

Access for construction of the northern foundations and abutment adjacent to the N25 will be via a localised closure of the hard shoulder and slip lane adjacent to the abutment to form a works area, with associated traffic management on either side of the works area. This will enable construction access and egress as well as protection for the works area. The exit to N25 junction 2 on the eastbound slip lane is proposed to be maintained. Abutments will be constructed in a planned accelerated programme to minimise the duration that traffic management is required.

The southern abutment for the N25 bridge structure is proposed to be constructed with access from the southern wooded area. Therefore, no significant traffic management on the N25 is anticipated to be required for these works.

Access to the entire N25 will be required for the bridge steelwork erection during an overnight / weekend closure of the highway. A diversion is expected for eastbound traffic from the western side of junction 1 and the eastern side of junction 2 via the L3004 Glounthaune Road. Traffic in an eastbound direction is expected to be diverted off the westbound exit from N25 junction 2 and via the L3004 Glounthaune Road to the Dunkettle Interchange.

#### *5.6.1.3 Access to southern wooded area*

Access to the southern wooded area will be primarily via the construction compound in the existing Radisson Blu Hotel car park. Following site clearance works, a temporary construction surface will be placed to allow plant and machinery access for the construction of the south abutment of the N25 bridge, as well as the foundations and structure for the south elevated ramp.

Due to the variable level changes in this area and to allow construction access, it is anticipated that a temporary access ramp will be constructed of hardcore fill material, with an anticipated width of 5-10m and a longitudinal slope of approximately 1:10. The lower area will be levelled to allow for construction and craneage. Refer to **Image 5.2** for further details.

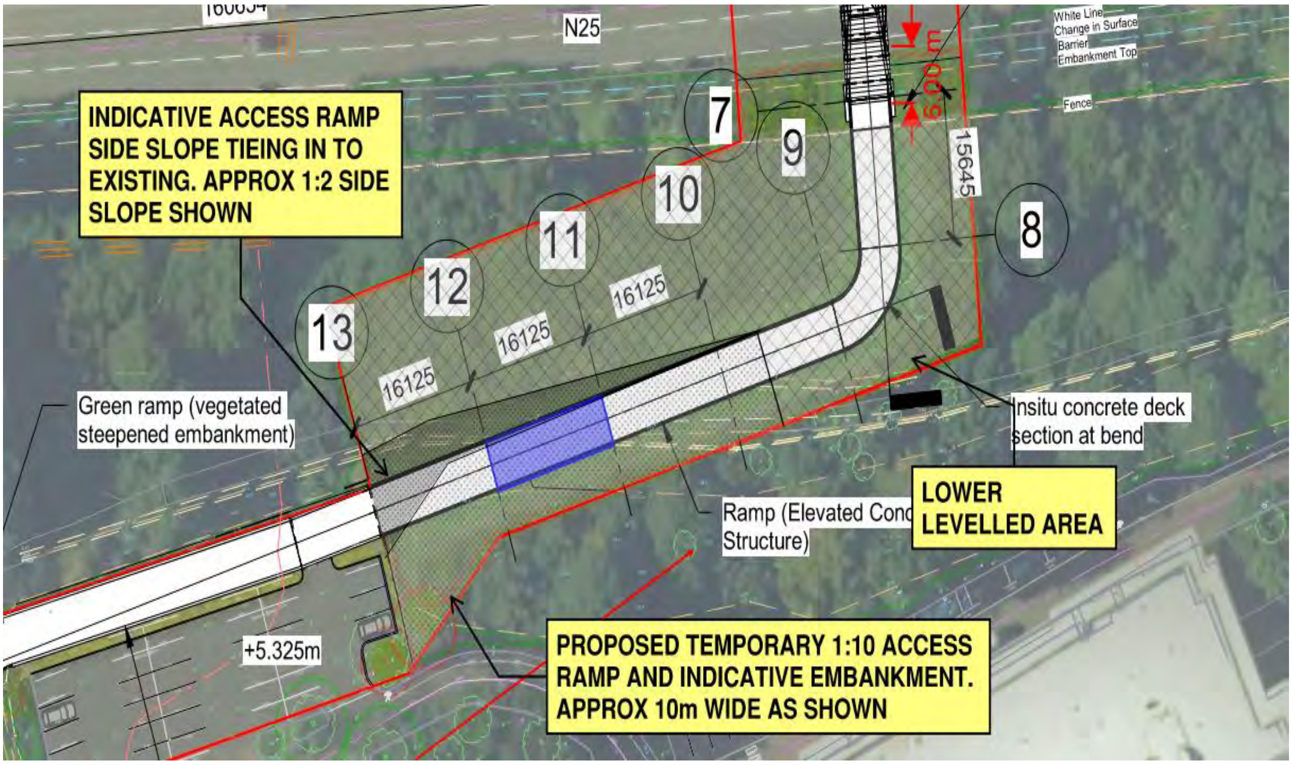


**Image 5.2: Indicative temporary access proposals for southern wooded area**

### 5.6.2 Stage 2 – Utility diversions

Any area to be excavated will be subject to utilities surveys, ground penetrating radar (GPR) surveys and cable avoidance tool (CAT) scanning. Service diversions are only anticipated to be require in the northern amenity park area.

Following identification of services with the relevant utility providers, including Uisce Eireann, Eir, GNI, BT Ireland, Enet and ESB Networks, the proposed utility diversions / protection measures are as follows:

- The Uisce Eireann 750mm diameter ductile iron water main is proposed to be protected via an *in situ* concrete structure where it passes under the proposed north embankment ramp. Refer to **Image 5.3**.

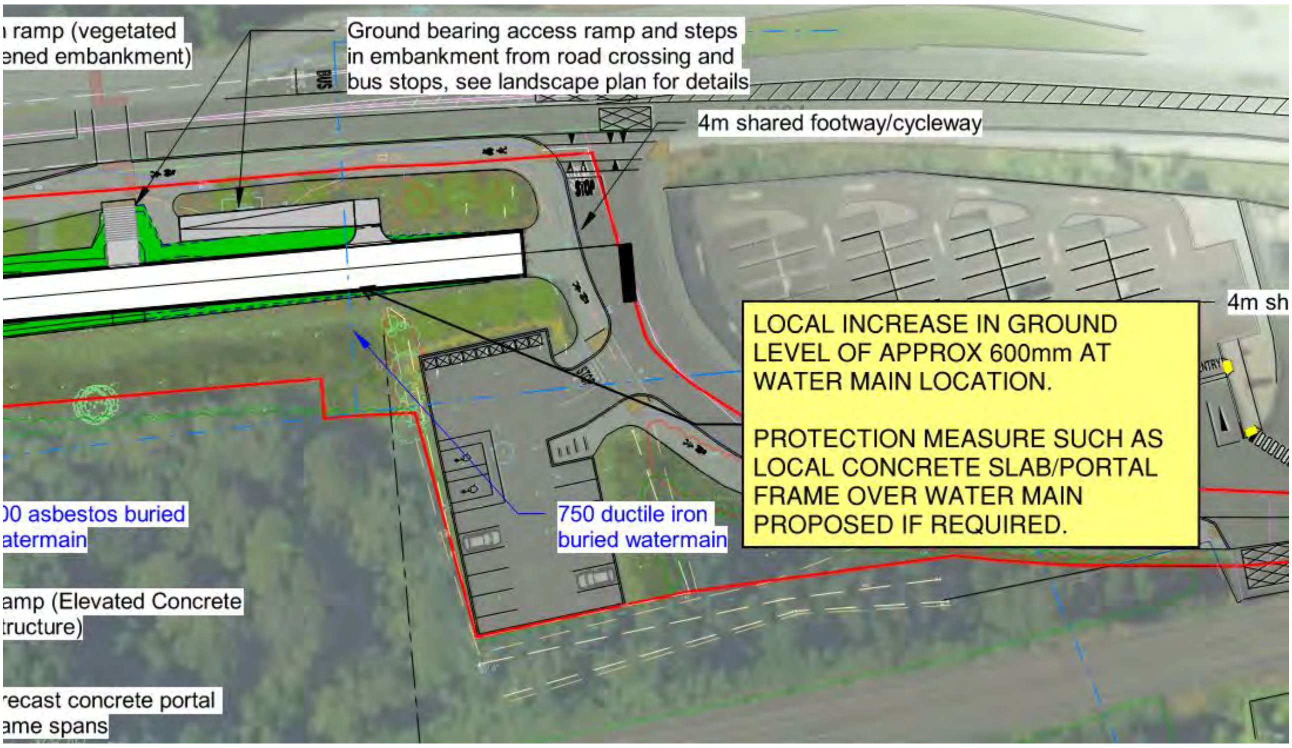


**Image 5.3: Proposed protection measure to water main under north embankment**

- Subject to discussions with Uisce Eireann, it is proposed that the 700mm diameter asbestos water main will remain in place with suitable protection measures and easements to allow piling works and bridge assembly / protection works. Refer to **Image 5.4**.

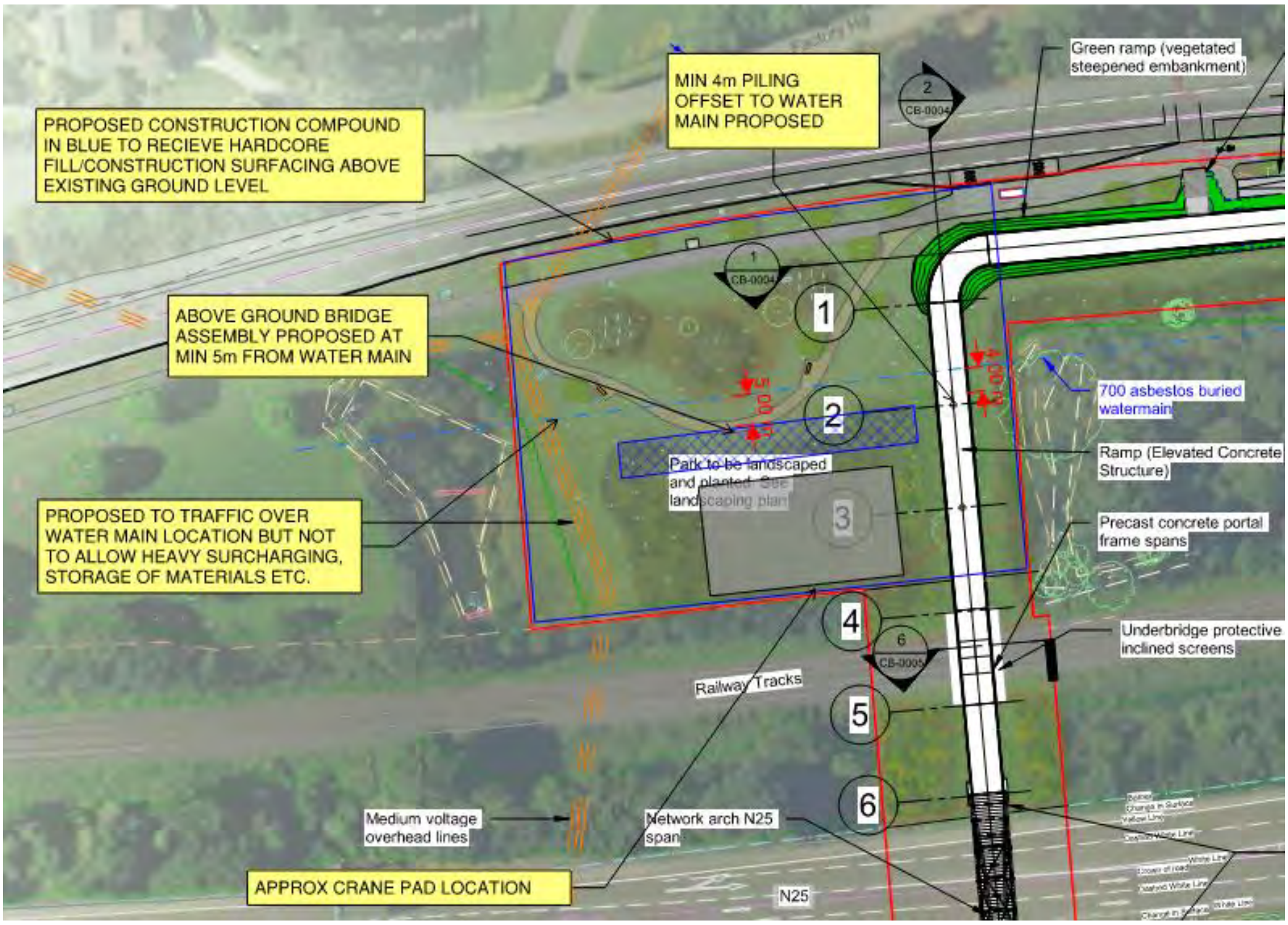


**Image 5.4: Proposed easement to underground water main running through bridge assembly area**

- Subject to discussions with ESB, it is proposed that the existing medium voltage overhead lines traversing through the northern amenity park area in a north / south direction be slightly rerouted by moving a single electricity pole and moving connecting overhead lines. This will allow for bridge assembly and erection to take place from the bridge assembly area, with suitable protection measures in place. Refer to **Image 5.5**.

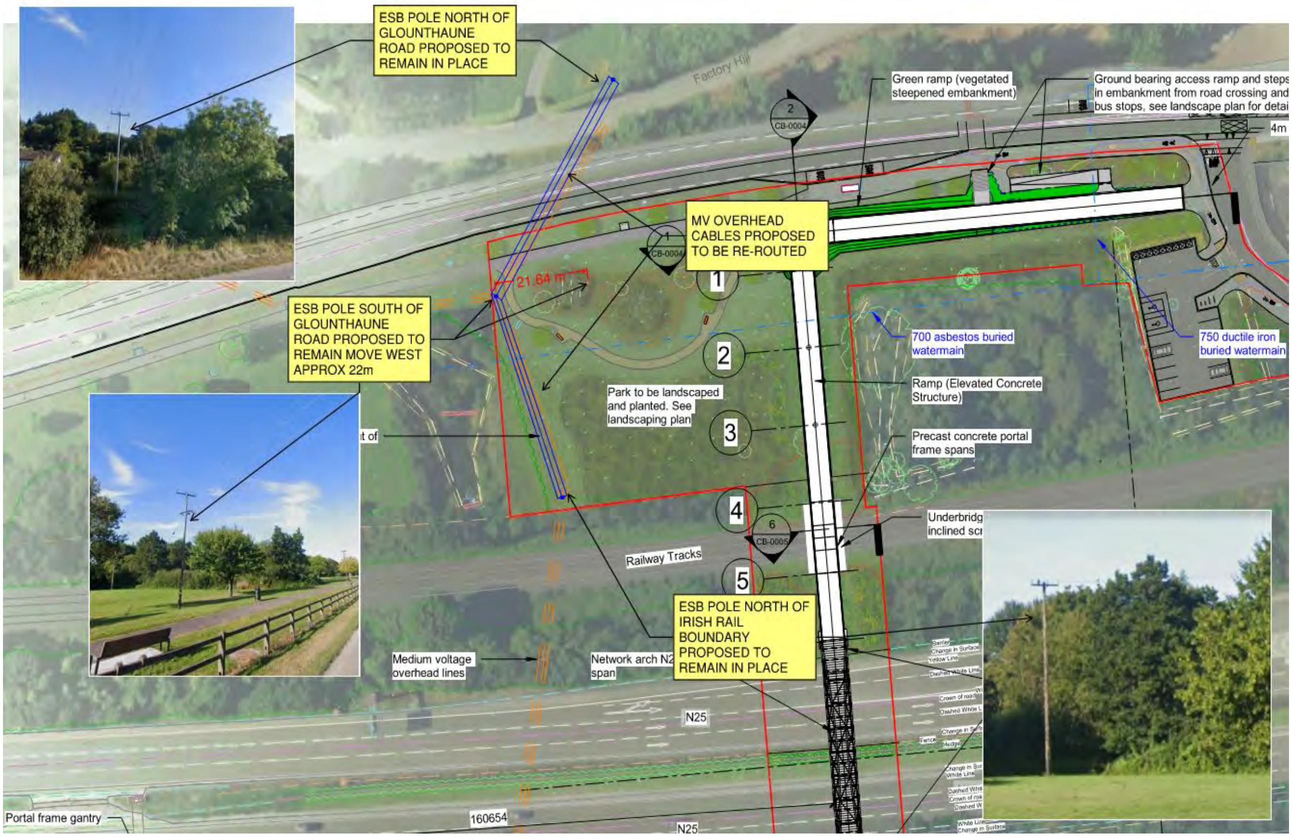


Image 5.5: Proposed re-routing of ESB MV overhead lines

### 5.6.3 Stage 3 – Bridge fabrication

#### *5.6.3.1 Precast concrete elements*

Precast, prestressed concrete bridge beams are proposed to be used for construction of the southern ramp superstructure. Additionally, it is possible that the ramp piers could also be precast concrete subject to the contractor preference. Precast concrete elements will most likely be fabricated in Ireland and delivered to site in sections to be lifted into place.

The precast concrete portal frame crossing the Irish Rail land will be a precast concrete proprietary system. These structures are built in accordance with well-defined designs developed by suppliers for efficiency of structure and construction. The portal frames will be delivered to site in segments for construction on site by the contractor or a specialist supplier.

#### *5.6.3.2 N25 main span superstructure*

The design of the Proposed Development has been chosen to comprise an approximately 49m span steel network arch bridge. This bridge form comprises a steel frame and double arch with tension elements supporting the deck and transferring load to the main arch. Refer to **Image 5.6** for an example of a similar structure.

**Image 5.6: Example of steel network arch bridge structure with concrete deck**

The N25 bridge span will be fabricated off-site within Ireland, the UK or in Europe. Off-site fabrication minimises disruption to the existing environment and traffic and ensures maximum quality and precision of all aspects of the fabrication.

Prior to transport, the bridge will be pre-assembled to its final profile in a workshop in a test assembly. Following this test assembly, the structure will be broken up into components suitable for road transportation and delivered to site where it will be assembled on temporary supports in the staging / assembly area in the northern amenity park area. Suitable protective measures and canopies will be provided on site to provide a suitable working environment for any on site welding or painting, if required. Refer to **Image 5.7** for an example of bridge fabrication in a workshop.

The bridge assembly area is proposed to be located in the northern amenity park area, immediately to the west of the proposed elevated northern ramp.

**Image 5.7: Example of bridge fabrication and pre-assembly in workshop**

### 5.6.4 Stage 4 – Foundation construction

The foundations for the Proposed Development will consist of:

- Northern steepened slope reinforced earth embankment ramp, with green vegetated finish;
- North elevated ramp structure: 3 no. piers / pile groups (shares one support with portal frame structure);
- Precast portal frame structures: 2 no. piers / pile groups (shares one support with N25 northern abutment). Piles and abutments adjacent to the rail track are to be set back a minimum of 4.5m from the nearest running rail in accordance with the Irish Rail Standard 'Requirements for Track and Structures Clearances I-PWY-1101' (Irish Rail, 2010);
- N25 main span: 2 no. piled abutments. Piles and abutments adjacent the highway are to be set back a minimum of 4.5m from the road edge as per TII requirements;
- South elevated ramp structure: 6 no. piers / pile groups (shares one support with N25 southern abutment); and
- Northern steepened slope reinforced earth embankment ramp, with green vegetated finish.

#### *5.6.4.1 Piled foundations*

All structural forms will sit on reinforced concrete piled foundations. It is expected, subject to detailed design, that piles will be approximately 900mm diameter and 20-30m in length. Elevated ramp foundations are proposed to have approximately 4-6 piles per pile group with main bridge foundations proposed to have 6-8 foundations per pile group. The pile details are to be refined at detailed design stage and smaller piles or less piles with inherently lower construction and environmental impacts may be provided, if possible. The piling methodology is assumed to be rotary bored and cased piles or Continuous Flight Auger (CFA) piles.

Following site clearance and placement of temporary construction surfaces, it is anticipated piling will take place for all foundations. Piling works adjacent to the N25 and Irish Rail site are expected to take place during closures of the rail line and lane closures of the N25, with suitable traffic management and protection measures in place.

In undertaking the piling works, the contractor will be conscious of utilities and will be responsible for carrying out survey works to confirm utility locations in the vicinity of the piling works and to maintain agreed easements with utility providers.

#### *5.6.4.2 Pilecaps and piers / abutments*

Following piling works, the tops of the piles will be broken down and in situ reinforced concrete pilecaps will be constructed. All pilecaps will sit below the existing ground level by approximately 500mm.

The northern elevated ramp piers and N25 abutments will be constructed on site with their reinforcement fixed and with in-situ poured concrete. Suitable protection and access measures, including temporary lane closures on the northern eastbound lanes of the N25, will be made to allow for reinforcement fixing, shuttering and pouring concrete.

Piers for the Irish Rail portal frame structures are expected to be placed in the same work cycle as the portal frame roof slab during a weekend closure of the railway in agreement with Irish Rail. Specific environmental management measures for works on the Irish Rail portal frame span in the vicinity of the Kilcoolishal Stream are presented in Section 5.6.9 of the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR).

Piers and crosshead for the south elevated ramp structure will be either in-situ reinforced concrete or precast sections. Due to space limitations in the southern wooded area, it is anticipated the contractor may construct piers and superstructures for this structure starting at the furthest point from the access to the wooded area (adjacent to the N25) and working back towards the access point in the construction compound. Due to access constraints, the contractor may use precast concrete piers and crossheads.

#### *5.6.4.3 Embankments*

Embankments will be used in the northern and southern areas of the Proposed Development. While not strictly foundations, these embankments will support the ramped footway / cycleways meeting the elevated structures. The embankments are expected to be constructed using strengthened and reinforced soil methods to minimise the overall land take and material import volumes required. Side slopes of the embankments are proposed to be up to 70 degrees.

The sides of the embankments are proposed to have a green finish with vegetation. Additional planting works will take place around the embankments to enable them to blend in with the surrounding environment – refer to the landscaping proposals in **Chapter 8**, *Landscape and Visual* for further details.

Refer to Section 5.7.1 for details of earthworks import and export volumes.

**Image 5.8: Example of steepened slope reinforced soil embankment (left before growth, right after growth)**

### 5.6.5 Stage 5 – Bridge transportation

#### *5.6.5.1 N25 bridge steelwork components*

It is intended that the proposed bridge elements will be fabricated in a steelwork fabrication yard offsite and transported to site in transportable lengths ahead of final erection. A CTMP will be prepared and implemented by the contractor to ensure the safe delivery of the prefabricated bridge elements to the bridge assembly area. The contents of the CTMP will be agreed with CCC prior to the delivery of the bridge components. In addition, the CTMP will designate traffic routes, timings and parking arrangements. Refer to the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR for further details on the CTMP.

The maximum component length is anticipated to be under 20m which is within the standard abnormal load length. However, junctions will be surveyed as necessary to ensure that the bridge can be transported safely.

Transportation of the large, prefabricated elements will be limited to night-time hours to limit impact on traffic in the surrounding area. Routes and times will be agreed and coordinated with CCC and An Garda Siochana in advance.

Once at the Proposed Development site, the prefabricated elements will be stored in the bridge assembly area which is located in the northern amenity park area. Security will be in place at the bridge assembly area at all times.

#### *5.6.5.2 Precast concrete elements*

It is intended that precast concrete elements will be fabricated in a precast yard offsite and transported to the Proposed Development site in transportable lengths ahead of final erection. The contents of the CTMP will be agreed with CCC prior to the delivery of the precast concrete elements to the bridge assembly area.

In addition, the CTMP will designate traffic routes, timings and parking arrangements. The maximum component length is anticipated to be under 20m which is within the typical abnormal load length. However, all junctions will be surveyed to ensure that the bridge can be transported safely.

Routes and times will be agreed and coordinated with CCC and An Garda Siochana in advance. For the southern elevated ramp bridge, beams will be stored in the southern construction compound area adjacent to the ramp prior to being lifting into final position. If precast sections are used for the northern elevated ramp, they will be stored in the proposed bridge assembly area to the west of the proposed ramp.

### 5.6.6 Stage 6 – Bridge assembly

#### *5.6.6.1 Irish rail portal frame construction*

Precast portal frame components are not expected to require specific assembly on site prior to erection into their final positions.

#### *5.6.6.2 Reinforced concrete deck assembly for elevated approach ramps*

Precast prestressed bridge beams for the elevated ramps will not require specific assembly on site prior to lifting into their final positions.

#### *5.6.6.3 N25 bridge steelwork components*

Following delivery of the prefabricated bridge elements, it is anticipated that sections of the main bridge span will be assembled and welded together in the bridge assembly area. It is also anticipated that all ancillary features such as the parapet infill panels, handrails, deck surfacing, floor grille and lighting will be installed before final erection. If a concrete decking is proposed in detailed design, it is anticipated that this will be installed after the bridge is lifted in to place due to the prohibitive weight for lifting a full concrete deck into place. In this case, permanent formwork will be installed in advance of the bridge lift to allow for a safe working platform.

#### *5.6.6.4 Summary*

It is predicted that the bridge assembly will take between 12 and 16 weeks. The bridge assembly area will be safely secured to prevent public access. Measures outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) will be implemented by the contractor to manage the potential effects of the Proposed Development on the environment e.g., surface water management and noise control. A CTMP will also be developed by the contractor which will outline how traffic associated with the Proposed Development will be managed and the segregation measures that will be implemented to ensure the safety and welfare of pedestrians and other road users during the Construction Phase. It is anticipated that the volume of traffic passing the bridge assembly area will be low and it is proposed that the footpath that currently passes through the northern amenity park area will be temporarily diverted, either around the bridge assembly area or to the Dunkettle to Carrigtwohill pedestrian and cycle route on the opposite side of the L3004 Glounthaune Road. Refer to **Chapter 7**, *Traffic and Transportation* for further details.

### 5.6.7 Stage 7 – Bridge erection

#### *5.6.7.1 Precast concrete elevated ramp erection*

Precast elements of the elevated approach ramps consist of MY bridge beams on the southern ramp and will potentially also consist of bespoke precast superstructure sections on the northern elevated ramp.

For the northern elevated ramp sections, the total superstructure weight for each of the spans will be approximately 140 tonnes. These can be lifted into place using mobile cranes sited at a close distance to the structure. Due to the open nature of the amenity park area, this is possible and will reduce the need for major crane pads. A suitable crane for the lifting of the northern spans is expected to be a Liebherr LTM 1750-6.1 800 tonne mobile crane, or similar. Refer to **Image 5.9** for further details.

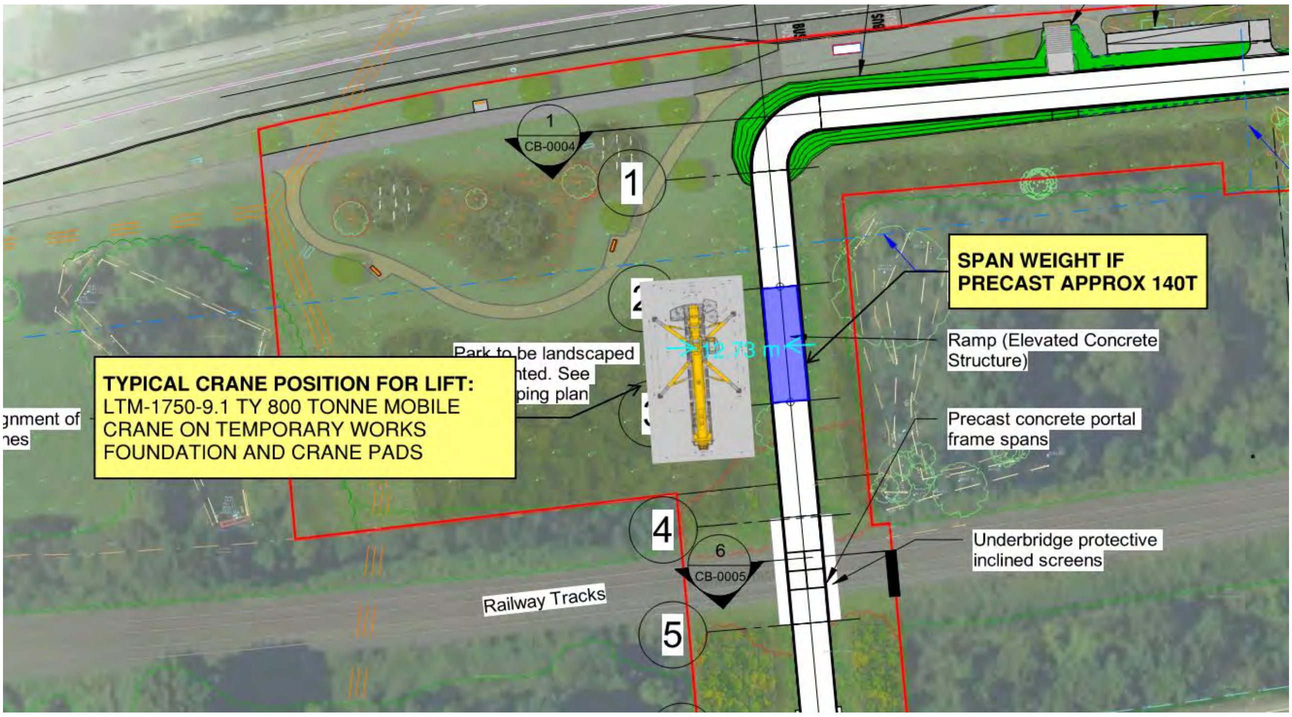


**Image 5.9: Proposed methodology for erection of north elevated ramp superstructure for precast deck option**

For the southern elevated ramp, MY prestressed precast bridge beams with an in-situ concrete stitch deck are proposed. The maximum lifting weight of an MY edge bridge beam is approximately 14 tonnes. Due to the uneven nature of the terrain surrounding the southern elevated ramp, a rough terrain crane is anticipated to be used for lifting of the bridge beams into position. The surrounding area will be cleared and a construction surface placed prior to construction. Due to the variable level changes in this area and to allow construction access, it is anticipated that a temporary access ramp will be constructed of hardcore fill material with a width of approximately 5-10m and a slope of approximately 1:10. The lower area will be levelled to allow for construction and craneage.

Crane pads or a build-up of hardcore is expected to be required at the craning positions. A suitable crane is the Liebherr LTR 1100-2.1 100 tonne rough terrain crane or similar which is available from Irish suppliers. Refer to **Image 5.10** for an indication of the lift radii and crane pad positions.

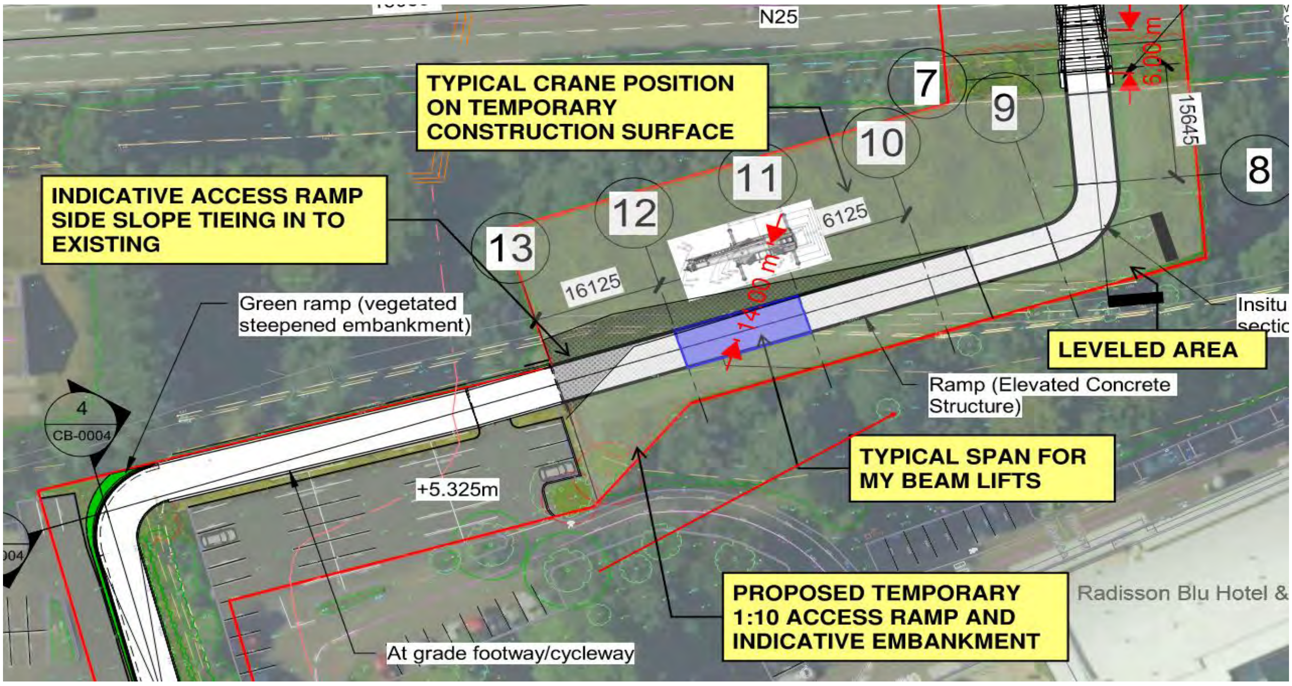


**Image 5.10: Proposed methodology for erection of southern elevated ramp precast concrete bridge beams**

### 5.6.7.2 *Irish Rail spans precast concrete portal frame*

The erection of portal frame components will be by the main contractor or a specialist supplier. The portal frame will be assembled in its final position during a temporary track closure in agreement with Irish Rail. Sections will be joined together via in-situ concrete stitches as per the supplier details.

Components are designed to be lifted into place by mobile cranes. The crane size to be used will be confirmed by the contractor. However, it is anticipated to be placed on the same temporary works crane pad as that used for the first lift of the N25 bridge. Due to the higher volume of concrete, the lift weight for the larger roof sections of the portal frame is expected to be similar to the N25 bridge lift weight – approximately 55 tonnes. For the roof sections of the south portal frame span, it is expected that the crane will be located on the N25 northern carriageway. This will require an overnight partial closure of the N25 eastbound carriageway. It is expected that it will be possible for a single lane to remain open with suitable traffic management measures in place.

As such, it is expected that the crane required will be the same crane as that required for the N25 bridge lift. A suitable crane is the Liebherr LTM 1750-9.1 800 tonne mobile crane TY variant. This crane is available from local suppliers.

It is proposed that the erection of the Irish Rail spanning portal frames be completed prior to the erection of the N25 steel bridge to allow for these spans to be used as an intermediate support position for the N25 span during the craning operation.

Refer to **Image 5.11** for further details.

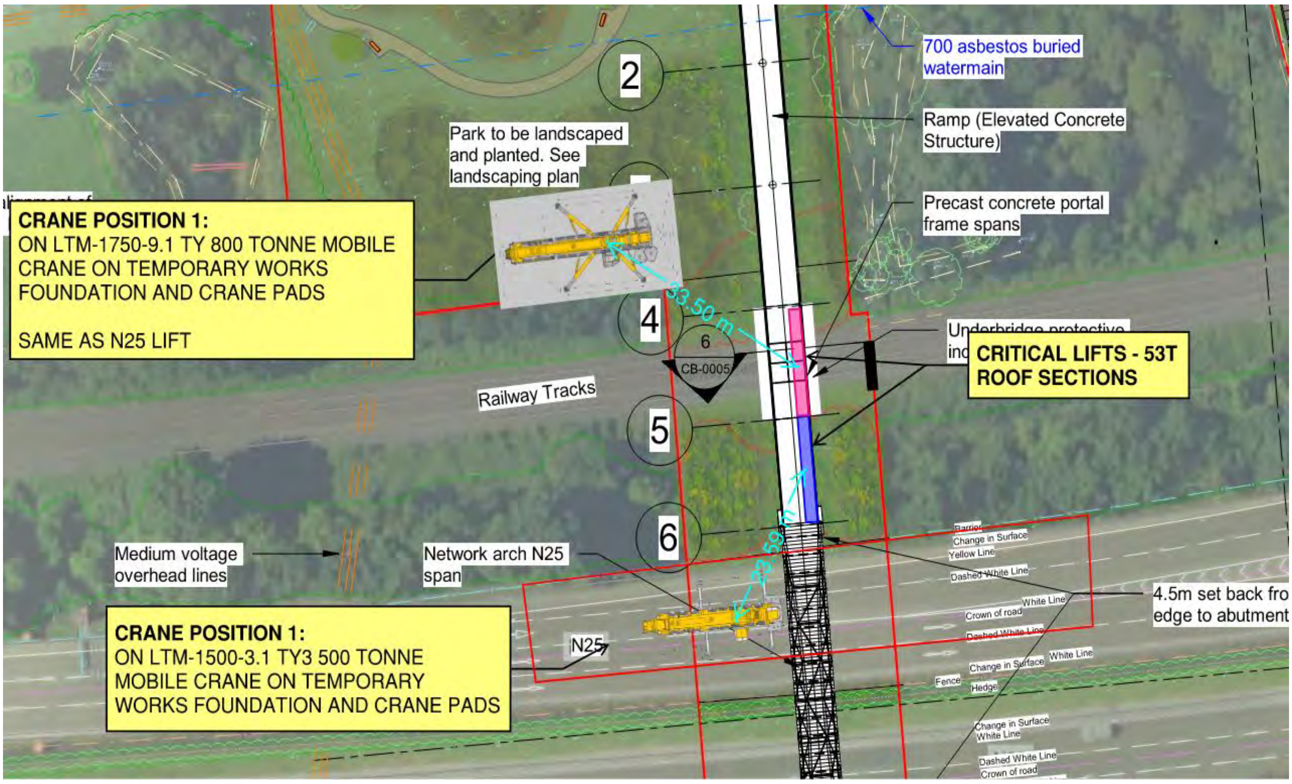


**Image 5.11: Proposed methodology for erection of precast portal frame elements of railway spans**

### 5.6.7.3 *N25 bridge span*

Following assembly of the N25 steel network arch bridge structure on temporary supports and following construction of the northern ramp and portal frame structures (without parapets fitted), it is proposed that a large mobile crane (LTN 1750-9.1 TY 800 tonne crane or similar) is set up on a temporary works crane pad adjacent to the Irish Rail boundary in the bridge assembly yard. This crane is proposed to lift the bridge structure with a maximum lifting radius of approximately 35m onto a temporary seating position on the northern elevated ramp and portal frame structures. It is expected that the end of the N25 structure will over span the portal frame slightly and cantilevers over the N25 hard shoulder in its temporary position. The lifting weight of the N25 structure is assumed to be approximately 55 tonnes. The distributed weight on the northern ramp and portal frame of this structure is less than the design live load for the ramps. Therefore, no special strengthening measures of these structures are anticipated for this stage.

Following the initial lift, the crane is proposed to be repositioned to the northern edge of the N25 carriageway during an overnight closure of the N25 at this location. A second lift will then take place to lift the structure into its final position. The proposed crane is available from local suppliers.

The two-stage lift of the N25 structure and crane pad positions is illustrated in **Image 5.12**.

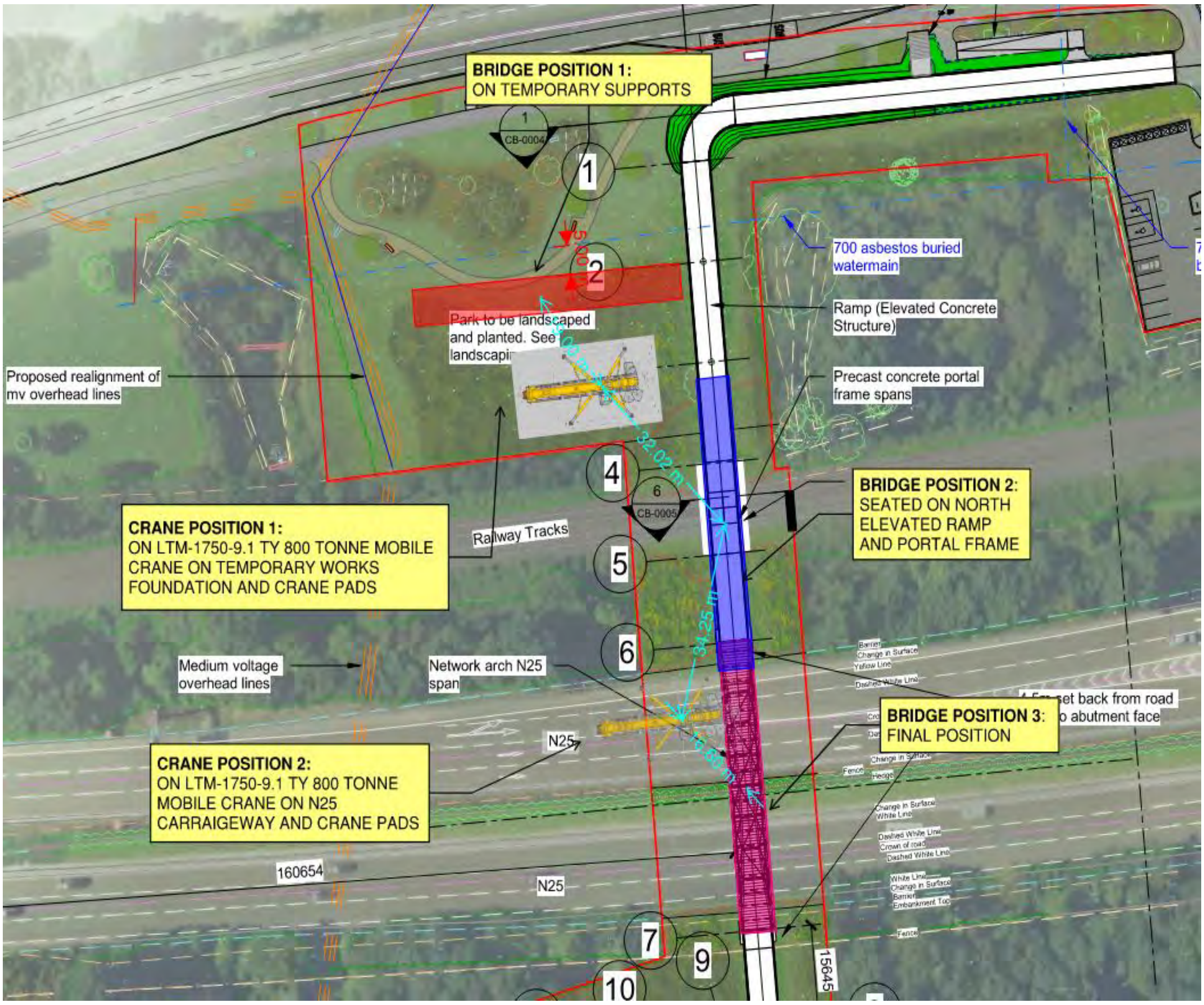


**Image 5.12: Proposed methodology for bridge lift 1 using LTN1750-9.1 TY**

### 5.6.8 Stage 8 – Completion of works

Stage 8 will comprise the completion of the works. This stage will include paint repair works required due to any paint that may have become damaged during the N25 bridge lift, adjustments to handrailing, installation of parapets on the northern ramp and commissioning of lights. Other works during this stage will comprise surfacing to ramps and at the tie in points, as well as works to reinstate the existing footways / cycleways. All construction related material will be removed from site following completion of the works.

#### *5.6.8.1 Paving and landscaping works*

The completion of the works will also include the removal of the two construction compounds and the bridge assembly area, with these work areas being returned to their original condition and use. Areas in the northern amenity park area and southern wooded area will be landscaped and planted with compensatory planting to compensate for the trees removed during site clearance works. Additional linking footpaths will be constructed, linking the bridge structure with surrounding active travel and public transport infrastructure. Refer to the landscaping proposals in **Chapter 8**, *Landscape and Visual* for further details.

## 5.7 Construction Access

### 5.7.1 Construction traffic

Construction access to the L3004 Glounthaune Road construction compound (north) and Radisson Blu Hotel construction compound (south) will be from the local road network. Access to the local access roads to the construction compounds will be via the N25 dual carriageway using Little Island junction 2 to avoid excessive traffic on the surrounding local road network. It is anticipated construction traffic will use the following routes to access the site from the N25 Little Island junction:

- North construction compound: N25 junction 2, R623 north, L3004 Glounthaune Road west;
- South construction compound: N25 junction 2, R623 south, Eastgate Way, Radisson Blu Hotel local access road; and
- Southwest tie in area: N25 junction 2, R623 south, Eastgate Way, Eastgate Road north.

**Table 5.2** and **Table 5.3** provide a breakdown of the construction truck journeys expected to the different site areas.

**Table 5.2: Estimated construction traffic – north compound traffic and bridge assembly area**

| Works Element | Quantity of material | Tonnage (t) | Construction vehicles required | Approximate No. of deliveries |
|---|---|---|---|---|
| Tree removal and vegetation clearance | 7,800m$^2$ minor vegetation clearance and 21 trees removed | N/A | 2 no. 12m flatbed trucks<br>1 no. excavator<br>1 no. mini excavator<br>2 no. 6 tonne dumper trucks | 10 no. |
| Construction surfacing (hard core / crane pads etc.) | 7,800m$^2$ of construction surfacing x 1m deep | 23,800 tonnes (bulk weight) | 20 tonne dumper trucks<br>2 no. excavators<br>2 no. 12 tonne dumper | 1,190 no. |
| Excavation for footways / embankments | 660m$^2$ of embankment footprint + 1,000m$^2$ at grade shared footway / cycleway | 1,520 tonnes (bulk weight) | 1 no. 20 tonne dumper truck<br>1 no. 6 tonne dumper truck on site<br>1 no. mini excavator | 76 no. |
| Embankment material delivery | 1,550m$^3$ compacted embankment material | 4,740 tonnes (bulk weight) | 20 tonne dumper trucks | 237 no. |
| Piling and concreting works for foundations / piers / ramp superstructure | 570m$^3$ wet concrete | 1,450 tonnes | 6.5m$^3$ concrete trucks assumed | 88 no. |
| Removal of piling spoil | 255m$^3$ excavated material | 780 tonnes (bulk weight) | 1 no. 20 tonne dumper truck<br>1 no. 6 tonne dumper truck on site<br>1 no. excavator | 39 no. |
| Excavation for pilecaps | 284m$^3$ | 869 tonnes (bulk weight) | 1 no. 20 tonne dumper truck | 44 no. |

| Works Element | Quantity of material | Tonnage (t) | Construction vehicles required | Approximate No. of deliveries |
|---|---|---|---|---|
| | | | 1 no. 6 tonne dumper truck on site<br><br>1 no. excavator | |
| Steel reinforcement deliveries | 91,000kg | N/A | 12m flatbed trucks | 91 no. |
| Precast concrete elements | 12 no. precast concrete elements for portal frame structures | 480 tonnes | Max. 20m long abnormal load delivery trucks | 12 no. |
| Steelwork element deliveries | 9 no. sections of main span in abnormal load deliveries + 800m (linear m) of parapets (delivered in 3x12m lengths per truck) | 55 tonnes (N25 structure) + 33 tonnes (parapets) | Max. 20m long abnormal load delivery trucks + 12m flatbed trucks (parapet deliveries) | 31 no. |
| Removal of Construction surfacing (hard core / crane pads etc.) | 7800m$^2$ of construction surfacing x 1m deep | 23,800 tonnes (bulk weight) | 20 tonne dumper trucks<br><br>2 no. excavators<br><br>2 no. 12 tonne dumper | 1,190 no. |

**Table 5.3: Estimated construction traffic – south compound traffic**

| Works Element | Quantity of material | Tonnage (t) | Construction vehicles required | No. of Deliveries |
|---|---|---|---|---|
| Tree removal and vegetation clearance | 2,800m$^2$ minor vegetation clearance and 121 trees removed | N/A | 2 no. 12m flatbed trucks<br><br>1 no. excavator<br><br>1 no. mini excavator<br><br>2 no. 6 tonne dumper trucks | 20 no. |
| Construction surfacing (hard core / crane pads etc.) | 2,800m$^2$ of construction surfacing x 1m deep | 8,600 tonnes (bulk weight) | 20 tonne dumper trucks<br><br>2 no. excavators<br><br>2 no. 12 tonne dumper trucks | 430 no. |
| Excavation for footways / embankments | 230m$^2$ of embankment footprint + 580m$^2$ at grade footway / cycleway | 740 tonnes (bulk weight) | 1 no. 20 tonne dumper truck<br><br>1 no. 6 tonne dumper truck on site<br><br>1 no. mini excavator | 37 no. |
| Embankment material delivery | 270m$^3$ compacted embankment material | 820 tonnes (bulk weight) | 20 tonne dumper trucks | 41 no. |
| Piling and concreting works for foundations / piers | 600m$^3$ wet concrete | 1,530 tonnes | 6.5m$^3$ concrete trucks assumed | 93 no. |
| Removal of piling spoil | 382m$^3$ excavated material | 1,168 tonnes (bulk weight) | 1 no. 20 tonne dumper truck<br><br>1 no. 6 tonne dumper truck on site | 58 no. |

| Works Element | Quantity of material | Tonnage (t) | Construction vehicles required | No. of Deliveries |
|---|---|---|---|---|
| | | | 1 no. excavator | |
| Excavation for pilecaps | 284m$^3$ | 869 tonnes (bulk weight) | 1 no. 20 tonne dumper truck<br><br>1 no. 6 tonne dumper truck on site<br><br>1 no. excavator | 44 no. |
| Steel reinforcement deliveries | 96,000kg | N/A | 12m flatbed trucks | 96 no. |
| Precast concrete elements | 30 precast concrete elements for portal frame structures | 450 tonnes | Max. 20m long abnormal load delivery trucks | 15 no. |
| Removal of Construction surfacing (hard core / crane pads etc.) | 2,800m$^2$ of construction surfacing x 1m deep | 8,600 tonnes (bulk weight) | 20 tonne dumper trucks<br><br>2 no. excavators<br><br>2 no. 12 tonne dumper trucks | 430 no. |

### 5.7.2 Road diversions, restrictions and closures

While there will be some closures of parking areas required, no permanent road closures will be required for the duration of the works due to use of the construction compounds.

The footpath to the north of the northern amenity park area will be closed during the construction works in the vicinity of the northern construction compound and bridge assembly area. This footpath is local to the park only and does not continue beyond the park area to the east. On the west side, it leads to the car park / recycling area which will also be closed during the works. Therefore, no continuity of route for pedestrian traffic will be lost during the construction works. East / west pedestrian and cycle traffic will instead use the Dunkettle to Carrigtwohill pedestrian and cycle route on the north side of L3004 Glounthaune Road.

A CTMP will be prepared by the contractor in advance of the commencement of the construction works (refer to the CEMP in **Appendix 5.1** in **Volume 4** for further details). The CTMP will be fully implemented to facilitate pedestrian and traffic diversions for the duration of the construction works.

A number of temporary road / lane closures will be required during the construction works, as follows:

- Site clearance: overnight traffic management on N25 junction 2 eastbound off ramp slip lane to allow site clearance;
- N25 span north abutment construction: temporary lane closure of localised section of the eastbound hard shoulder and off ramp slip lane, and surrounding traffic management to allow access and exit from the construction area, and to enable the construction of the N25 span north abutment. This is expected to be in place for 6 – 10 weeks;
- Irish Rail south portal frame span construction: overnight lane closures and traffic management on N25 junction 2 eastbound off ramp slip lanes and adjacent traffic lanes to facilitate erection of south span of the precast concrete portal frame structure over Irish Rail land. It is expected that a single eastbound lane can remain open;
- N25 span steelwork erection: weekend closure of the N25 to allow for steelwork erection of the N25 span; and
- Irish Rail portal frame structures: weekend closure of Irish Rail track in agreement with Irish Rail to allow for construction of the precast concrete portal frame structures.

## 5.8 Site Management

### 5.8.1 Employment

It is anticipated that the Proposed Development will provide onsite employment to approximately 50 people during the Construction Phase.

A breakdown of the estimated number of construction personnel required for the various phases associated with the construction, assembly and erection of the proposed structure and associated links is presented in **Table 5.4**. CCC personnel will have a site presence during the Construction Phase of the Proposed Development.

**Table 5.4: Estimated workforce required during Construction Phase**

| Project stage | Estimated no. of people |
|---|---|
| Site clearance and enabling works | 6 |
| Laying construction surfacing to north bridge assembly area and southern wooded area | 8 |
| Piling works | 8 |
| Northern embankment construction | 6 |
| Southern embankment construction | 4 |
| Northern in-situ concrete works: steelwork fixing (pilecaps, piers, abutments, and north ramp superstructure) | 8 |
| Steelwork fabrication – off site | 12 |
| Steelwork assembly - on site | 12 |
| Steelwork erection | 10 |
| Precast concrete portal frame assembly | 8 |
| Precast concrete south ramp superstructure assembly | 8 |
| Landscaping and tie in footpath work | 8 |

### 5.8.2 Working hours

The timing of construction activities, core working hours and the rate of progress of construction works are a balance between efficiency of construction and minimising nuisance and significant effects.

The core construction working hours for the Proposed Development will be:

- 7am – 7pm: Monday to Friday; and
- 8am – 2pm: Saturday.

The hours above correspond to the current construction programme.

The permissible noise levels are detailed in **Chapter 10**, *Noise and Vibration* where 'daytime' noise limits are defined for the period 7am to 7pm, and lower permissible noise levels are stipulated outside these hours.

The removal of waste material off site by road and regular deliveries to site will be generally confined to daytime hours which are outside of peak traffic hours (i.e., 10am to 4pm).

It may be necessary to undertake certain activities outside of the core construction working hours such as the installation of the main span over the N25, which is anticipated to take place during an overnight or a weekend road closure. Any construction works outside of the core construction working hours will be agreed in advance with CCC and scheduling of such works will have regard to nearby sensitive receptors.

### 5.8.3 Site access

All construction works will be undertaken in a clearly delineated site area which will have specific entry and exit points for construction related traffic onto the public road network. All access points will be temporary and used solely during the Construction Phase.

Where works are to be undertaken adjacent to the existing roads, temporary traffic barriers will be erected to separate the construction works from the public, to create a safe working space for the contractor and to clearly define the areas within which construction will be undertaken.

All site access routes will be connected to the existing local road network. Minor road works may occur such as the removal of existing kerbs, paving and a small amount of excavation prior to the replacement of paving and realigned kerbs within the Eastgate Business Park, the Little Island train station area and the L3004 Glounthaune Road.

Site access to the northern construction compound will be via the existing car park entrance off the Little Island train station access road.

Site access to the northern bridge assembly area will be via a temporary access directly off the L3004 Glounthaune Road.

Site access to the southern construction compound will be via the western end of the Radisson Blu Hotel car park, which is accessibly from Eastgate Way and the Radisson Blu Hotel local access road. The southern construction compound will be located in a dedicated area of the car park, with parking restrictions and management measures implemented within the car park as necessary to ensure that the functioning of the car park is maintained and to avoid any site parking overspill issues.

### 5.8.4 Utilities and services

Only minor service diversions are required. Surface and sub-surface infrastructure services and utilities which may be temporarily affected during the construction works are as follows:

- Surface water drainage;
- Electricity; and
- Water mains.

Effects on surface and sub-surface infrastructure services and utilities are addressed in **Chapter 18**, *Material Assets*.

### 5.8.5 Hoarding

A site boundary in the form of hoarding or fencing (2.4m in height) will be established around each of the construction compounds and the bridge assembly area, as well as any associated working areas, before any significant construction activity commences.

The site hoarding will also perform an important function in relation to minimising nuisance and effects including:

- Noise emissions (by providing a buffer);
- Visual impact (by screening the working areas, plant and equipment); and
- Dust minimisation (by providing a buffer).

The hoarding will be typical to that provided on most construction sites. Mounting posts will be erected by using a mini-digger and the posts will be set in concrete. The size and nature of the posts and hoarding will depend on the requirements for any acoustic mitigation as well as preferences that the contractor may have. However, given the location of the Proposed Development, the type of hoarding to be used will include mesh fence or solid hoarding which will be positioned appropriately within the working areas to minimise the noise transmitted to nearby receptors from plant, equipment and vehicles entering or leaving the working areas.

Where practicable, hoarding and fencing will be retained and re-configured and re-used between working areas as the construction activities progress.

### 5.8.6 Site lighting

Site services will be installed in parallel with the rearrangement and diversion of existing utilities, where relevant. The working areas will be powered by mains supplies or diesel generators where an electrical supply is not available.

Site lighting will typically be provided by tower mounted 1000W metal halide floodlights that will be cowled and angled downwards to minimise spillage to surrounding properties. Lighting will be powered off during night-time hours to minimise the additional light spillage onto surrounding properties.

### 5.8.7 Deliveries to site

Deliveries of construction materials will be planned and programmed to ensure that the materials are delivered only as they are required to the working areas. Works requiring multiple vehicle deliveries, such as concrete pours, will be planned so as to limit congestion and disruption to the public road networks. Deliveries will be limited to outside of peak hours.

### 5.8.8 Cranage

The construction works will require the use of mobile cranes on site.

Various sized cranes will be required for the moving of building materials on site and lifting structures into place i.e., the main bridge span and approach spans. Heavy machinery transport on the road network to and from working areas will be restricted to outside of peak hours.

Refer to Section 5.6.7 for details of the proposed mobile cranes to be used during the Construction Phase.

### 5.8.9 Community liaison during construction

CCC recognises the importance of effective community liaison in order to reduce nuisance to residents during the works, to ensure public safety and welfare and to help ensure the smooth running of construction activities. Important issues in ensuring good relations are:

- Providing information for the public during the Construction Phase (particularly nearby sensitive receptors);
- Providing the correct points of contact and being responsive; and
- Ensuring good housekeeping in all aspects of the operations.

A 'good neighbour' policy will be implemented, as far as possible. Key aspects of this policy include:

- Early implementation of the policy i.e., from the commencement of construction;
- Reduction of nuisance factors;
- Maintaining access to public areas and amenities;
- Clear and concise information; and
- Undertaking timely liaison with stakeholders.

With regard to liaison, the contractor will be required to prepare a Community Liaison Plan, which will include details of how the local community, road users and affected residents will be notified in advance of the scheduling of major works, any temporary traffic diversions and the progress of the construction works.

This plan will typically include details of the following:

- Contractor's community relations policy;
- Personnel nominated to manage public relations;
- A methodology for processing observations, queries and complaints from the general public, relevant authorities, the media and emergency services; and
- The strategy for project-wide liaison with all relevant parties.

A liaison manager will be appointed by the contractor and will be responsible for managing such tasks as the following:

- Briefing neighbours on progress and issues as necessary;
- Liaison with CCC and emergency services as appropriate;
- Liaison with local Gardaí, particularly in relation to traffic movements and permits where necessary; and
- Contact details for the liaison manager will be posted on all construction site notice boards and on any other information or correspondence, which may be distributed from time to time.

## 5.9 Materials Management

### 5.9.1 Site clearance waste and excavated materials

It is estimated that approximately 415 tonnes of cleared vegetation will be generated as a result of the Proposed Development.

Excavated material generated as part of the construction works will generally consist of:

- Made ground;
- Topsoil and subsoil; and
- Spoil from piling.

In total, it is estimated that the construction of the Proposed Development will require the excavation of approximately 5,950 tonnes (bulk weight) of material.

It is estimated that approximately 300mm will need to be excavated under the proposed embankments and tie ins at grade footways / cycleways to allow for competent formation layers to be placed. The total amount of material estimated to be generated from these works will be approximately 2,260 tonnes (bulk weight).

Where practicable and subject to the material being suitable for re-use, excavated topsoil will be stored in an appropriately designated area in the bridge assembly area on site for use in the landscaping works. All material will be stored in accordance with the principles set out in Section 5.9.3. Refer to **Chapter 15**, *Resources and Waste*, for further details.

In addition to the excavated topsoil, it is estimated that approximately 1,950 tonnes (bulk weight) of piling spoil material and approximately 1,740 tonnes (bulk weight) of excavated material for the pile caps will be generated. This material will be removed from site.

Following the completion of the construction works, it is estimated that approximately 32,400 tonnes of construction surfacing material will be removed from site.

Surplus excavation material will be removed off site by a waste collection permit holder and delivered to an authorised waste facility (i.e., a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence). Where feasible and subject to testing, this material is likely to be used as a by-product in construction, provided the material itself and its proposed end use complies with the provisions of Article 27. A review will be undertaken by the contractor for suitable construction projects for reuse of this material in accordance with Article 27 e.g., projects requiring materials specified in Transport Infrastructure Ireland Series 600 Specification for Earthworks.

In the event that an Article 27 declaration is not feasible for all or part of the surplus excavation material, it will be delivered for recovery or disposal to a facility authorised in accordance with the Waste Management Act, 1996.

Should excavated material containing hazardous substances be discovered as part of the Proposed Development, this will be delivered to a facility authorised to accept hazardous wastes in accordance with the terms of an Industrial Emissions Licence or Waste Licence or exported from Ireland for treatment, recovery or disposal in accordance with current industry practice and the provisions of the Waste Management (Shipments of Waste) Regulations, 2007 S.I. No. 419 of 2007.

To ensure that there will be no queuing of trucks on public roadways, the transport of material to and from site will be managed in accordance with the measures outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR).

The contractor will further develop and implement the mitigation measures as outlined in the Construction Resource and Waste Management Plan (CRWMP) which is included as **Appendix 15.3** in **Volume 4** of this EIAR.

### 5.9.2 Main construction materials

The Proposed Development will have a requirement for imported materials, primarily concrete, crushed stone, embankment build-up, footway / cycleway paving materials, steelwork, reinforcement steel and precast concrete sections.

These materials will be imported to site during the construction works, when required. A breakdown of the type and quantity of materials is presented in **Table 5.5**.

**Table 5.5: Estimated quantities of construction materials**

| Material type | Estimated quantity (bulk weight) |
|---|---|
| Concrete | 3,000 tonnes |
| Clause 804 hardcore | 32,400 tonnes |
| Reinforcing steel | 187,000 kg |
| Structural steelwork | 55 tonnes N25 span + 33 tonnes parapets |
| Precast concrete elements | 930 tonnes |
| Embankment fill | 5,560 tonnes |
| Link footway / cycleway surfacing | 1,930 tonnes |

### 5.9.3 Materials storage

Construction compounds will be the primary locations for storage of materials, plant and equipment, site offices, welfare facilities and construction staff car parking. No stockpiling will be permitted in any other areas, aside from the bridge assembly area. Surplus excavation material will be removed off site by an authorised waste contractor to an appropriately licensed / permitted waste facility.

A SWMP will be prepared and implemented by the contractor as part of the CEMP. The measures included will prevent any silt-laden run-off, including that from stockpiles, entering nearby watercourses.

Site drainage will be provided to collect surface water runoff, which will be directed into a site water treatment facility before being discharged to the local drainage network. As the construction works will be carried out close to sensitive watercourses, silt traps will also be required.

As detailed in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), specific controls / mitigation measures will be put in place to manage sediment runoff, erosion and minimise pollution to receiving waterbodies during the Construction Phase. Further details on same are also provided in **Chapter 16**, *Water* and **Chapter 17**, *Land, Soils, Geology and Hydrogeology*.

The following construction management measures will be implemented at the two construction compounds and the bridge assembly area:

- Any containers of potential polluting materials such as fuels and oils will be stored in appropriately bunded containment areas designed to retain spillages;
- All bulk fuel storage will be integrally bunded or kept within a bunded area; and
- A designated bunded refuelling area on an impermeable surface will be provided.

Spill-kits and hydrocarbon absorbent packs will be stored at the two construction compounds and the bridge assembly area, as well as in the cabin of each vehicle. All operators will be fully trained in the use of this equipment.

## 5.10 Landscaping Works

Landscaping is described in more detail in **Chapter 8**, *Landscape and Visual*. Landscaping will generally comprise the following:

- Reinstatement of the northern amenity park area with additional compensatory tree and vegetation planning;
- Provision of additional amenity footpaths; and
- Reinstatement of wooded area below and surrounding Irish rail spans, and the southern wooded area, including compensatory planting of new trees and vegetation surrounding the structure.

## 5.11 Maintenance Works

Bridge structures in Ireland are designed and detailed to Eurocode Standards, which typically provide a 120-year design life. The durability and maintenance requirements of bridges is particularly important due to the long design life and the environment that bridge structures are exposed to. This is particularly relevant for structures in marine environments, where the increased quantity of chlorides due to coastal waters present an additional corrosion risk.

Concrete structures have been proposed for many elements throughout this crossing with the exception of the steel elements of the N25 network arch crossing and parapets. Parapets and tension elements of the N25 crossing will be of stainless steel construction to minimise maintenance requirements.

A maintenance schedule will be put in place by CCC to undertake routine inspection and maintenance / cleaning of all elements of the structure.

Key maintenance and inspection activities to allow the structure to reach its design life are as follows:

- Regular bridge cleaning;
- Annual routine visual inspection;
- Detailed Principal Inspection at maximum 6-year intervals;
- Minor paint maintenance to steelwork after 10-15 years;
- Major paint maintenance to steelwork after 20-25 years;
- Bearing replacement after approximately 40 years;
- Repair of bridge deck surfacing after 10 years; and
- Replacement of bridge deck surfacing after approximately 20 years.

Maintenance works associated with the Proposed Development will involve routine maintenance comprising the following elements:

- Bridge steelwork;
- Bridge cables;
- Reinforced concrete structures;
- Embankments;
- Bridge bearings;
- Lighting; and
- Deck surfacing.

### 5.11.1 Bridge steelwork

Bridge steelwork as part of the N25 bridge crossing is a key element that requires maintenance in order for the overall crossing to achieve its 120-year design life.

Maintenance works associated with the bridge steelwork will involve routine maintenance such as the application of a protective coat of paint to ensure that the steel structure remains in a satisfactory condition over its lifetime. Typically, a steel structure requires protective coating to be re-applied every 20 to 25 years.

Repainting of bridge elements above deck level are proposed to be completed from the bridge deck level.

For repainting of the bridge soffit elements, a section of the highway will need to be closed for overnight closures in a sequential fashion to allow for the maintenance works to take place. Whilst this may cause network disruption, it is expected painting could take place in a staged fashion during the overnight closures of sections of the road and using traffic management. This will minimise disruption levels.

An alternative method to painting is the use of weathering steel which does not require the application of a protective coating system or repainting. This type of material is not generally suitable for coastal environments. However, it is possible to justify its use with suitable testing for chloride levels in the air. A painted steel structure will be more onerous for its environmental impacts due to the requirements for repainting. This will therefore be assessed in this EIAR.

### 5.11.2 Bridge cables

It is anticipated that network rail arch tension 'cables' will be of stainless steel Macalloy bar construction. Maintenance of these elements is not expected. However, regular inspection of the stainless steel elements will be conducted to ensure that no corrosion takes place, particularly at locations close to the tension members connections with the bridge steelwork, due to the potential for bimetallic corrosion. Inspection and maintenance works are expected to take place from deck level.

### 5.11.3 Reinforced concrete structures

Reinforced concrete structures can last their entire 120-year design life without any significant maintenance works required, if detailed correctly. Regular inspection of reinforcement concrete structures will take place to identify any concrete defects or reinforcement corrosion early and to allow for corrective action to take place.

### 5.11.4 Embankments

Embankments are typically low maintenance and if detailed correctly can outlast the adjacent structures without significant maintenance works required. Regular inspection of embankments will take place to identify defects and to allow for corrective actions to take place. If planting is used on embankments, maintenance of the landscaping works will be required.

### 5.11.5 Bridge bearings

The use of bridge bearings will be minimised where possible to reduce the maintenance works required. Bearings will be required on the N25 span. The bridge abutments have been designed to allow the inspection of bearings from the roadside. However, it will also be possible to inspect the bearings from the bridge deck with the use of cameras and drone technology. Bearings have a lower lifespan than the structure and will likely need to be replaced. The bridge abutment will be designed to allow jacking of the structure locally and replacement of the bearings. This would be conducted with the use of traffic management and a lane closure on the N25.

### 5.11.6 Lighting

Lighting of the proposed structure and embankments will be integrated into the parapets. Lighting will be directional, anti-glare and functional to avoid light spill off the structure whilst maintaining a safe feel for users. Lighting will be designed to be inspected and maintained from the structures deck and will not interfere with the adjacent woodland or stream areas. For approach footways / cycleways off the structures and embankments where no parapets are required, lighting will be provided from lighting poles where existing lighting sources is not adequate.

### 5.11.7 Deck surfacing

Deck surfacing is to consist of either:

- A combination of bituminous paving on embankments and elevated ramp structures; and / or
- An approved combined bridge deck waterproofing and surfacing system.

Surfacing will require regular sweeping with CCC's normal cycle path sweeping equipment. Intermittent washing with high pressure water washing will also take place to remove any potential moss or vegetation formation, particularly in wooded and shaded areas. No chemicals are required for deck cleaning and water run-off will be prevented from entering the adjacent watercourses by the bridge drainage system.

Ramp and bridge deck surfacing has a lower design life when compared to the structures themselves, with it typically being 15-25 years. Therefore, the surfacing will need to be replaced throughout the lifespan of the Proposed Development. Replacement works will be completed by licenced contractors with suitable proposals being developed and approved to ensure that any waste products are recycled or disposed of appropriately and to prevent any contamination of the surrounding environment during the works.

### 5.11.8 Parapet infill

The mesh parapet infill system, if used, will be maintained and / or replaced as required over the lifetime of the Proposed Development. This can be done from deck level and will not require any construction interaction with the surrounding environment.

## 5.12 References

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Transport Infrastructure Ireland Series 600 Specification for Earthworks.

Waste Management (Shipments of Waste) Regulations, 2007.

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## Chapter 06

# Planning and Policy

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## Images


Image 6.1: National Strategic Outcomes 1

# 6. Planning and Policy

## 6.1 Introduction

This chapter of the EIAR sets out the planning policy context within which the Proposed Development is presented. This chapter addresses national, regional and local planning policy issues pertinent to the assessment of the Proposed Development and gives consideration to the supporting planning case.

A description and overview of the Proposed Development is provided in **Chapter 4**, *Description of the Proposed Development*.

## 6.2 National Planning Policy

### 6.2.1 Project Ireland 2040 – National Planning Framework

The Department of Housing, Planning and Local Government published Project Ireland 2040: National Planning Framework (NPF) in February 2018 (Department of Housing, Planning and Local Government, 2018). The NPF represents the overarching national planning policy document of direct relevance to the planning functions of regional and planning authorities, including An Bord Pleanála, and since the 16th of February 2018, it replaced the National Spatial Strategy (NSS).

The NPF, which provides the framework for future development and investment in Ireland, is fully supported by the Government's investment strategy for public capital investment and investment by the State sector in general. It is the overall plan from which other, more detailed plans will take their lead, including city and county development plans and regional strategies, hence the title, National Planning 'Framework'.

The goals of the NPF are expressed as National Strategic Outcomes and are illustrated in **Image 6.1**.


**Image 6.1: National Strategic Outcomes**

Section 3.4 of the NPF focuses on the Southern Region of Ireland. Cork Metropolitan Area lies within the South-West regional area of the Southern Region, and it is within this Area that the Proposed Development is located.

The NPF states that Cork and its Metropolitan Area needs to "*focus on more balanced and compact, connected growth. This means that housing development should be based on employment growth, higher densities, access to amenities and sustainable transport modes, in order to avoid long-distance commuting patterns and quality of life impacts*". The NPF states that strategies will be developed deliver *"improved public spaces and enhanced public transport as well as safe and pleasant options for walking and cycling"*.

'Key future growth enablers' set out for Cork include:

- The development of a much-enhanced public transport system; and
- Improving sustainable transport links.

The Proposed Development is wholly compliant with these key growth enablers and will assist in meeting the objectives of the NPF, as:

- It will contribute to the wider growth of the Southern Region;
- It is located on an existing public transport corridor and will maximise the potential of this public transport service;
- It will link transportation and employment areas to pedestrian routes and a strategic cycleway network; and
- It will provide an enhanced public realm and amenity area.

In addition, the Proposed Development is in line with National Policy Objective 64 to *"Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions"*.

### 6.2.2 National Development Plan 2021-2030

The National Development Plan (NDP) 2021-2030 (Government of Ireland, 2021) supersedes the previous iteration which was initially published in conjunction with the NPF in February 2018. The NDP is the national plan setting out investment priorities to guide national, regional and local planning and investment decisions over the timeframe of the plan. The revised NDP was delivered amidst the Covid-19 and aligns the economic recovery with the NPF and Climate Action Plan. The priorities of the plan are stated as National Strategic Outcomes (NSO), refer to **Image 6.1**.

NSO 2 focuses on enhanced regional accessibility. With respect to transport, the NDP aims to implement measures to "*enhance intra-regional accessibility through improving transport links between key urban centres of population and their respective regions, as well as improving transport links between the regions themselves*."

NSO 4 focuses on sustainable mobility and recognises that the implementation of an environmentally sustainable public transport system will meet the increase in travel demands and address urban congestion while contributing towards the *"national policy vision of a low-carbon economy. Furthermore, the provision of safe alternative active travel options such as segregated cycling and walking facilities can also help alleviate congestion and meet climate action objectives…"*.

NSO 7 focuses on enhanced amenity and heritage. Cultural heritage is recognised as a key component and contributor to the attractiveness and sustainability of cities. In addition, *"all elements of living space including streets, public spaces, built heritage and natural amenity areas, cultural and sporting opportunities and sustainable transport networks, all of which play a central part in defining the character and attractiveness of places"*.

The Proposed Development complements the NDP as it will provide additional sustainable travel options and encourage a significant modal shift in transport. In addition to providing segregated cycle and walking facilities the Proposed Development also assists in providing an enhanced public realm and amenity area which will add to the attractiveness of the area.

### 6.2.3 Climate Action Plan 2023

The Climate Action Plan was prepared by the Government of Ireland in 2019, with an updated version published in 2023 (DECC, 2023). The purpose of the Climate Action Plan is to identify actions to be put in place for each sector with the objective of reducing Ireland's greenhouse gas emissions and thereby achieving EU targets of economy-wide carbon budgets and sectoral emissions ceilings. The Climate Action Plan 2023 sets out a roadmap for taking decisive action to halve our emissions by 2030 and reach net zero no later than 2050. The sectors identified as having a high carbon footprint include agriculture, electricity, buildings, industry, transport and waste management.

In relation to the transport sector the Climate Action Plan seeks to provide a good public transport, cycling and walking infrastructure, improve the energy efficiency of vehicles, and adopt the 'Avoid-Shift-Improve' approach to reduce the need for travel and the use of encourage sustainable travel modes. Furthermore, the associated Climate Action Plan Annex of Actions highlight actions for government and local authority to adopt to achieve Ireland's emissions reduction targets, including an emphasis on actions related to active transport accessibility and prioritisation.

In relation to the transport sector, the Climate Action Plan calls for a significant cut in transport emissions by 2030 through measures including:

- 500,000 extra walking, cycling and public transport journeys per day by 2030;
- Increasing the proportion of kilometres driven by passenger electric cars to between 40 and 45% by 2030, in addition to a reduction of 10% in kilometres driven by the remaining internal combustion engine cars;
- Increased rollout of rural public transport through Connecting Ireland (42-50% reduction in emissions by 2030); and
- All replacements for bus and commuter rail vehicles and carriages to be low or zero carbon by 2030.

The Proposed Development supports the principles of the Climate Action Plan in so far as it will encourage people to choose alternative modes of transport (i.e., cycling and walking). Every shift, however small, from the private vehicle to public transport, cycling or walking is positive and is a gain in terms of climate action.

An appraisal of the Proposed Development under the heading of Climate is included in **Chapter 12**, *Climate*.

### 6.2.4 Smarter Travel: A Sustainable Transport Future 2009-2020

'Smarter Travel – A Sustainable Transport Future' (Department of Transport, 2009) is a policy framework which sets out how the vision of a sustainable travel and transport system can be achieved. The objective of the policy framework is to reduce the demand for private car travel: *"To support sustainable travel, future population and employment growth will have to predominantly take place in sustainable compact urban areas or rural areas, which discourage dispersed development and long commuting"*.

Five key goals which form the basis of the policy framework include the following:

1. Improve quality of life and accessibility to transport for all and, in particular, for people with reduced mobility and those who may experience isolation due to lack of transport.
2. Improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks.
3. Minimise the negative impacts of transport on the local and global environment though reducing localised air pollutants and greenhouse gas emissions.
4. Reduce overall travel demand and commuting distances travelled by the private car.

5. Improve security of energy supply by reducing dependency on imported fossil fuels.

Chapter 5 of the Smarter Travel Policy document identifies actions to deliver alternative ways of travelling. Of all travel modes, cycling and walking have the lowest environmental impact. The Policy recognises that to successfully promote cycling and walking as realistic alternatives to the private car, a safe and pleasant experience must be provided.

Action 7 of the Smarter Travel Policy document identifies the requirement to *"implement safe walking and cycling routes to and from schools and other educational institutions*" and Action 16 recognises the "*strong convergence between walking as a tourism asset and walking as recreational activity for local residents*".

Over the years, Cork City Council and Cork County Council (CCC) have developed a number of plans and strategies to help achieve the national Smarter Travel Policy objectives. These include:

- The Cork Metropolitan Area Transport Strategy (CMATS) 2040; and
- Cork Cycle Network Plan (CCNP) 2017.

The recently published National Planning Framework (NPF) 2040 envisages that Cork will become the fastest-growing city region in Ireland with a projected 50% to 60% increase of its population in the period up to 2040. The projected growth and increased demand for travel will also intensify Ireland's current decarbonisation challenge, as transport accounts for approximately 20% of the country's greenhouse gases. The CMATS is aligned with the Climate Action Plan 2023 and is committed to facilitating a shift toward sustainable and active modes. To address these challenges, the CMATS 2040 has been developed by the National Transport Authority (NTA) in collaboration with Transport Infrastructure Ireland (TII), Cork City Council and CCC (NTA, 2020). The CMATS is discussed further in Section 6.4.1.

The objective of the CCNP 2017 is to provide a clear plan for the future development of the cycling network within the Metropolitan Area, to encourage greater use of cycling for trips to work, school, recreation and leisure. Development of the CCNP has been driven by a need to respond to national targets for sustainable transport as set out in 'Smarter Travel, A New Transport Policy for Ireland 2009-2020'. The CCNP 2017 is discussed further in Section 6.4.2.

The Proposed Development aligns with the Smarter Travel Policy document both at a national and local level. In developing the CMATS and the CCNP, cognisance was taken of the Smarter Travel Policy document to ensure increased uptake of alternative transport, including cycling and walking. The Proposed Development will encourage people to move from private vehicle use to alternative modes of transport (i.e., cycling and walking). The alternative transport modes of cycling and walking are more sustainable than private vehicle use and will also generate more health benefits.

### 6.2.5 Achieving Effective Workplace Travel Plans: Guidance for Local Authorities

The National Transport Authority (NTA) published 'Achieving Effective Workplace Travel Plans: Guidance for Local Authorities' (NTA, 2013) to assist local authorities with the implementation of workplace travel plans in the development plan process and the development management process.

The guidance suggests that the requirement for a workplace travel plan or a workplace travel plan 'statement' should be assessed on a case-by-case basis. Consideration should be given to the location of the development, the scale of the development, the precise nature of the uses proposed and the anticipated impact on the surrounding area regarding trip volume and congestion. 'Standard' workplace travel plans should be required if an existing or Proposed Development has the potential to employ over 100 persons.

While the Proposed Development does not meet the requirement for the preparation of a 'standard' workplace travel plan, it aligns with the guidance by facilitating active travel of employees to their place of work at a number of businesses and industries within the Cork Metropolitan Area.

Separately, the Cork County Development Plan (CCDP) 2022-2028 (CCC, 2022) outlines the need for the preparation of a 'Mobility Management Plan' for new developments. Refer to Section 6.4.3 for further details.

### 6.2.6 Spatial Planning and National Roads: Guidelines for Planning Authorities

'Spatial Planning and National Roads: Guidelines for Planning Authorities' (Department of Environment, Community and Local Government, 2012) sets out planning policy considerations relating to developments affecting national primary and secondary roads, including motorways and associated junctions, outside the 50-60km/h zones for cities, towns and villages.

The guidelines aim to achieve and maintain a safe and efficient network of national roads within the broader context of sustainable development and transportation strategies. The following key principles informed these guidelines:

- Land-use and transportation policies are highly interdependent;
- Proper planning is central to ensuring road safety;
- Development should be plan-led;
- Development management is the key to plan implementation; and
- Planning Authorities and the National Roads Authority and other public transport bodies must work closely together.

The Proposed Development directly facilitates this by providing an accessible and active travel alternative for pedestrians and cyclists within the region.

## 6.3 Regional Planning Policy

### 6.3.1 Southern Regional Assembly: Regional Spatial and Economic Strategy (RSES)

The Regional Spatial and Economic Strategy (RSES) (Southern Regional Assembly, 2020) sets out a 12-year strategic development framework for the Southern Region and includes Metropolitan Area Strategic Plans (MASPs) to guide the future development of the Region's three main cities and metropolitan areas – Cork, Limerick-Shannon and Waterford. The RSES for the Southern Region came into effect on 31st January 2020.

The purpose of the RSES is to support the implementation of the NPF while facilitating choices that reflect the differing needs of the regions. The strategies are proposed in the context of a renewed focus on 'regional parity' in the NPF being promoted to address anti-competitive pressures on Dublin, by offering more sustainable choices and options for people, businesses and communities that can positively influence more sustainable patterns of living and working which benefit our entire society and make our economy more equitable and resilient.

The vision for the Southern Region is outlined in the RSES as follows:

- Nurture all our places to realise their full potential;
- Protect and enhance our environment;
- Successfully combat climate change;
- Achieve economic prosperity and improved quality of life for all our citizens;
- Accommodate expanded growth and development in suitable locations; and
- Make the Southern Region one of Europe's most creative, innovative, greenest and liveable regions.

The Proposed Development alights with the Southern Region's RSES by providing sustainable travel alternatives for the residents and visitors of Little Island.

### 6.3.2 Southwest Regional Planning Guidelines

The Southwest Regional Planning Guidelines (Southwest Regional Authority, 2010) were implemented to fulfil the Southern Region's obligations to prepare regional planning guidelines (RPGs) under the Planning and Development Act, 2000, as amended. The regional planning guidelines for the Southwest Region act as a regional tier in the hierarchy of plans and policies and influence local area plans and local development plans.

A key component of the RPGs is to drive the sustainable growth and prosperity of the region. The RPGs contain statements and analysis of key economic objectives with a set of planning guidelines to be incorporated within the development plans of all local authorities within the region. The specific functional areas that have been identified within the RPGs are as follows:

- Greater Cork Area (including Cork Gateway and Mallow Hub);
- Tralee / Killarney linked hub;
- Northern area; and
- Western area.

Development priorities in these RPGs that relate specifically to the Greater Cork Area (including Little Island) include:

- Realignment and reinforcement of spatial planning and land use policies;
- Plan for an increase in the population and employment of the Cork Gateway;
- Refocusing of economic and investment strategy; and
- Front-loading of infrastructure investments for the Cork Docklands

There are also a number of infrastructural provisions and upgrades for the Cork Greater Area that have been prioritised that include:

- Upgrading of N25 Cork-Waterford;
- Dunkettle Interchange; and
- The N25 flyovers within Cork.

The Proposed Development satisfies the objectives listed within the Southwest Region RPGs as it constitutes an upgrade to the N25 infrastructure and provides sustainable means of transportation to people within the area of Little Island.

## 6.4 Local Planning and Transport Policy

The Proposed Development is located in Little Island, County Cork. CCC is committed to intensifying public transport delivery and usage to deliver growth and improve quality of life in Cork. The Cork County Development Plan 2022-2028 supports the Proposed Development as part of the Cork Metropolitan Area Transport Strategy (CMATS) 2040, which is the overall transport strategy for the Cork Metropolitan Area.

### 6.4.1 Cork Metropolitan Area Transport Strategy (CMATS) 2040

The Cork Metropolitan Area Transport strategy (CMATS) (NTA, 2020) has been published in the context of the NPF which envisages that Cork will become the fastest growing city region in Ireland in the coming years. Cork's population is estimated to result in a projected 50% to 60% increase in the period up to 2040. This projected population and associated economic growth will result in a significant increase in the demand for travel. This demand needs to be managed and planned for carefully to safeguard and enhance Cork's attractiveness to live, work, visit and invest in.

The Strategy will provide a coherent transport planning policy framework and implementation plan around which other agencies involved in land use planning, environmental protection, and delivery of other infrastructure such as housing and water can align their investment priorities. CMATS will inform the development of regional and local planning, and associated investment frameworks.

The Strategy aligns with the statutory Cork Metropolitan Area Strategic Plan (MASP), the Southern Assembly's Regional Spatial and Economic Strategy (RSES) and the statutory Development Plans of both Cork City Council and CCC.

The CMATS contains a number of guiding principles across a number of transport modes, to achieve the vision set out within the CMATS, including the following:

- **Principle 1:** 'To support the future growth of the CMA through the provision of an efficient and safe transport network';
- **Principle 2:** 'To prioritise sustainable and active travel and reduce car dependency within the CMA'; and
- **Principle 3:** 'To provide a high level of public transport connectivity to key destinations within high demand corridors'.

The CMATS aligns with the key goals set out in the Smarter Travel Policy (refer to Section 6.2.4) in its efforts to deliver viable and attractive alternatives to the private car in Cork.

The Proposed Development is relevant to a number of the proposals in the CMATS, including:

- *'The routes outlined in the 2017 Network Plan* (i.e., the Cork Metropolitan Cycle Network Plan 2017) *have largely been retained and updated to include new primary routes. These include future high quality, segregated routes developed and integrated into the design and development of the Northern Distributor Road and Southern Distributor Road and a new link from Dunkettle to Little Island to enhance connectivity'*
- *'Primary routes have been designated as such because they experience the highest level of demand. Primary routes are typically direct and provide medium-long radial connections to key destinations across the CMA. These routes are supplemented by secondary and feeder routes which may provide access to residential catchments. Some key primary cycle routes to be improved within the CMA include: Segregated routes along the City Docks waterfront areas including the EuroVelo Route 1 from Cork City Centre to Tivoli and Little Island'.*
- *'The provision of additional road network infrastructure within the Urban Expansion Areas (UEAs) in Cork County is required to support the development of these areas. Local road network improvements in these areas will be designed to effectively accommodate all modes of transport. The over-arching objective of these roads is to reduce through traffic and to facilitate walking, cycling, public transport access and public realm improvements in town and village centres. Similarly, improvements to the road network at Little Island should be designed with the intention of prioritising walking and cycling access particularly between the railway station / bus services and employment destinations / residential areas'*
- *'Local authorities should seek to translate the overarching outcomes and objectives through the use of area specific Local Transport (Implementation) Plans sometimes referred to as Sustainable Urban Mobility Plans (SUMPs) at city or Metropolitan town centre level. These Plans should set ambitious and realistic targets to prioritise active and sustainable transport mode shares that reduce local private motor trips over the short, medium and long term. Cork County Council are currently progressing a LTIP at Little Island and envisage future LTPs for Carrigaline, Ringaskiddy, Midleton and other urban settlements'.*

CMATs identifies two new crossings of the N25 which are identified as primary cycle routes. The first of these crosses the N25 to the east of the Proposed Development and forms part of the Dunkettle Scheme which is currently under construction. The other primary crossing identified is to the east of Junction 2 Little Island Interchange, close to the location of the proposed crossing which is the subject of this assessment. Therefore, the Proposed Development directly aligns with the CMATs proposal.

### 6.4.2 Cork Cycle Network Plan

The Cork Cycle Network Plan (CCNP) (CCC & Cork City Council, 2017) has been prepared for the Cork Metropolitan Area. The objective of the CCNP is to provide a clear plan for the future development of the cycling network within the Cork Metropolitan Area to encourage greater use of cycling for trips to work, school, recreation and leisure.

Development of the CCNP has been driven by a need to respond to national targets for sustainable transport as set out in Smarter Travel: A Sustainable Transport Future 2009-2020 (Department of Transport, 2009).

The CCNP identified the modal share for cycling within the Cork Metropolitan Area as 1.7% in 2017 (compared to the national modal share of 2.3%) and set a target for this to increase to 10% in 2020.

It can therefore be seen that the take-up of cycling within the Cork Metropolitan Area is relatively low and as such there is a need to provide strategic direction to influence modal shift. The purpose of the CCNP is limited purely to recommendations for cycling infrastructure and development of an integrated and coherent cycling network. It does not provide recommendations in relation to additional behaviour change and spatial planning measures which also need to be considered if modal shift is to be achieved.

The area of Little Island is currently limited in cycling infrastructure. However, the CCNP has detailed that the areas of Glanmire, Glounthane and Little Island are proposed areas for new cycle infrastructure. Little Island is currently dominated by commercial land use and is located to the east of Cork City. There is a general lack of access routes with the N25 acting as a boundary to the north and the southern, eastern and western boundaries of Little Island being confined by Cork Harbour. At present, the Little Island area is predominantly accessed via the Dunkettle interchange at its westernmost extent, the Little Island Interchange and associated footways, slip lanes on and off the N25 and an overbridge which connects it with the L3004 Glounthaune Road, north of the N25. The only route from which it can currently be accessed by vulnerable road users is via this overbridge to and from the L3004 Glounthaune Road.

There are currently relatively few cycling facilities going to or from Little Island. Dedicated cycling facilities currently exist along the Dunkettle Q-link Road to Little Island. However, these facilities lack continuity at junctions and major crossing points.

Glounthaune is a mainly residential settlement located to the northeast of Little Island on the north side of the N25 national route 10km from Cork City. Glounthaune is primarily accessible from the L3004 Glounthaune Road, with a single, isolated junction connecting the two. The village is also connected to Glanmire via a narrow residential, local road. Cycling access to Glounthaune from the Little Island area has recently been improved as a result of the opening of the inter-urban cycle route I-U1 which was identified within the CCNP.

The CCNP is inclusive to detailed maps that illustrate the proposed cycling network for the Little Island area. Little Island will have three main primary routes, which will run in north-south and east-west directions respectively with three secondary routes interlinking with these. A new bridge primary route to the east of Junction 2 Little Island Interchange, close to the location of the Proposed Development, has been detailed in the CCNP, while a new link to the west of Little Island will span across the N25 to connect into two interurban routes extending to Glanmire and the future Glanmire masterplan site, as well as an inter-urban route which connects directly with the City Centre to the west and Carraigtwohill and Midleton to the east. It is an objective of the CCNP to identify a high-quality direct cycle link between the Tivoli area of Cork City and Little Island. No specific route has been identified within the CCNP. It remains an objective of the CCNP to make provision for such a link.

The Proposed Development supports both the CMATS and the CCNP. Overall, the implementation of the CMATS and the construction of a new pedestrian and cyclist bridge is seen as a positive measure which will encourage a modal shift from other forms of transport.

### 6.4.3 Cork County Development Plan 2022-2028

The Cork County Development Plan (CCDP) 2022-2028 (CCC, 2022) has been prepared in accordance with the steps set out in the Planning and Development Act, 2000, as amended. The CCDP 2022-2028 came into effect on 6th June 2022. It is expected to remain in force (subject to any interim variations that the Council may make) until 2028. The CCDP is a six-year development plan for the County that attempts to set out, as concisely as possible CCC's planning policy to 2028. The CCDP also sets out the overall planning and sustainable development strategy for the county which must be consistent with the NPF and the Southern Region RSES and Cork Metropolitan Area Strategic Plan (MASP) 2020.

The CCDP 2022-2028 differs from the previous County Development Plan in two key areas:

- The Plan relates to the new administrative boundary of the county, post the extension of the City boundary.
- The CCDP 2022 from 6th June 2022 replaced:

- The Cork County Development Plan, 2014;
- The 8 Municipal District Local Area Plans adopted in 2017; and
- The 9 Town Development Plans of former Town Council Towns.

The core strategy of the CCDP outlines strategic priorities for the Cork Metropolitan area to ensure it can fulfil its strategic function as a driver for growth in the Southwest Region. Some strategic priority areas as they relate to the Proposed Development include:

- Promote Metropolitan Cork development as an integrated planning unit to function as a single market area for homes and jobs where there is equality of access for all, through an integrated transport system, to the educational and cultural facilities worthy of a modern and vibrant European City;
- Provide an enhanced public transport network linking the City, its environs, the Metropolitan towns and the major centres of employment; and
- Develop the Cork City Environs so that they complement the City. In the South Environs, priority should be given to consolidating the rapid growth that has occurred in recent years by the provision of services, social infrastructure and recreation facilities to meet the needs of the population. The North Environs will play a major role in the rebalancing of the City in terms of future population and employment growth.

The CCDP 2022-2028 also outlines the need for the preparation of a Mobility Management Plan (MMP) for new developments. A MMP will be prepared for the Proposed Development by the contractor to encourage access to the site by its workforce using sustainable forms of transport such as walking, cycling and public transport. Refer to the Construction Environmental Management Plan (CEMP) in **Appendix 5.1** in **Volume 4** of this EIAR for further details.

### 6.4.4 Cork 2050: Cork's Submission to the NPF (2017)

Cork 2050: Cork's Submission to the NPF (Cork 2050) (CCC and Cork City Council, 2017) is a joint submission by Cork County and City Councils to the NPF as part of the consultation process for a new framework. Cork 2050 establishes a strategic vision for the growth of the 'whole of Cork' which is focused on future sustainable development. Cork 2050 further prioritises strategic infrastructural investment in Cork across key sectors including transport, health and environment.

The submission outlines the region's approach to maximising the potential of Cork by building on strengths and addressing issues that limit opportunities. A key component of the submission outlines the capacity of Cork to relieve pressure on Dublin and drive the growth in the Southern Region to support a stronger national economy. Cork 2050 states the region is the best location nationally capable of:

- Achieving a critical mass of population within the Metropolitan Area (Cork City, County Towns, Rural Areas and Islands) with in excess of 500,000 people by 2050;
- Creating up to 120,000 jobs over the next 33 years;
- Supporting high-capacity public transport corridors of a scale that underpins high levels of sustainable economic and population growth; and
- Facilitating growth through significant infrastructure capacity and supplemented by committed upgrades and a programme of investment up to 2050.

The submission identifies an East-West Metropolitan Growth Corridor which incorporates Little Island. The Little Island train station and the N25 are noted as being part of the strategic transport corridor which is vital for the future growth of the region. Principle actions which are specific to transport and relating to Little Island within Cork 2050 include:

- Deliver public transport corridors across Metropolitan Cork in the form of BRT / LRT and rail;
- Increase population densities along public transport corridors at certain locations to achieve averages of between 3,500 - 4,500 persons per sq. km within a 1km zone;
- Support expansion of towns along public transport corridors in Metropolitan Cork;

- Invest in local infrastructure (water services, roads, cycling etc.) and the public realm of Cork City, county towns and villages, focussing on improving health and wellbeing; and
- Develop key roads infrastructure, particularly the Dunkettle Interchange, M20, M28 and Northern Ring Road and in strategic transport corridors.

The Proposed Development directly supports Cork 2050 by delivering on the targets to develop sustainable infrastructure within an area identified as a key Growth Corridor. In providing alternative means of sustainable transport to Little Island from the region, the Proposed Development provides an active transport route that satisfies the objective of Cork 2050.

### 6.4.5 Little Island Transportation Study – Final Strategy Development Report

CCC commissioned the Little Island Transportation Study (LITS) (CCC, 2018) to identify existing transportation issues within Little Island and to explore potential solutions. A further driver for the study was to ensure that an integrated and balanced approach to transportation engineering was in place for Little Island to fulfil its strategic function as an employment location, logistics hub and residential community.

The LITS aims to determine what transport infrastructure improvements and policy measures are required to alleviate severe peak hour traffic congestion. An increase in active travel and public transport use are promoted as measures which will improve the environment for general traffic, cyclists, pedestrians and public transport vehicles.

A public questionnaire was conducted which noted that better quality walking and cycling links from the Little Island train station to Little Island was the top reason to encourage people to use the train to travel to Little Island. Additionally, 77% of respondents rated the general traffic conditions in Little Island as very poor, with 35% and 67% stating that pedestrian and cyclist infrastructure, respectively, was very poor. The LITS determined that pedestrian volume was highest in the PM peak at the N25 overbridge, with 249 pedestrians travelling towards Little Island train station.

The Proposed Development will satisfy the objectives of the LITS by providing a necessary upgrade to the pedestrian and cycling infrastructure within Little Island. In turn, this will reduce vehicle movements in Little Island by creating a link between the train station and the surrounding environs.

### 6.4.6 Little Island Transportation Study – Strategy Design Report

The Little Island Transportation Study – Strategy Design Report (SDR) (CCC, 2019) provides additional detail in relation to the design of the proposed infrastructure and policy measures to be implemented in Little Island over a 20-year period to ensure sustainable growth. The SDR should be read in conjunction with the LITS (refer to Section 6.4.6) as it focuses on the key elements of the transport strategy developed for Little Island.

To inform the report, the following details were assessed and incorporated:

- National, regional and local planning and policy documents guiding the development of Little Island;
- Current traffic conditions in Little Island including key issues identified during site visits and public consultation;
- The evaluation framework utilised to assess various LITS strategies including the development of a study vision and goals;
- The development of the Little Island Traffic Model (LITM) used to test various transport strategies; and
- The assessment of test strategies through the identified evaluation framework; and
- The identification of the emerging preferred LITS Strategy.

Following the assessment of the above details, the SDR categorised the implementation of required measures into three delivery streams:

- Short-term (2018-2023) strategy measures;

- Medium-term (2023-2030) strategy measures; and
- Long-term (2030-2040) strategy measures.

The SDR recommended that the transport strategy proposals aimed at increasing the mode share for sustainable modes are frontloaded in the implementation plan. As a result, the following Short Term Strategy Measure was incorporated within the report:

> *The mobility hub at the Little Island Train Station, incorporating the pedestrian/cycle footbridge should be prioritised within the first five years of the strategy. It is recommended that a masterplan for the mobility hub, including the pedestrian/cycle footbridge, is commenced on completion of the Little Island Transportation Study, and that it is delivered prior to the delivery of the N25 Interchange to Ballytrasna Park Junction bus priority scheme.*

Therefore, the Proposed Development is directly referenced as a required Strategy Measure within the SDR to enhance pedestrian and cyclist access within Little Island.

## 6.5 Conclusion

This chapter has demonstrated that the Proposed Development is congruent with current national, regional and local transport and planning policy as set out in the various relevant documents presented above.

In recent years, there has been a major shift towards sustainable transport across Ireland at a national, regional and local scale. The Proposed Development, through the provision of additional cycling and walking facilities in Little Island, aligns with the goals of the various planning and policy documents that promote this shift.

## 6.6 References


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## Chapter 07

# Traffic and Transportation

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# 7. Traffic and Transportation

## 7.1 Introduction

This chapter describes the likely significant traffic and transportation impacts associated with the Little Island Pedestrian and Cyclist Bridge (i.e., the 'Proposed Development') during its Construction Phase, Operational Phase and Decommissioning Phase. This chapter presents the baseline transport environment including reporting on existing traffic volumes based on traffic count surveys carried out on the surrounding public road network. The projected increase in traffic associated with the Proposed Development and its likely impacts on the receiving transportation network are assessed. Finally, appropriate mitigation measures to reduce or avoid potential negative impacts on the surrounding transportation network are presented.

The Proposed Development will function as an active travel link for pedestrians and cyclists to travel from the Little Island train station and surrounds to the Eastgate Business Park and the further surrounds of Little Island and vice versa. It will also promote the use of public transport modes by providing a safe and attractive link for people travelling between Little Island train station and Little Island.

In terms of phasing, the assessment is based on the following assumptions:

- Construction Phase start: 2025; and
- Operation year for traffic assessment: 2026.

Further information on the construction of the Proposed Development is described in **Chapter 5**, *Construction Strategy.*

## 7.2 Methodology

A detailed description of the Proposed Development in relation to traffic and transportation is provided in Section 7.3. The assessment methodology used in this impact assessment is set out below.

### 7.2.1 Study area road network

The study area shown in **Image 7.1** is the primary zone of influence with respect to the management of traffic during the Construction Phase and Operational Phase of the Proposed Development. It is also the area most likely to experience temporary changes in traffic flow during the Construction Phase and Operational Phase.

The study area considered as part of this transportation assessment includes the following roads:

- N25;
- R623;
- L3004 Glounthaune Road;
- Eastgate Business Park access road (Eastgate Way); and
- Link Q of Dunkettle Interchange.

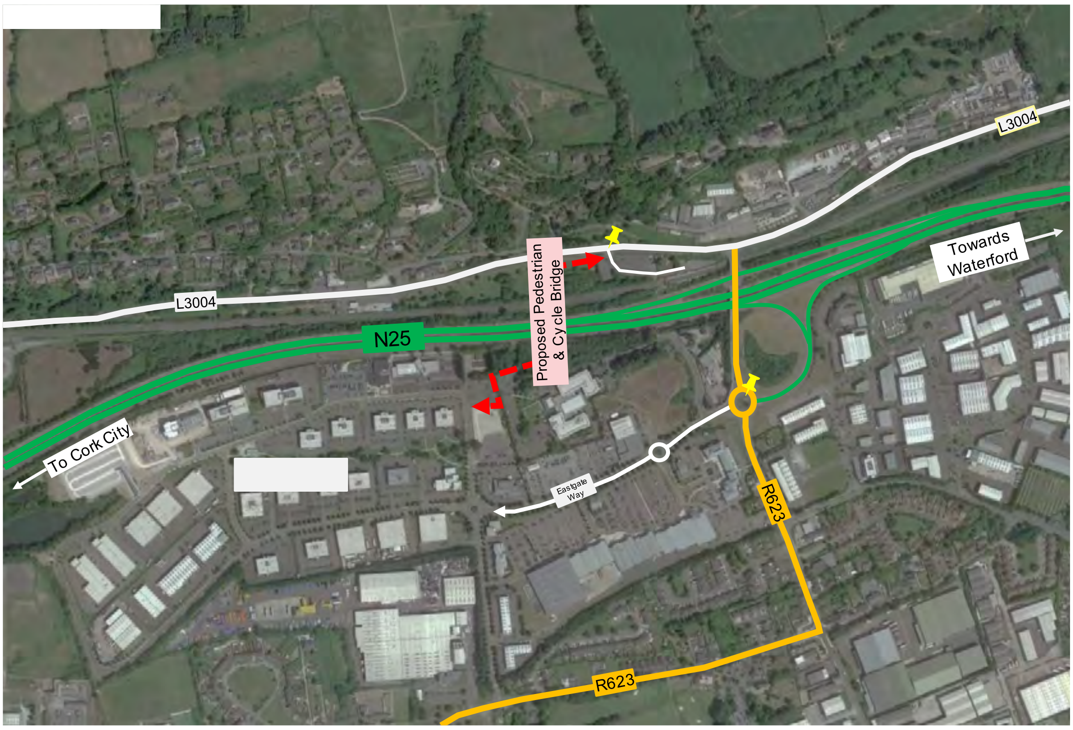


Image 7.1: Road network around the Proposed Development

### 7.2.2 Traffic data collection and collation

Two traffic count surveys completed for two relevant junctions were used in the assessment. The survey for count site 1 was carried out in 2017, while the survey for count site 2 was conducted in 2019. The count sites are shown in **Image 7.1**. The results of both surveys were updated for 2023 by applying industry standard growth rates as per TII's Project Appraisal Guidelines for National Roads Unit 5.3 (TII, 2016).

The time periods assessed as part of this transportation assessment robustly included the morning peak hour and the evening peak hour, with these converted to the 24-hour Average Annual Daily Traffic (AADT) based on the TII's Project Appraisal Guidelines for National Roads Unit 5.3 (TII, 2016). In terms of future assessment years, the Construction Phase is expected to commence in 2025 (subject to planning consent). The Construction Phase is expected to last for 18 months, with 2026 assessed as the operational year.

## 7.3 Baseline Environment

### 7.3.1 Site location

The Proposed Development will function as an active travel link for pedestrians and cyclists to travel from the Little Island train station and surrounds to the Eastgate Business Park and the further surrounds of Little Island and vice versa. The Proposed Development site and its location are illustrated in **Image 7.1**.

### 7.3.2 Local transport network

#### *7.3.2.1 Road network*

The road network in the vicinity of the site is illustrated in **Image 7.1**. A description of each road is provided below.

***N25***

The N25 road is a national primary road, forming the route from Cork to Rosslare Europort via Waterford City. The road is part of the E30 European route and a short section is also part of the E01 European route. It forms part of the proposed Atlantic Corridor route.

Junction 2, where the N25 meets the R623, is the relevant section of N25 for the Proposed Development. The N25 has a width of 33m with three lanes in each direction. The Proposed Development will be built over the N25 and will connect the Little Island train station on its northern side to the Eastgate Business Park on its southern side.

***R623***

The R623 road is a regional road in County Cork,  providing access to / from the N25 and to / from the Little Island Industrial area, located to the south of the N25. The road generally makes provision for one lane per direction, with additional lanes along the wider approaches to junctions to accommodate turning movements. The road is approximately 7 to 10m wide.

***L3004 Glounthaune Road***

L3004 Glounthaune Road is a local road in County Cork, running parallel to the N25 in an east-west direction. The road provides access to the Little Island train station, along with accesses to some residential and industrial uses. The road has a width of 9.8m, with one lane in each direction.

***Eastgate Way***

Eastgate Way provides access to / from the Eastgate Business Park and to / from the R623. It is 8m wide and has one lane in each direction.

***Link Q (Dunkettle Interchange)***

Link Q (Dunkettle Interchange) is a new access road between Little Island and Bury's Bridge Roundabout. A roundabout is located at the southern end of Link Q which meets the R632 at the Little Island access road. Link Q (Dunkettle Interchange) provides access from the L3004 Glounthaune Road to the Jack Lynch tunnel. This tunnel increases connectivity to south and west Cork.

#### *7.3.2.2 Public transport network*

The Proposed Development site is served by both train and bus. The Little Island Irish Rail train station is located approximately 150m away from the Proposed Development. In the southbound Midleton-Cobh direction, trains depart the station every 15 minutes between 5.30am and 8.15pm, with services running every 45 minutes after 8.15pm during the week, while the service is reduced during the weekend. For the northbound Cobh-Midleton direction, the first train departs at 6am. There are trains every 30 minutes between 7am and 7.30pm, and every hour between 7.30pm and 11pm. Likewise, the service is reduced during the weekends.

A bus stop is located at the access point to the Little Island train station on the L3004 Glounthaune Road, nearby the Proposed Development. The bus stop is served by Bus Eireann and Barry's Coaches, as follows:

- Bus 240, from Cork bus station to Ballycotton, serves Little Island bus stop three times per day per direction;
- Bus 241, from Cork bus station to Trabolgan, serves Little Island bus stop once per week on a Saturday in an eastern direction and three times per day in a western direction;
- Bus 260, from Cork bus station to Ardmore, serves Little Island bus stop five times per day per direction;
- Bus 261, from Cork bus station to Ballincurra, serves Little Island bus stop once per day in a western direction and twice per day in an eastern direction;
- Bus 210, from Apple Cork Campus to Castleview, serves Little Island bus stop 16 times per day towards the north and 14 times per day towards the south; and
- Bus 211, from Apple Cork Campus to Castleview, serves Little Island bus stop five times per day in both directions.

### *7.3.2.3 Active travel*

Walking infrastructure within the study area comprises footpaths along the N25, R623, L3004 Glounthaune Road and Eastgate Way on both sides of the road for the most part. There are currently noticeable pedestrian movements between the Little Island train station and Eastgate Business Park and vice versa. **Image 7.2** illustrates the nearby walking infrastructure.

The Dunkettle to Carrigtwohill pedestrian and cycle route is located to the north of the Proposed Development. Having recently become operational, this will bring more users to and from the Little Island train station.

The Dunkettle to Carrigtwohill pedestrian and cycle route forms part of the wider inter-urban cycleway to Midleton, which when complete, will link to the proposed Midleton to Youghal Greenway, approximately 12.5km to the east of the Proposed Development. This 23km greenway will be accessible for both pedestrians and cyclists upon full completion in early to mid-2024. This will increase sustainable connectivity throughout towns and villages in East Cork, namely Midleton, Mogeely, Killeagh and Youghal, and will be complementary to the Proposed Development. Refer to **Image 7.3**.

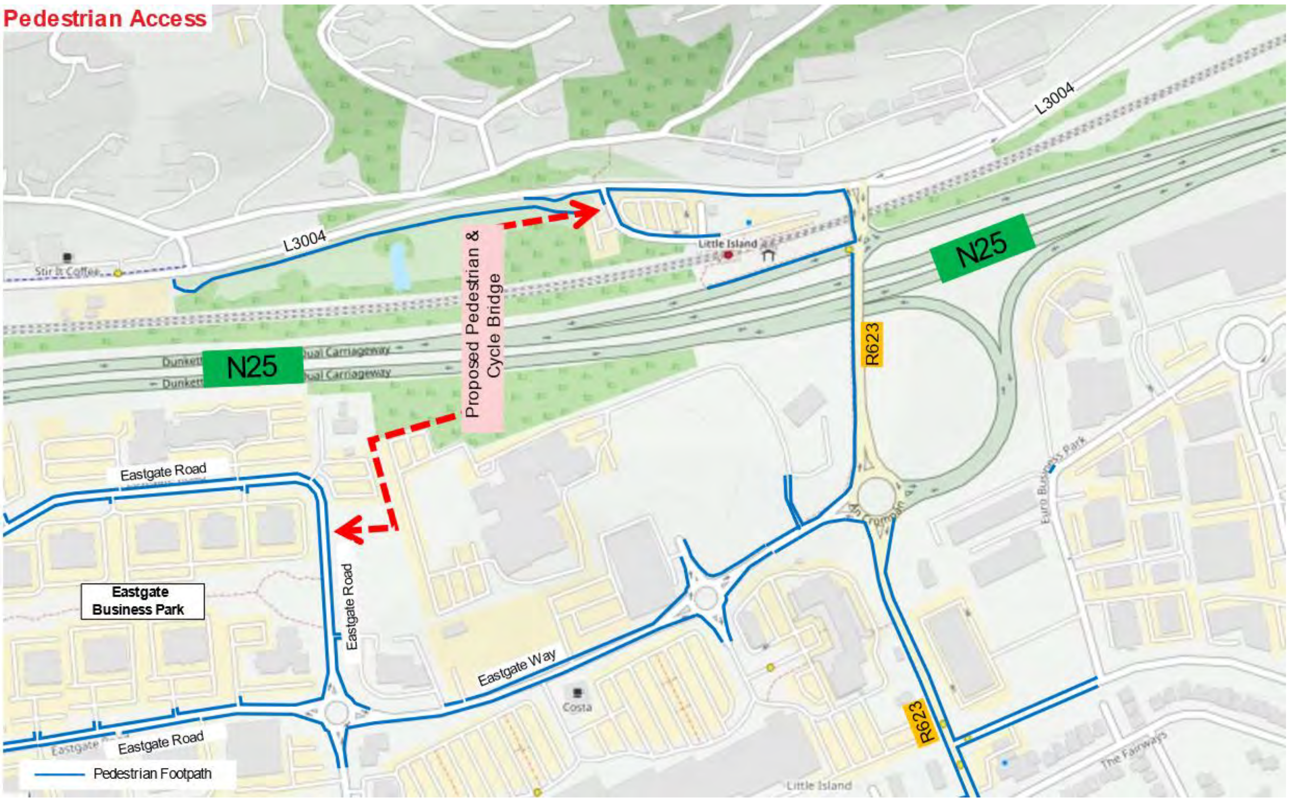


**Image 7.2: Walking infrastructure around the Proposed Development**

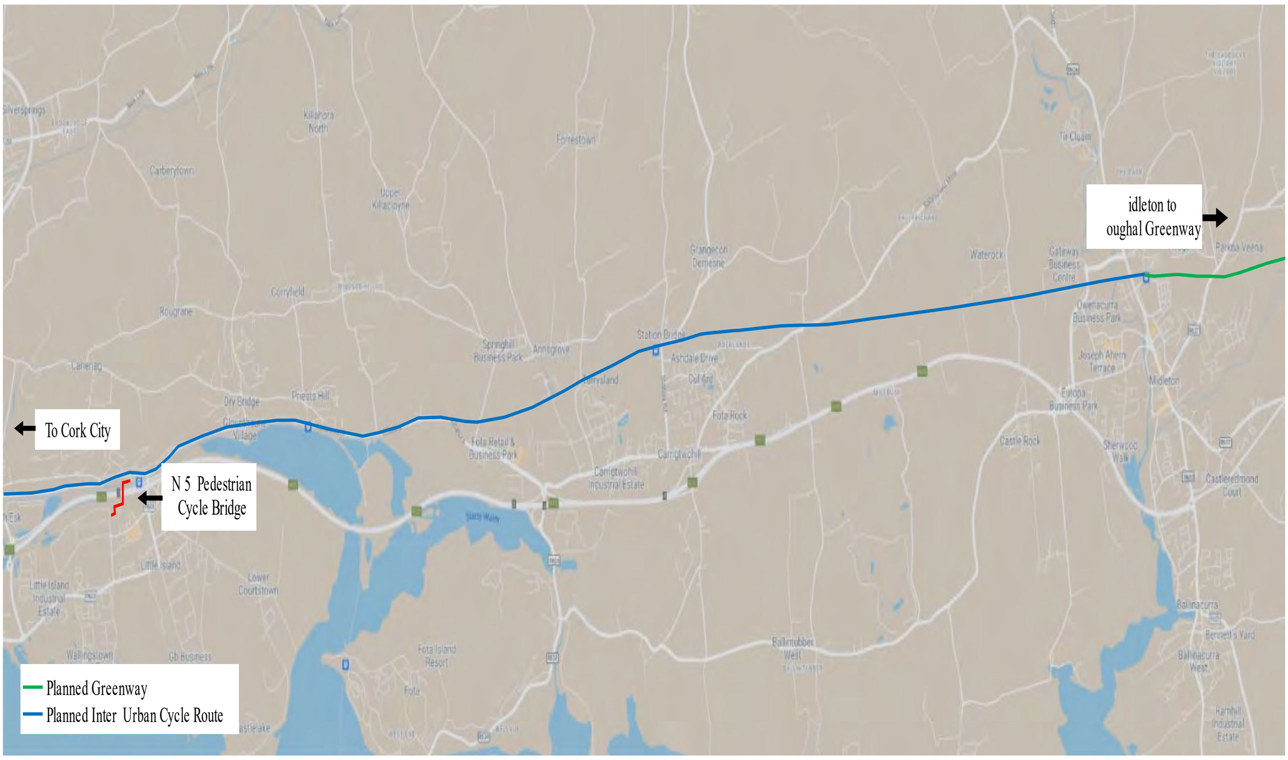


**Image 7.3: Existing / proposed cycle route and greenway in the vicinity of the Proposed Development**

### 7.3.3 Existing travel patterns

To assess the potential impact of the Proposed Development on the future traffic operations of the local public road network, an examination of current baseline traffic operations was carried out. As described in Section 7.2.2, traffic count surveys for two junctions were carried out in 2017 and 2019, with these being adjusted to be reflective of 2023 conditions using the TII Project Appraisal Guidelines (TII, 2016) growth rates.

## 7.4 Potential Impacts

### 7.4.1 Do-Nothing scenario

If the Proposed Development does not proceed, the traffic volume is expected to remain at its current levels. Representative traffic count information for the morning peak hour, evening peak hour and 24 hour Average Annual Daily Traffic (AADT) are presented in **Image 7.4**, **Image 7.5** and **Image 7.6** for the study area public road network.

ARUP

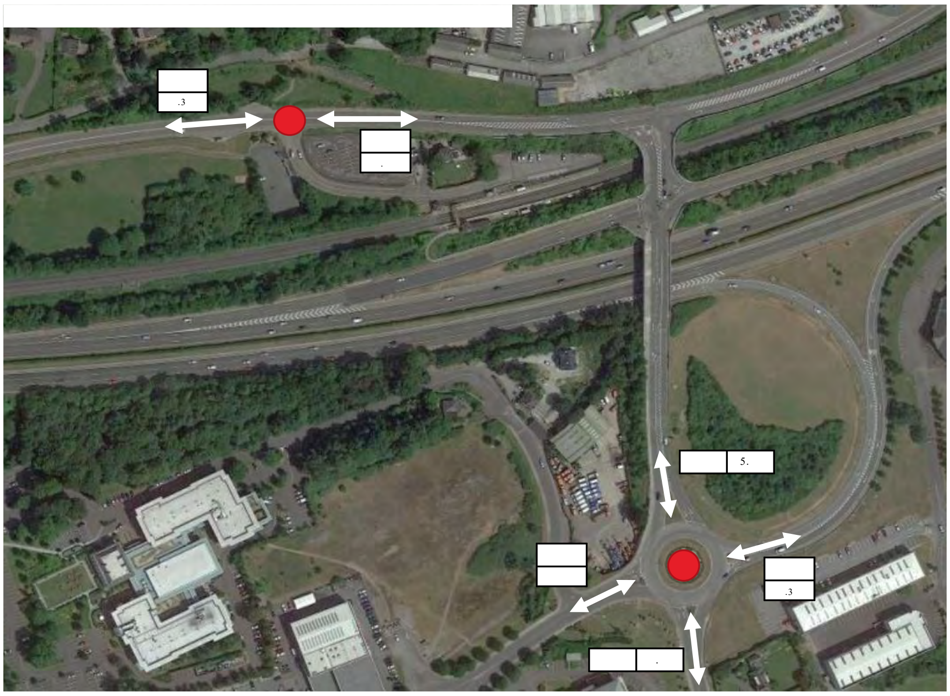

Image 7.4: AM peak hour traffic volume estimates for 2023

ARUP

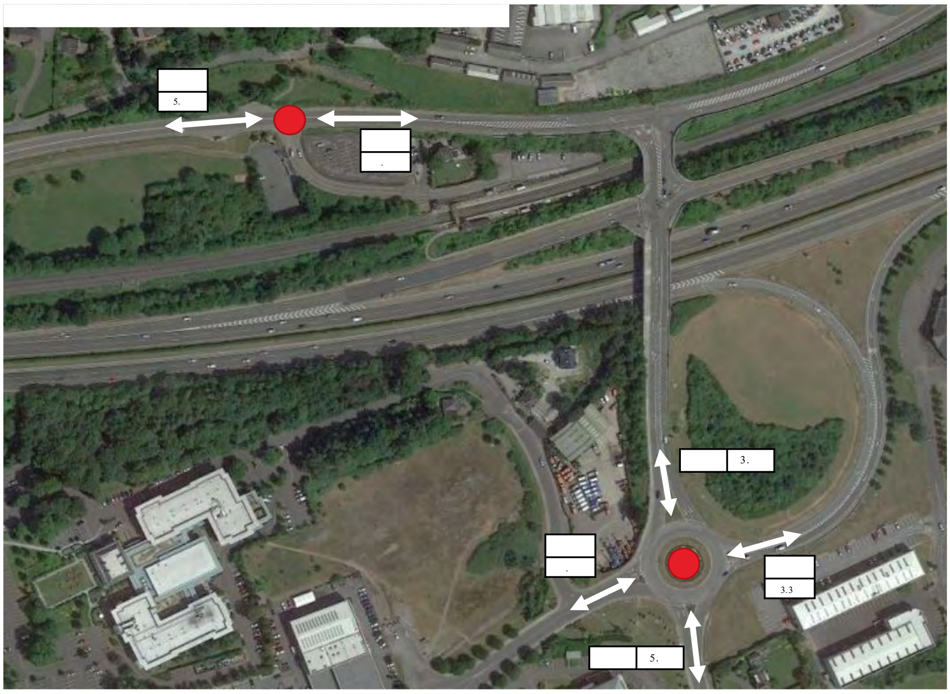

Image 7.5: PM peak hour traffic volume estimates for 2023

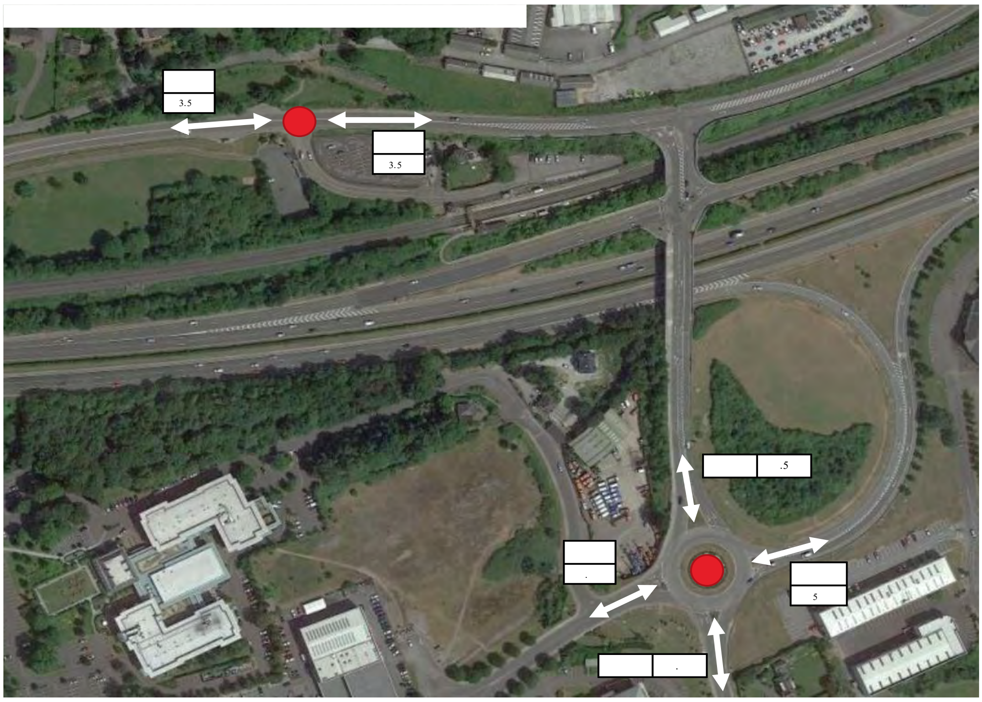


**Image 7.6: 24-hour traffic volume estimates for 2023**

### 7.4.2 Construction Phase

Subject to obtaining planning approval, the Proposed Development will commence construction in 2025, with the Proposed Development becoming fully operational in 2026. Access to both construction compounds and the bridge assembly area will be from the local road network. Local roads to the construction compounds will be accessible via the N25 dual carriageway using the Little Island junction 2 (R623) to avoid excessive traffic on the surrounding local public road network.

Site access to construction compound 1 (northern construction compound) will be via the existing car park entrance to the Little Island train station.

Site access for the bridge assembly area will be via a temporary access directly off the L3004 Glounthaune Road.

Site access to construction compound 2 (southern construction compound) will be via the western end of the Radisson Blu Hotel car park, which is accessible from Eastgate Way and the Radisson Blu Hotel local access road. The southern construction compound will be located in a dedicated area of the car park, with parking restrictions and management measures implemented within the car park as necessary to ensure that the functioning of the car park is maintained and to avoid any site parking overspill issues.

**Image 7.7** illustrates the construction compound access points.

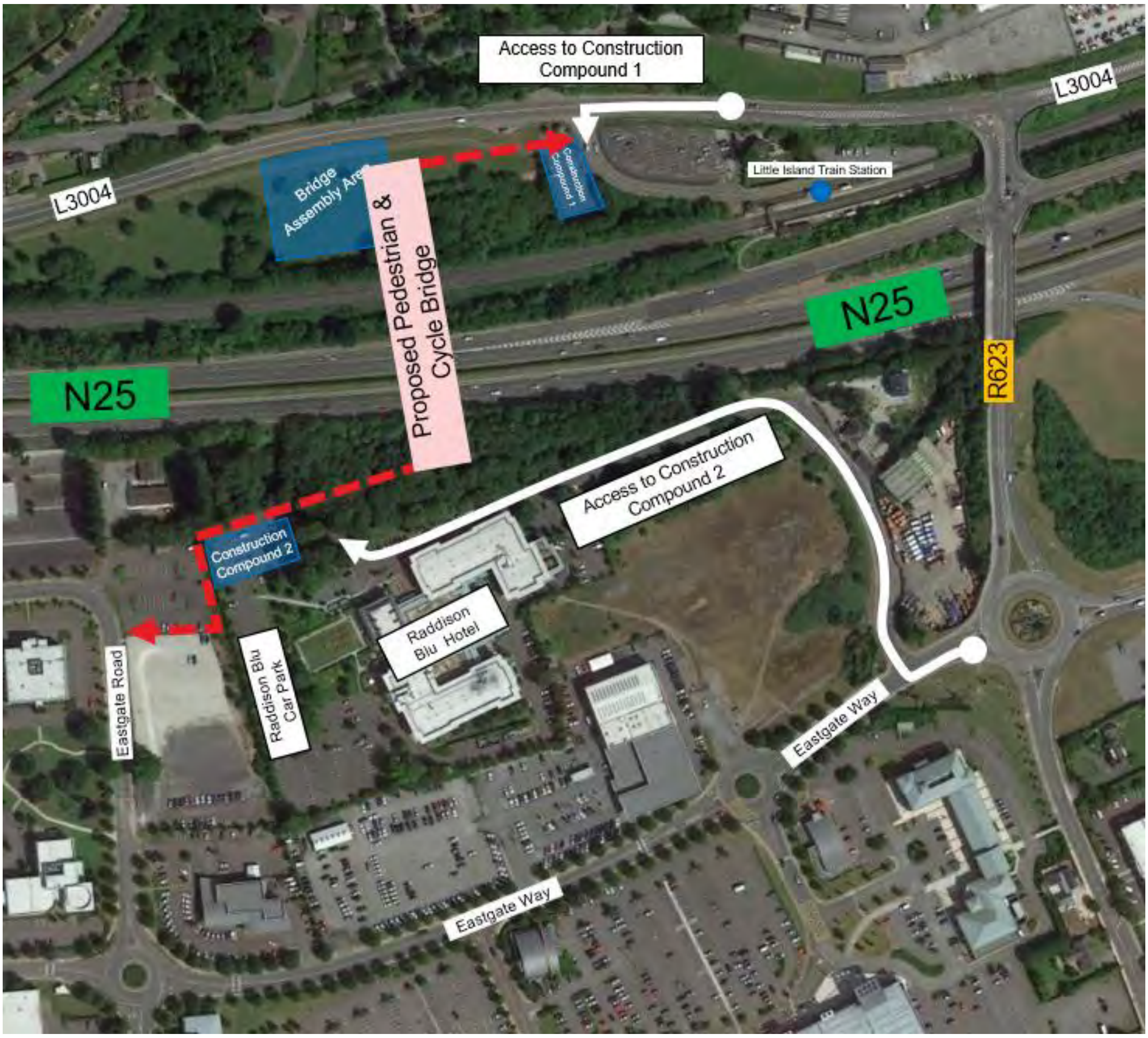


**Image 7.7: Construction compound access points**

#### *7.4.2.1 Traffic generation*

The volume of construction traffic activity is based on:

- The scale of the expected import and export of earthworks;
- Other material and equipment deliveries to site;
- Staff movements; and
- Service trips (i.e., construction compound set up, maintenance, external third-party visitors, etc.).

The construction of the Proposed Development will be completed using a combination of construction methods and in a number of stages. Construction will be undertaken using best current practice. The likely stages of construction are as follows:

- Site access, clearance and tree removal, setting up of construction compounds and construction surfacing;
- Utility diversion;
- Bridge superstructure fabrication and precast concrete element casting;
- Northern approach ramp embankment and foundation construction;

- Irish Rail structures construction;
- Northern approach ramp elevated section deck construction;
- Southern approach ramp foundation and elevated section deck construction;
- Bridge foundation and abutment construction;
- Bridge assembly;
- Bridge erection;
- Ramp and bridge deck finishing; and
- Completion of works.

#### *7.4.2.2 Construction trip generation and construction phasing*

Construction traffic generated will vary depending on the stage of work. **Table 7.1** and **Table 7.2** show the amount of additional traffic that will be generated as a result of the different phases of construction work from month 1 to month 18, when the construction ends.

During months 2 and 3 and for site access, clearance, tree removal, set up of construction compounds and construction surfacing, 58 no. daily journeys to / from construction compound 1 (northern construction compound) and 25 no. daily journeys to / from construction compound 2 (southern construction compound) will be made, which is the largest number of trips during the entire Construction Phase. It is assumed that there will be approximately 20 no. two-way staff journeys and 10 no. two-way service journeys in months 2 and 3 per day, resulting in a total of 113 no. additional daily journeys during that period.

However, since these are estimates of trips to / from the construction compounds, the actual numbers may differ. Hence, a range of 100-120 has been considered as the maximum number of daily journeys during the Construction Phase, with the calculations adjusted accordingly.

Where no numbers are present in **Table 7.1** and **Table 7.2**, a minimum of 10 no. daily journeys from the construction compounds were considered for assessment outside of the main delivery periods.

**Table 7.1: Construction traffic generated by phase – north**

| | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 | Month 13 | Month 14 | Month 15 | Month 16 | Month 17 | Month 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tender award | | | | | | | | | | | | | | | | | | |
| Bridge fabrication planning and approval | | | | | | | | | | | | | | | | | | |
| Site access, clearance and tree removal. Set up of construction compounds and construction surfacing. | | 58 | 58 | | | | | | | | | | | | | | | |
| Utility diversion | | | | | | | | | | | | | | | | | | |
| Bridge superstructure fabrication and precast concrete element casting (off site) | | | | | | | | | | | | | | | | | | |
| Northern approach ramp foundation construction, removal of piling spoil | | | | 15 | 15 | | | | | | | | | | | | | |
| Irish Rail structures construction | | | | 13 | 13 | | | | | | | | | | | | | |
| Northern approach ramp elevated section deck construction | | | | | | | | | | | | | | | | | | |
| Southern approach ramp foundation construction, removal of piling spoil | | | | | | | | | | | | | | | | | | |
| Southern approach ramp elevated section deck construction | | | | | | | | | | | | | | | | | | |
| N25 bridge foundation and abutment construction, removal of piling spoil | | | | | | | | | | | | | | | | | | |
| N25 bridge foundation and abutment construction | | | | | | | | | | | | | | | | | | |
| N25 span assembly (offline) | | | | | | | | | | | | | | | | | | |
| N25 span erection | | | | | | | | | | | | | | | | | | |
| Ramp and bridge deck finishing (installation of lights, parapets, handrails, surfacing etc.) | | | | | | | | | | | | | | | | | | |
| Construction of southern embankment ramp | | | | | | | | | | | | | | | | | | |
| Removal of construction surfacing material | | | | | | | | | | | | | | | | | 57 | 57 |

| | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 | Month 13 | Month 14 | Month 15 | Month 16 | Month 17 | Month 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tie in footway / cycleway construction and final landscaping / tree planting | | | | | | | | | | | | | | | | | | |
| **Total** | | **58** | **58** | **28** | **28** | | | | | | | | | | | | **57** | **57** |

**Table 7.2: Construction traffic generated by phase – south**

| | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 | Month 13 | Month 14 | Month 15 | Month 16 | Month 17 | Month 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tender award | | | | | | | | | | | | | | | | | | |
| Bridge fabrication planning and approval | | | | | | | | | | | | | | | | | | |
| Site access, clearance and tree removal. Set up of construction compounds and construction surfacing. | | 25 | 25 | | | | | | | | | | | | | | | |
| Utility diversion | | | | | | | | | | | | | | | | | | |
| Bridge superstructure fabrication and precast concrete element casting (off site) | | | | | | | | | | | | | | | | | | |
| Northern approach ramp embankment construction | | | | | | | | | | | | | | | | | | |
| Northern approach ramp foundation construction | | | | | | | | | | | | | | | | | | |
| Irish Rail structures construction | | | | | | | | | | | | | | | | | | |
| Northern approach ramp elevated section deck construction | | | | | | | | | | | | | | | | | | |
| Southern approach ramp foundation construction | | | | | | 14 | 14 | | | | | | | | | | | |
| Southern approach ramp elevated section deck construction | | | | | | | | | | | | | | | | | | |
| N25 bridge foundation and abutment construction | | | | | | | | | | | | | | | | | | |

| | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 | Month 13 | Month 14 | Month 15 | Month 16 | Month 17 | Month 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N25 span assembly (offline) | | | | | | | | | | | | | | | | | | |
| N25 span erection | | | | | | | | | | | | | | | | | | |
| Ramp and bridge deck finishing (installation of lights, parapets, handrails, surfacing etc.) | | | | | | | | | | | | | | | | | | |
| Construction of southern embankment ramp | | | | | | | | | | | | | | | | | | |
| Removal of construction surfacing material | | | | | | | | | | | | | | | | | 21 | 21 |
| Tie in footway / cycleway construction and final landscaping / tree planting | | | | | | | | | | | | | | | | | | |
| **Total** | | **25** | **25** | | | **14** | **14** | | | | | | | | | | **21** | **21** |

The maximum amount of construction traffic generated for the morning peak hour, the evening peak hour and all day for the study area public road network is illustrated in Image 7.8, Image 7.9 and **Image 7.10**, respectively.

For the purpose of a robust assessment, two worst case scenarios were assessed. It was assumed that the total daily generated traffic (113 no.) could potentially travel to / from the study area in the AM peak hour only or in the PM peak hour only. In addition, a scenario where the total daily generated traffic travel to / from the study area throughout the day was also assessed.

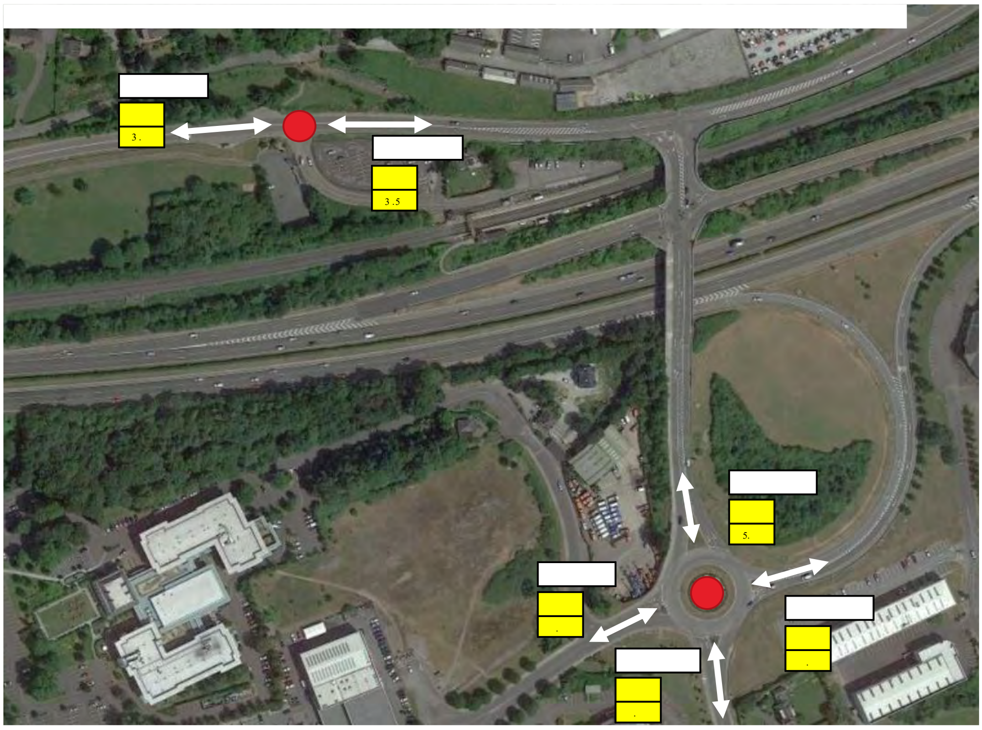

Image 7.8: AM peak hour generated construction traffic

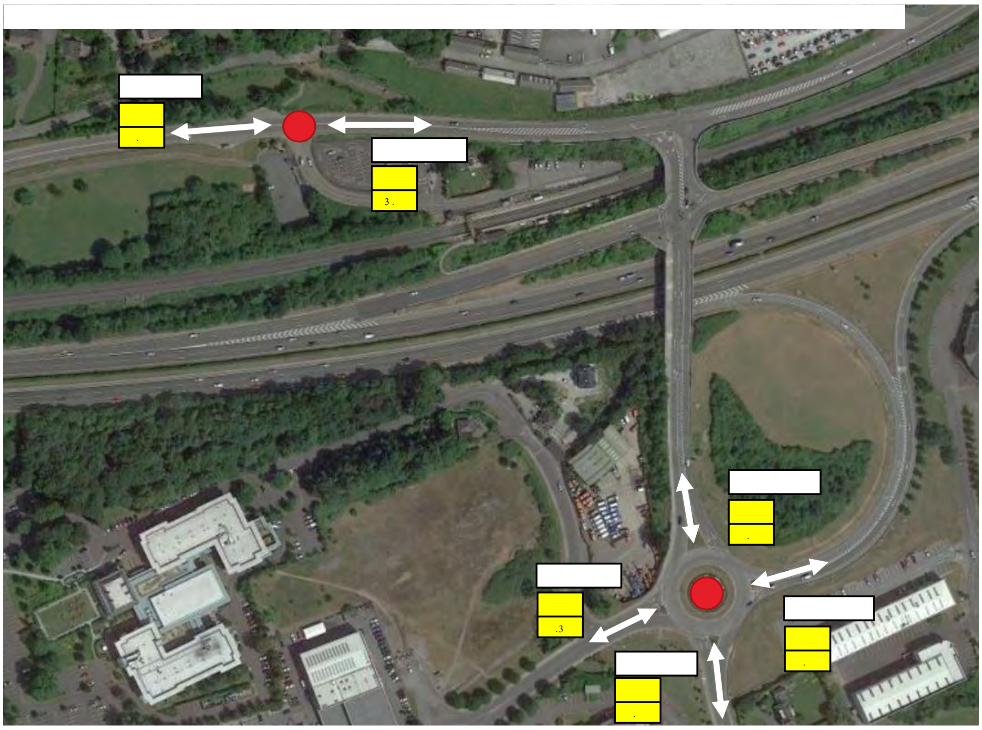

Image 7.9: PM peak hour generated construction traffic

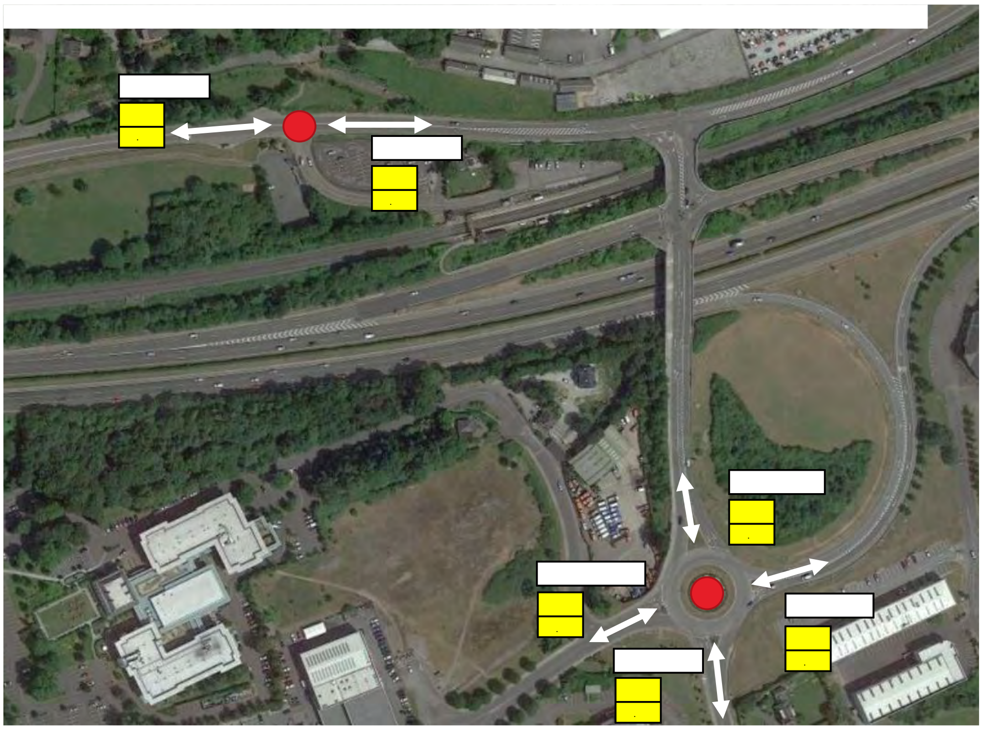

**Image 7.10: 24-hour generated construction traffic**

In relation to required car parking, both construction compounds will provide adequate spaces for the anticipated demand during the Construction Phase. There will therefore be no extra demand for the Little Island train station car park (compared to the time prior to the construction). Furthermore, none of the parking spaces within the Little Island train station car park will be lost as the result of the construction works.

However, to facilitate the southern construction compound, a total of 70 no. car parking spaces will be lost during construction, including 38 no. car parking spaces from the Radisson Blu Hotel car park and 32 no. car parking from the Eastgate Business Park car park. The impact of this parking loss during the construction phase will be short-term, negative and imperceptible.

The maximum generated construction traffic related to construction compound 1 (northern compound) that would require access through the Little Island train station car park entrance is 88 no. trips per day during months 2 and 3. The construction traffic will park at construction compound 1 and will not utilise the parking area at the Little Island train station car park for parking. Access to the Little Island train station car park is currently underutilised and it would be possible to accommodate the additional trips to / from construction compound 1 from a capacity point of view.

### *7.4.2.3 Construction trip distribution and assignment*

It is likely that most trips will access the construction compounds via the N25 and the R623 interchange, which would provide adequate capacity. However, in the unlikely event that construction traffic needs to access the study area via regional and local roads, the impact was assessed assuming a worst-case scenario, whereby all the journeys could potentially utilise any of the road links in the study area network to access the construction compounds. Therefore, a total of 113 no. extra journeys were added to each link in the assessment.

The resultant percentage of change to the baseline traffic flow was calculated. It was determined that the highest percentage increase in traffic (13.7% in the AM peak hour, 13.1% in the PM peak hour and 1.2% in the 24-hour period) could be along the L3004 Glounthaune Road. Due to the nature of this low increase in traffic volume, the impact on the surrounding public road network is considered as short-term, negative and imperceptible.

### 7.4.3 Operational Phase

As a result of the Proposed Development, 12 no. car parking spaces will be lost from the Radisson Blu Hotel car park and 32 no. car parking spaces will be lost from the Eastgate Business Park car park. Considering the existing total number of car parking spaces in the Radisson Blu Hotel and Eastgate Business Park, the impact of the loss of these car parking spaces is assessed as permanent, negative and imperceptible.

It is expected that the Proposed Development will provide efficient pedestrian and cycle connectivity between Little Island train station and the Eastgate Business Park. It will also promote sustainable transport modes while minimising impacts on the surrounding area and environment. Eastgate Business Park is a relatively dense employment zone within Little Island. Providing improved access to this area from the Little Island train station and the Dunkettle to Carrigtwohill pedestrian and cycle route will strongly encourage an increase in trips by sustainable transport modes. The Proposed Development will provide greater walkability for the area and reduced walking and cycling times between the Little Island train station and Eastgate Business Park. Hence, the overall impact of the Proposed Development during the Operational Phase is assessed as permanent, positive and significant.

The Little Island Sustainable Transport Interventions (LISTI) project is an ongoing initiative focused on establishing various sustainable transport facilities. These include the addition of new bus routes, bicycle lanes and footpaths on both the western and eastern sides of the Proposed Development site. The LISTI project is currently under construction and is expected to reach completion by 2025, prior to construction of the Proposed Development commencing. The integration of the Proposed Development and LISTI is seen as mutually beneficial, as they will collectively encourage the adoption of sustainable modes of transport.

### 7.4.4 Decommissioning Phase

The Decommissioning Phase of the Proposed Development is likely to be similar to the Construction Phase but of reduced scale and corresponding impact on the receiving traffic and transportation networks within the study area. There will be a temporary, negative and not significant impact on traffic and transportation in the vicinity of the Proposed Development.

## 7.5 Mitigation and Monitoring

### 7.5.1 Mitigation

#### *7.5.1.1 Construction Phase*

The following mitigation measures are proposed for the Construction Phase of the Proposed Development:

- Overnight traffic management on N25 junction 2 eastbound off ramp slip lane to allow site clearance;
- Blocking a small area of only one lane on the eastbound off ramp for access for construction of the N25 span northern abutment for 6-10 weeks;
- Overnight lane closures and traffic management on N25 junction 2 eastbound off ramp slip lanes and adjacent traffic lanes to facilitate erection of south span of the precast concrete portal frame structure over Irish Rail land. It is expected that a single eastbound lane can remain open;
- Overnight / weekend closure of the N25 to allow for steelwork erection of the N25 span;
- Weekend closure of Irish Rail track in agreement with Irish Rail to allow for construction of precast concrete portal frame structures;
- Provision of a temporary bus service covering the same route and stops, in order to reduce the impact of the closure of the Irish Rail track, in consultation with Irish Rail and Bus Eireann;
- A temporary road widening and right turn pocket will be provided along the L3004 Glounthaune Road for right turning construction traffic to / from construction compound 1;
- Overnight partial closure of N25 for maintenance repainting of bridge soffit in a sequential fashion for 6-10 nights;

- Provision of adequate parking spaces in the construction compounds during the Construction Phase should be ensured;
- Parking restrictions and management measures at the Radisson Blu Hotel and Eastgate Business Park car parks will be reviewed and implemented as necessary in agreement with the local businesses and Cork County Council (CCC) to ensure that the functioning of the car parks is maintained and to avoid any site parking overspill issues; and
- A Construction Traffic Management Plan (CTMP) will be developed by the contractor when updating the Construction Environmental Management Plan (CEMP) (refer to **Appendix 5.1** in **Volume 4** of this EIAR) and presented to CCC for approval prior to commencement of the construction works.

#### *7.5.1.2 Operational Phase*

As there are no significant negative impacts predicted on traffic and transportation during the Operational Phase of the Proposed Development, no mitigation measures are proposed.

#### *7.5.1.3 Decommissioning Phase*

The mitigation measures described for the Construction Phase in Section 7.5.1 will be updated to reflect best practice at the time and will be implemented for the Decommissioning Phase.

### 7.5.2 Monitoring

#### *7.5.2.1 Construction Phase*

A CTMP will be developed by the contractor when updating the CEMP and presented to CCC for approval prior to commencement of the construction works. Refer to the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR for further details.

The effectiveness of the CTMP will be continually monitored to ensure that impacts on traffic flows and road users on the surrounding public road network are minimised and additional mitigation measures are introduced, as required. The monitoring regime will consider all modes of traffic, including pedestrians, cyclists and public transport.

#### *7.5.2.2 Operational Phase*

As there are no significant negative impacts predicted on traffic and transportation during the Operational Phase of the Proposed Development, no monitoring measures are proposed.

#### *7.5.2.3 Decommissioning Phase*

The monitoring measures described for the Construction Phase in Section 7.5.2.1 will be updated to reflect best practice at the time and will be implemented for the Decommissioning Phase.

## 7.6 Cumulative Impacts

A review of CCC, An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

At the time of writing, limited information was available regarding crucial factors such as the estimated traffic volumes generated by the different stages of these projects and their detailed construction timelines. While these circumstances hindered the possibility of conducting an accurate quantitative assessment of the cumulative impact of these projects on the operation of the road network and traffic volumes around the Proposed Development, a negative, short term cumulative impact is nonetheless expected during the Construction Phase should the Construction Phase of these projects overlap with that of the Proposed Development.

In order to minimise this impact, it is crucial that the mitigation measures proposed in this EIAR and, where required, in the planning documents for the other permitted / Proposed Developments in the vicinity, are implemented during the Construction Phase.

## 7.7 Residual Impacts

### 7.7.1 Construction Phase

Following the adoption of mitigation measures for the Construction Phase, the additional traffic associated with the construction of the Proposed Development is anticipated to have a short term, negative and not significant impact on the public road network and its users for the duration of the construction works. Construction traffic management will be carried out in accordance with CTMP. The CTMP will ensure that impacts on the local public road network during construction are minimised.

### 7.7.2 Operational Phase

No significant negative residual impacts on traffic and transportation are envisaged during the Operational Phase. The overall impact of the Proposed Development during the Operational Phase is assessed as permanent, positive and significant.

### 7.7.3 Decommissioning Phase

The Decommissioning Phase will require less extensive works than the Construction Phase but will nevertheless require similar mitigation measures. Following the adoption of mitigation measures for the Decommissioning Phase, the additional traffic associated with the decommissioning of the Proposed Development is anticipated to have a temporary, negative and not significant impact on the public road network and its users for the duration of the decommissioning works.

## 7.8 References


Transport Infrastructure Ireland (TII) (2016). Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections.

TII (2014). Traffic and Transport Assessment Guidelines.

N25 Little Island Pedestrian and Cyclist Bridge
Environmental Impact Assessment Report

# Chapter 08
# Landscape and Visual

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# 8. Landscape and Visual

## 8.1 Introduction

This chapter comprises a landscape and visual impact assessment of the Proposed Development. The Proposed Development consists of a new pedestrian and cyclist bridge that encompasses a segregated footway and cycleway that will be 5m wide. The proposed crossing will be approximately 460m long and will consist of a combination of different structural forms as follows:

- Northern approach ramp: combination of earthen embankment and elevated ramp structure;
- Irish Rail span: concrete portal frame structures;
- N25 span: steel network arch structure; and
- South approach ramp: combination of elevated ramp structure, at grade sections and earthen embankment.

The construction stage works will require areas for set down, assembly, access and manoeuvring of bridge infrastructure details of which are set out in this report under **Chapter 5**, *Construction Strategy*.

The objective of the assessment is to appraise the existing character and visual context of the site and its wider setting to assess the likely landscape and visual effects arising from the Proposed Development, describe any potential design mitigation measures and predict any residual effects of the Proposed Development.

This assessment was prepared by David Bosonnet and George Dundon of Brady Shipman Martin. Details of their relevant qualifications and experience are included in **Chapter 1**, *Introduction.*

This chapter initially sets out the assessment methodology (Section 8.2), followed by the description of the baseline condition of the site and context in terms of the character and visual environment (Section 8.3). The potential impacts of the Proposed Development are described and assessed in Section 8.4 and consider a 'Do Nothing Scenario', and the Construction, Operational and Decommissioning Phases. Proposed mitigation of landscape impacts is described and evaluated in Section 8.5, with mitigation considered for each of the Construction, Operational and Decommissioning Phases. Potential cumulative impacts with other Proposed Developments identified under the scope of this assessment are summarised and assessed in Section 8.6 followed by the Residual Impacts (Section 8.7). References used in the preparation of this landscape and visual impact assessment complete this chapter (Section 8.8).

## 8.2 Assessment Methodology

### 8.2.1 Introduction

Landscape has two separate, but closely related aspects. The first is visual impact, i.e., the extent to which new development can be seen in the landscape / townscape environment. The second is impact on the landscape character, i.e., effects of new development on the fabric or structure of the landscape including settlement as a constituent part of the landscape.

The visual impact assessment considers visual receptors in the vicinity of the Proposed Development. The majority of receptors comprise residential and commercial properties, cultural and heritage properties, community facilities, e.g., churches, amenities and recreational facilities, open spaces, walkways, public roads and railway routes and other views within the environment.

Landscape character is derived from the appearance of the land and built environment, and takes account of natural and man-made features such as topography, landform, vegetation, land uses and built environment, and their interaction to create specific patterns that are distinctive to particular localities.

### 8.2.2 Legislation and guidelines

The landscape and visual impact assessment has had regard to the following legislation, policy documents, and reference material:

- Cork County Council (CCC) (2022). Cork County Development Plan 2022-2028;
- CCC (2017). Little Island Transportation Study (LITS);
- Environmental Protection Agency (EPA, 2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- The Landscape Institute / Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. (GLVIA3, 3rd Edition);
- Fáilte Ireland (2011). Guidelines for treatment of tourism in an Environmental Impact Statement;
- Landscape Institute (2019). Landscape Institute Technical Advice Note 06/19; and
- From the experience of the professional landscape consultancy in carrying out landscape and visual assessments for over 25 years in Ireland.

### 8.2.3 Assessment methodology

The methodology used for the landscape and visual assessment entailed:

- A desktop study of the site in relation to its overall context locally, regionally and nationally; and
- Visiting the site and its environs in March 2023 and 2020 to assess the following:
  - Quality and type of views in the area;
  - The extent of the visual envelope, i.e., the potential area of visibility of the site in the surrounding townscape and
  - The character and quality of the surrounding townscape.

Following a review of the Proposed Development, desktop study and visit to the site, three key reference viewpoints in the surrounding environs were identified, photographed and surveyed for the purpose of preparing photomontages to help illustrate the visual effects of the Proposed Development (refer to **Appendix 8.2** in **Volume 4** of this EIAR). They have been chosen to reflect a range of distances, directions and sensitivity. A cumulative assessment of other significant planned or permitted (but not yet constructed) developments has also been prepared.

The overall design of the proposed pedestrian and cyclist bridge and links was part of an iterative design process informed by the potential landscape and visual effects, with mitigation incorporated into the design of the proposed infrastructure. This included a low-profile bridge deck structure, maximum use of columnar supports, prefabrication and assembly of the bridge deck structure, careful consideration of materials, finishes, and selection of the proposed route.

The extent to which additional illumination on the proposed bridge, which will be visible in the night landscape, will have an effect, was also considered.

### 8.2.4 Significance of impacts

The significance criteria as set out in the Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022) have been used for the purpose of this assessment.

The significance of landscape is considered against its designation (i.e., national, county, local, etc.). Where not designated or otherwise protected, the landscape is considered as being of local significance. Therefore, landscape assessments take account of the receiving environment, its character and features, as well as landscape planning designations and listings.

These impacts, which in quality may be positive, neutral or negative / adverse, are described as follows:

- **Imperceptible:** An effect capable of measurement but without noticeable consequences;
- **Not Significant:** An effect which causes noticeable changes in the character of the environment but without noticeable consequences;
- **Slight:** An effect which causes noticeable changes in the character of the environment without affecting its sensitivities;
- **Moderate:** An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends;
- **Significant:** An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment;
- **Very Significant:** An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment; and
- **Profound**: An effect which obliterates sensitive characteristics.

In terms of duration, effects are considered as follows:

- **Brief:** lasting up to one day;
- **Temporary:** lasting up to one year;
- **Short-term:** lasting one to seven years;
- **Medium-term:** lasting seven to fifteen years;
- **Long-term:** lasting fifteen to sixty years; and
- **Permanent:** lasting over sixty years.

There were no limitations or constraints in carrying out the assessment.

### 8.2.5 Tourism and recreation

The 'Guidelines for treatment of tourism in an Environmental Impact Statement' (Fáilte Ireland, 2011) notes that there are two interactions between tourism and the environment, namely impacts caused by tourism projects and impacts affecting tourism (e.g., the quality of a destination or a tourism activity).

Chapter 3 of the Fáilte Ireland Guidelines lists the reasons why tourists visit and enjoy Ireland. Aspects of relevance to this 'Landscape' section of the EIAR would include any potential impact on 'beautiful scenery', 'nature, wildlife and flora' (considered with Biodiversity) and 'good range of attractions' (considered with Biodiversity and Archaeology, Architectural and Cultural Heritage).

For elements of relevance to this section of the EIAR, the Guidelines note that particular attention needs to be paid to effects on:

- Views from existing tourism facilities, touring routes and walking trails;
- Physical access to and visibility of habitats; and
- Damage to sites and structures of cultural, historical, archaeological, or architectural significance and to their contexts or settings.

## 8.3 Baseline Environment

### 8.3.1 Site context

The Proposed Development site and study area is located approximately 1.2km west of Glounthaune village and approximately 10km east of Cork City on land bounded by the L3004 Glounthaune Road to the north and the Eastgate Retail and Business Parks to the south.

Significant road and rail infrastructure are situated in the centre and immediately adjacent to the site. The N25 dual carriageway passes east / west through the centre of the site. This is characterised by the four-lane highway and central median together with slip roads to the north and south sides, serving the junction that connects to "An Crompan" roundabout on R623, southeast of the proposal site. The R623 passes over the N25 and railway line to the east of the site via a precast concrete road bridge to join the L3004 Glounthaune Road.

The Cork City to Middleton Cobh railway line passes east / west through the site between the northern slip road of the N25 and the L3004, Rockgrove Road. Little Island train station is situated on the mainline railway immediately to the east of the Proposed Development site and is characterised by a cluster of Victorian brick and rendered buildings and associated platforms to both sides of the track, a footbridge, and a car park with surrounding security fence.

A course macadam footpath runs east / west within the green space set back from the L3004 Glounthaune Road behind a concrete post and two rail fences. This path enters a car park and local recycling point at the eastern end of the green space. Onward pedestrian movement is through the recycling yard gateway, east along the Little Island train station access road and east along the south side of the L3004 Glounthaune Road as far as a point opposite the entrance to the light industrial development outside Glounthaune village. This path also connects to footpaths leading into Little Island along the R623. Phase 3 of the Dunkettle to Carrigtohill pedestrian and cycle route passes the site along the northern side of the L3004 Glounthaune Road. A bus stop is situated at both sides of the L3004 Glounthaune Road, adjacent to the community recycling centre.

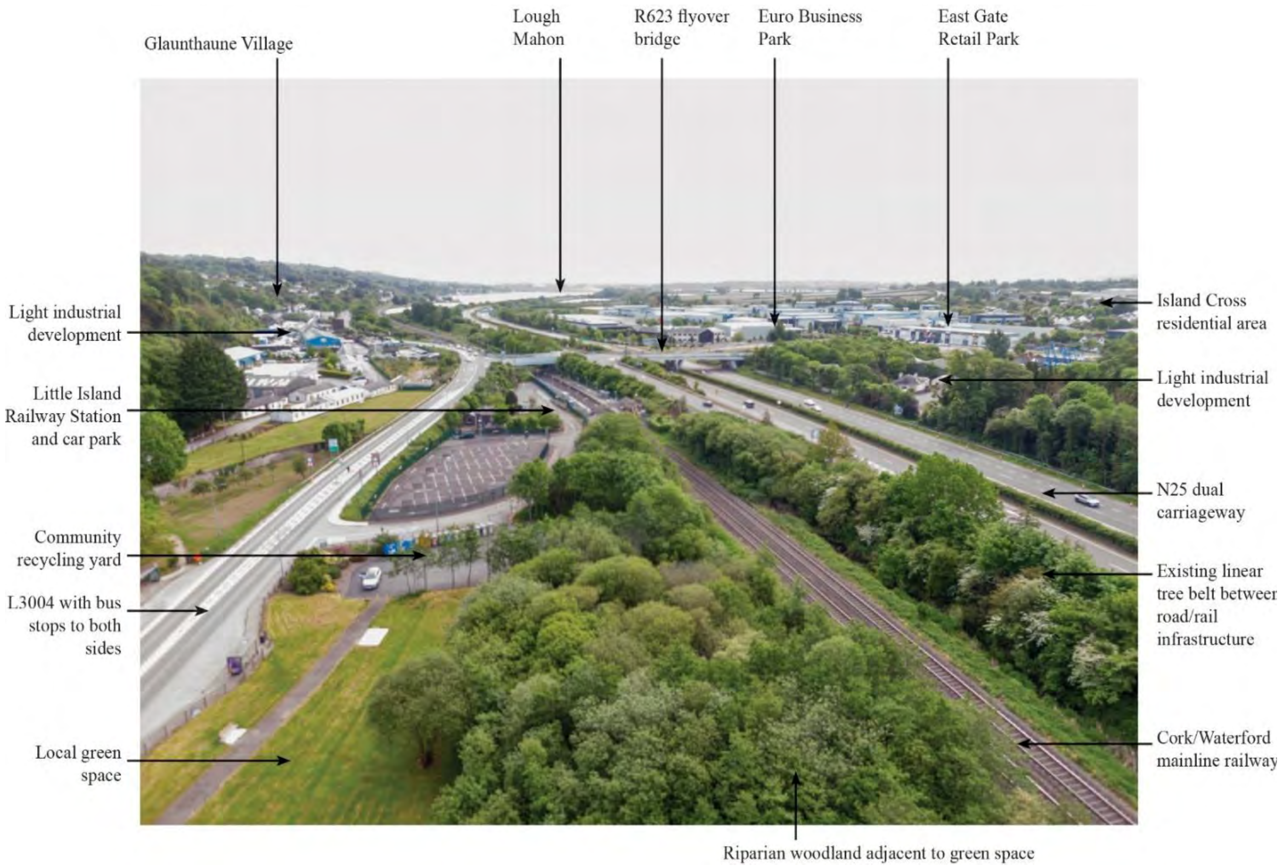
The Arboricultural Impact Assessment (refer to **Appendix 8.1** in **Volume 4** of this EIAR) has not identified any Tree Preservation Orders (TPOs) on the site and the site is not within an area designated by a Special Amenity Area Order. The road and rail corridor passing through the site and study area is characterised by established mixed deciduous trees alongside the roads and railway embankments. These belts of mixed species of trees and hedgerow vegetation along the linear infrastructure locally screen views north south between roads, railway and adjacent land at pedestrian and vehicle level (refer to **Photograph 8.1**).


**Photograph 8.1: Aerial view looking northeast over Proposed Development site**

An area of land between the south side of the N25 and the Radisson Blu Hotel and car park is characterised by mixed deciduous trees; predominantly Sycamore, Alder and Poplar, and evergreen trees; predominantly Sitka Spruce with woodland ground cover species within it. This block of woodland screens views to / from the Raddison Blu Hotel and the N25 which passes at approximately 5m below it to the north. The land of the Proposed Development site between the north side of the railway line and L3004 Glounthaune Road is characterised by a belt of mixed riparian trees comprised mainly of Willow, Alder and Ash. Part of this planting expands to form a block of woodland at the eastern end, wrapping around a hardstanding area and running between the railway line and the train station access road. A pond with marginal and aquatic plants enclosed by trees is located to the northwestern end of the study area. The remaining land between the riparian tree belt and the L3004 Glounthaune Road is laid to amenity grass with some relatively young individual specimen trees.

The principal land uses within the study area are commercial / retail, industrial, transport infrastructure and residential. The area to the south of the proposal site is characterised by extensive commercial and retail development with surface car parking and circulation roads including Little Island Industrial Estate, Eastgate Business Park and Eastgate Retail Park, interspersed with suburban residential development. The area to the north of the site is characterised by a steep slope rising north up to Rockgrove Road at circa 100m AOD above the River Lee Valley. The lower to middle parts of the slope is characterised by detached homes on large plots bounded by mature trees and hedgerows overlooking Little Island and Lough Mahon, before the landscape changes to agricultural land on the upper level extending into the countryside to the north. The extent of mature trees within and surrounding properties along this slope merge to create a locally dense tree canopy, which is a distinctive feature of the landscape setting to the north of the site.


**Photograph 8.2: Aerial view looking southeast from Proposed Development site**




**Photograph 8.3: Aerial view looking east from Proposed Development site**

**Photograph 8.4: View looking west on L3004 opposite junction with Little Island train station access road. Bus stops to both sides of road, mature trees and open space bounded by concrete post and rail fence**

**Photograph 8.5: View looking southwest from community recycling yard with open space path terminating at yard and riparian tree belt along boundary with railway line**

**Photograph 8.6: View looking east from within Little Island train station car park at east end of station with the view terminated by R623 flyover bridge**

**Photograph 8.7: View looking east from Radisson Blu Hotel car park towards existing woodland within the Proposed Development site**

The site and study area are located within a designated High Value Landscape area in the Cork County Development Plan 2022-2028 (refer to **Image 8.1**) which sets the following objective regarding landscape:

*"GI 14-9: Landscape*

a) *Protect the visual and scenic amenities of County Cork's built and natural environment.*
b) *Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while protecting the environment and heritage generally in line with the principle of sustainability.*
c) *Ensure that new development meets high standards of siting and design.*
d) *Protect skylines and ridgelines from development.*
e) *Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments."*

County Development Plan Objective GI 14-11: Draft Landscape Strategy, Land Use Plans and Policy Guidance refers to the Draft Cork County Landscape Strategy (2007) in the preparation of plans and other policy guidance being prepared during the lifetime of the Plan.

The Cork County Landscape Strategy defines the Landscape Character Area within which the site is situated as *'Character Area 19: Cork City and Estuary'*. Key characteristics of this landscape type include:

- *"A mix of rural and intensely urban areas, combined with a large expansive harbour.*
- *The harbour area also has a wealth of natural heritage, including a number of important habitats and wetland areas, which are of international significance due to the number and diversity of bird species they support.*
- *The rural areas around much of the greater harbour area are now characterised by a prevalence of infrastructure such as roads, bridges and electricity power lines and some urban sprawl.*
- *It is also home to a number of prime industrial/enterprise sites including one of the largest concentrations of pharmaceutical industries in the world."*

Notable recommendations for '*Character Area 19: Cork City and Estuary*', which are relevant to the proposal site include:

- *"Protect the north and south ridges and hillsides around the city, to ensure the protection of the visual backdrop to the city. These ridges would be adversely affected by unsympathetic development thus interfering with views of special amenity value to the city and surrounding area.*
- *Maintain and enhance views of the harbour. Proposals for development in the harbour should respect the sensitivity of this landscape and in particular should have regard to its rich and diverse natural heritage and concentration of Natural Heritage Areas that are designated for protection and the relationship between these and the built environment.*
- *Recognise the potential constraints on development created by the River Lee flood plain and the value of this flood plain as an increasingly rare habitat."*

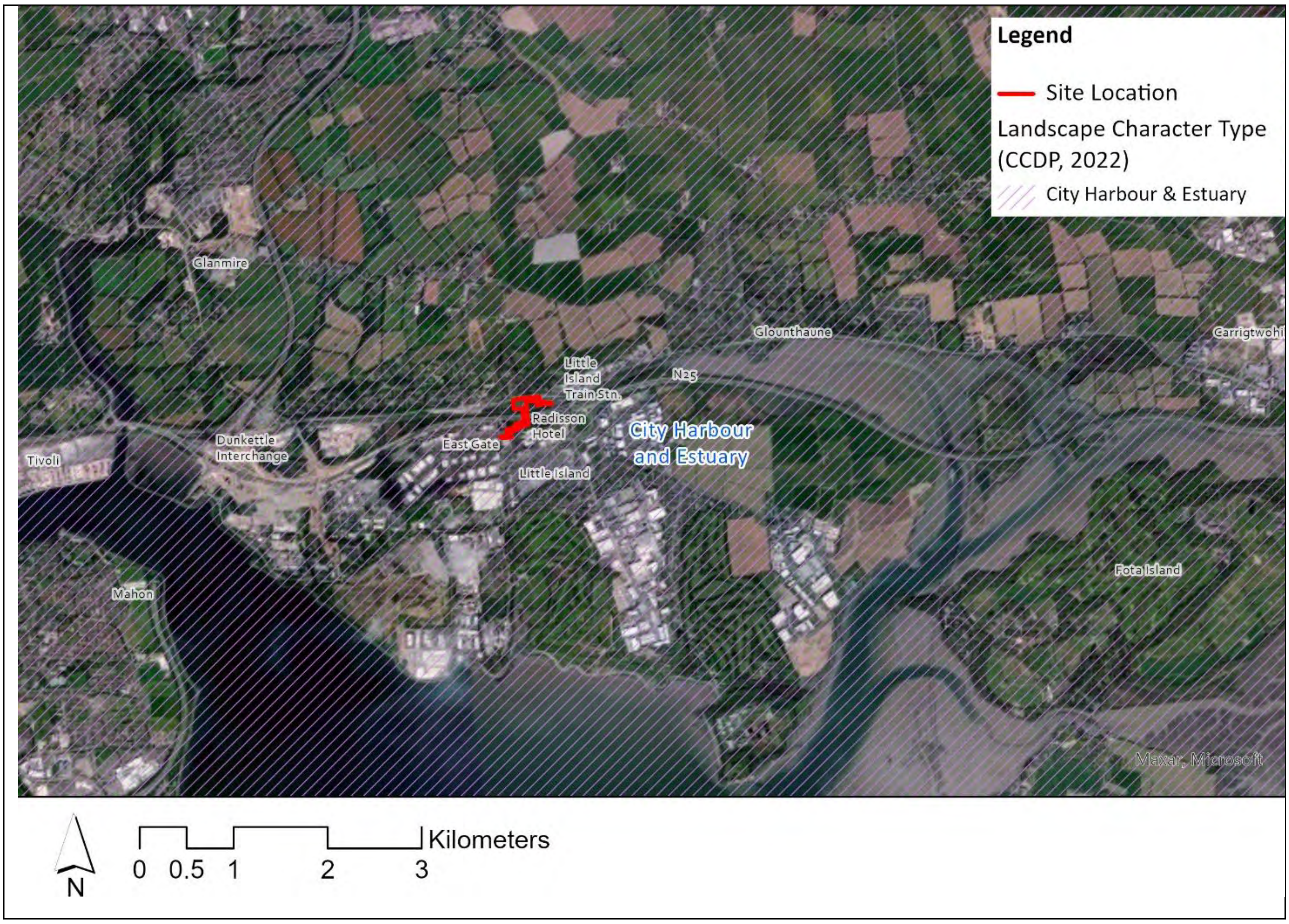



**Image 8.1: Area of high landscape value**

The designated Scenic Routes within the study area are shown in **Image 8.2** and are as follows:

- Road at Cashnagarriffe, N.W. Carrigtwohill and Westwards to Caherlag. Cork County Council Ref. No. S42. This route runs west / east across the elevated landscape north of the site for approximately 7km through the townlands of Rowgarrane, Ballynaroon, Johnstown, Killahora, Killacloyne, Carhoo and Anngrove before turning north to Forest-Town. The closest point of this scenic route to the site is approximately 1km; and
- Road from Dunkettle to Glanmire and eastwards to Caherlag and Glounthaune. Cork County Council Ref. No. S41. This route runs west / east across the elevated landscape north of the site for approximately 4.5km from the M8 through the townlands of Ballyhennick and Glounthaune as far as the L3004 Glounthaune Road at Johnstown Close. The closest point of this scenic route to the site is approximately 700m.

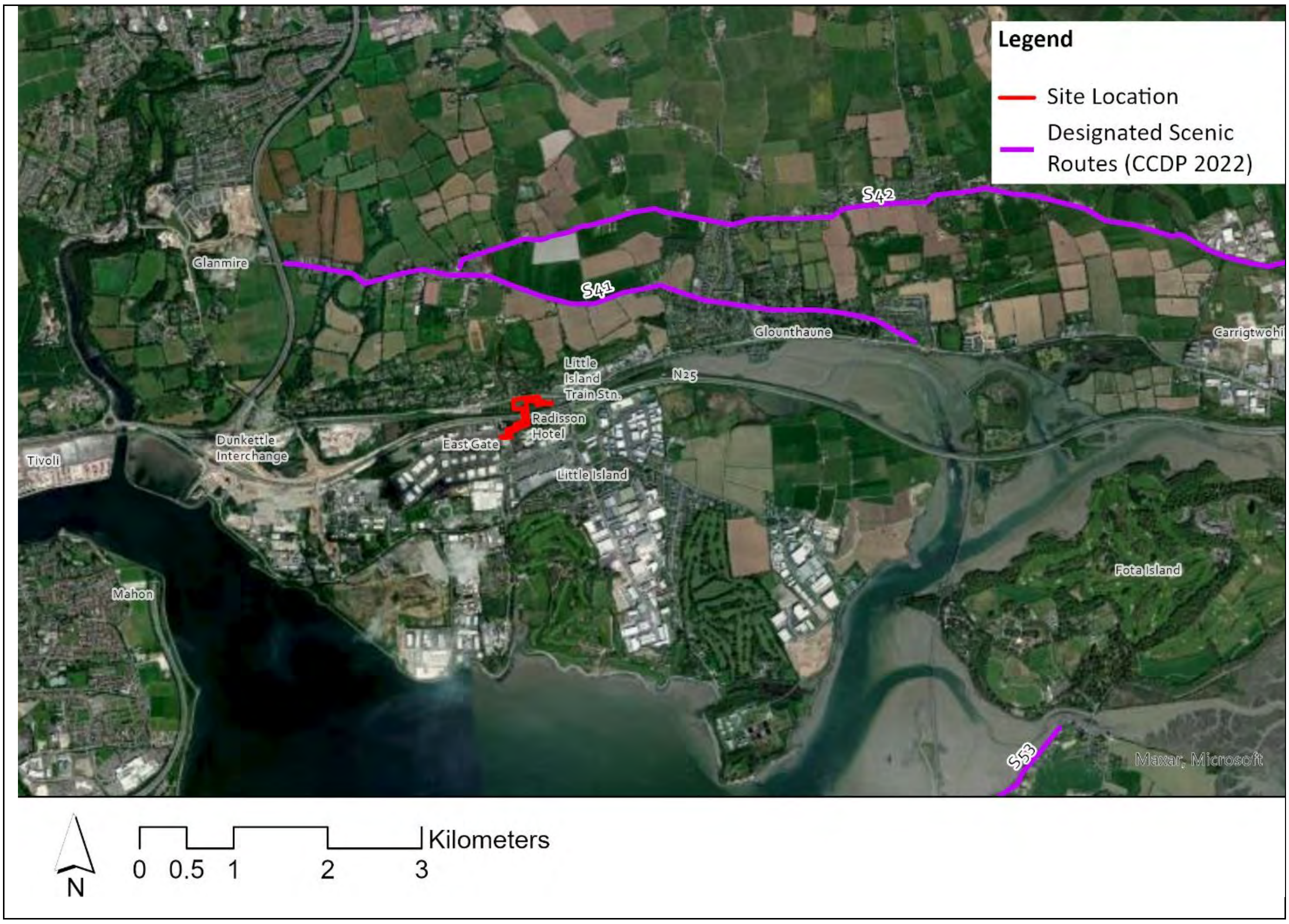



Image 8.2: Designated scenic routes

Architectural and archaeological features are addressed in **Chapter 13**, *Archaeology, Architectural and Cultural Heritage*. The designated architectural features in the study area include the following:

- Ditchley House, registered architectural heritage feature of regional significance (NIAH Reg. No. 20907527). A country house, gate lodge and piers dating from 1800-1840 incorporated into the Radisson Blu Hotel is located approximately 30m south of the Proposed Development site. The NIAH Appraisal states *"Substantial and imposing country house retaining much of its early character despite extensive site alterations. It exhibits the fine craftsmanship associated with the Georgian period, most particularly in the carved limestone door case and delicate fanlight. The remaining demesne structures on the site include Ditchley house, gate lodge and gate piers, all of which remain largely intact and form a pleasing grouping in the landscape."*
- Little Island train station - building, registered architectural heritage feature of regional significance (NIAH Reg. No. 20907528). A red brick Victorian railway station building dating from 1855-1860 is located immediately to the east of the Proposed Development site. The NIAH Appraisal states it is *"A fine example of the quality of craftsmanship employed by the railway authority in the construction of their utilitarian structures throughout the latter half of the nineteenth century. The composition employs materials of superior quality along with well-executed and considered detailing. The use of red brick together with carved limestone quoins provides textural interest and chromatic variation. It is one of a group of related railway structures including the foot bridge and station master's house."*
- Little Island train station - footbridge, registered architectural heritage feature of regional significance (NIAH Reg. No. 20907530). A Victorian free standing single span cast iron footbridge erected 1859 is located immediately to the east of the Proposed Development site. The NIAH Appraisal states it is *"A good example of Victorian engineering, this intact cast-iron footbridge features well-executed decorative detailing and still serves its original purpose."*

- Little Island train station master's house, registered architectural heritage feature of regional significance (NIAH Reg. No. 20907529). A detached two storey former station master's house dating from 1859 is located immediately to the east of the Proposed Development site. The NIAH Appraisal states that despite re-fenestration and alterations, it represents an occupied example of the large numbers of these buildings that were constructed, but many of which have fallen into disuse.


**Photograph 8.8: View looking west from Little Island train station with Victorian station building and cast-iron footbridge and Proposed Development site beyond**

- Rockgrove House, Registered Architectural Heritage feature of regional significance (NIAH Reg. No. 20907531). A country house, gate lodge and piers dating from circa 1760 is located approximately 350m northeast of the Proposed Development site. The NIAH Appraisal states *"The subtle bowed bays are a feature particularly characteristic of the Cork region. In spite of refenestration, the original character and form of this house is retained in the delicate detailing of features such as the render door case and window surrounds. The grouping of demesne structures including grotto, well-executed limestone gate piers and gate lodge adds significantly to the architectural heritage of the area."*

The designated natural heritage features in the study area are described in **Chapter 9**, *Biodiversity*.

The steeply rising topography, residential development and vegetation to the north and the scale and extent of commercial development and vegetated road corridor along the south, combine to create a contained site with a low degree of intervisibility with adjacent areas.

Road and rail infrastructure and commercial and residential development dominate the character of the southern context of the site. The industrial and infrastructural features of this landscape are consistent with this type of character described in '*Character Area 19: Cork City and Estuary*.' On the northern side of the proposal site, the L3004 is characterised by some individual residential dwellings, with a greener leafier character in the northern part of the study area. Solid concrete walls alongside the L3004 Glounthaune Road, road and rail infrastructure and an area of light industrial uses just east of the site contribute to the urbanising influences that, overall, create a peri-urban character to the site and its setting.

### 8.3.2 Characteristics of the Proposed Development

A detailed description of the Proposed Development and construction strategy is set out in **Chapter 4**, *Description of the Proposed Development* and **Chapter 5**, *Construction Strategy*, respectively.

The proposed bridge and link paths that serve it will function as an active travel link for pedestrian and cyclists to travel from the Little Island train station and surrounding area to the Eastgate Business Park and the wider area of Little Island. It also promotes the use of sustainable modes of transport of walking, cycling and public transport by providing a safe and attractive link for people travelling between Little Island train station and Little Island.

The proposed crossing main spans (N25 & Irish Rail) consist of a single span steel network arch structure over the N25 and a 2-span precast concrete segmental portal frame structure over the Irish Rail track and adjacent land to the south. The spans of these structures will be approximately 49m (N25) and 2x15m (Irish Rail).

The ramp structures will consist of a combination of elevated structures, embankments, landscaping and at grade sections. The southern ramp section between the Radisson Blu Hotel car park and the N25 bridge tie in will be an elevated structure due to the fall off in level to the north and east of the Radisson Blu Hotel car park. An earthen embankment is also proposed on the west side tie into the Radisson Blu Hotel car park due to the level difference. For details of proposed makeup of approach ramps, refer to **Figure 4.3** in **Volume 3** of this EIAR.

Both elevated ramp structures will use reinforced concrete spans. For the north elevated ramp, a bespoke concrete structure with single piers is proposed. For the southern elevated ramp structure, a precast prestressed bridge beam bridge design with two column piers and crossheads is proposed.

Proposed design interventions to incorporate the proposed bridge and access ramps into the landscape setting include:

- A new shared foot / cycle path link from the end of the northern access ramp leading east along the access route into Little Island train station;
- Redesign of the existing community recycling facility to include resurfacing and improved boundary treatment and landscape presentation;
- Proposed tree planting along the corridor of the proposed access ramps and bridge landing points as part of the compensation for removal of trees due to Proposed Development;
- Landscape and amenity enhancements to the existing open green space between the L3004 Glounthaune Road and the railway corridor to include, wetland habitat creation, improvement to the existing path, additional footpath links, grassland diversification and tree planting;
- Re-design of the Radisson Blu Hotel car park at the boundary with the proposed southern access ramp to include direct access from the car park to the bridge; and
- A new controlled crossing on Eastgate Road at the end of the southern approach ramp providing safe onward connectivity for pedestrians and cyclists into Little Island.

## 8.4 Potential Impacts

### 8.4.1 Do-Nothing Scenario

If the Proposed Development does not proceed, no landscape and visual impacts associated with the Proposed Development would arise. Additionally, the existing setting would experience little or no change in the short to medium-term.

### 8.4.2 Construction Phase

The main characteristics of the Construction Phase of the Proposed Development that have potential for landscape and visual impacts include:

- Site mobilisation and establishment, mature tree and vegetation removal;
- Construction of northern construction compound, southern construction compound and bridge assembly compound and associated fencing / hoarding (refer to **Figure 5.2** in **Chapter 5**, *Construction*) and the fencing of lands for the safe site management and construction of the works;
- The temporary closure of a section of the existing footpath in the green space adjacent to L3004 Glounthaune Road, the community waste recycling yard, a portion of the Radisson Blu Hotel car park and a portion of the public car park at Eastgate Road for the duration of the works;

- The temporary removal of 38 no. car parking spaces from the Radisson Blu Hotel car park and 32 no. car parking spaces from the Eastgate Business Park car park to construct the southern path link to the bridge to Eastgate Road and proposed pedestrian / cycle crossing;
- The temporary closure of Eastgate Road to construct the proposed pedestrian / cycle crossing;
- Disturbance and activity, including removal of topsoil, general earthworks, construction of pile caps and movements of construction traffic;
- Excavation and protection of services and utilities diversions;
- Construction of north and south approach path ramps and embankments adjacent to L3004 Glounthaune Road on the north side and in Eastgate Business Park car park and adjacent to Radisson Blu Hotel on the south side of the Proposed Development site. The construction of two bridge abutments on the N25;
- Offsite fabrication of the main bridge span and approach spans with the sections transported to the temporary bridge assembly compound and lifted into position using cranes; and
- Upgrade works and improvements to existing footpaths in the green space adjacent to the Proposed Development site and the L3004 Glounthaune Road and construction of new footpaths linkages to Little Island train station and the pedestrian / cycle crossing to Dunkettle to Carrigtwohill pedestrian and cycle route.

The most significant effects on the townscape and visual environment will be during the Construction Phase, which is estimated to last approximately 18 months and will give rise to a number of landscape and visual impacts.

#### 8.4.2.1 Landscape impact

**Removal of existing trees and vegetation**

To facilitate the Proposed Development and associated infrastructure works, it will be necessary to remove and prune trees and vegetation within the Proposed Development site.

These works are detailed in the Arboricultural Impact Assessment (refer to **Appendix 8.1** in **Volume 4** of this EIAR) and are summarised in **Table 8.1**.

**Table 8.1: Summary of tree removal and pruning works**

| Impact | Category A | Category B | Category C | Category U | Total |
|---|---|---|---|---|---|
| Individual trees to be removed to facilitate the Proposed Development | 13 | 36 | 33 | 21 | **103** |
| Individual trees to be pruned to facilitate the Proposed Development | 14 | 10 | 5 | 0 | **29** |
| Tree groups to be removed to facilitate the Proposed Development | 0 | 8 | 4 | 1 | **13** |
| Part-groups (i.e., sections of a tree group) to be removed to facilitate the Proposed Development | 4 | 1 | 0 | 0 | **5** |
| Tree groups to be pruned to facilitate the Proposed Development | 2 | 1 | 0 | 0 | **3** |

The estimated total number of trees to be removed on site is 277. The removal of trees and vegetation will give rise to localised **significant, negative** and **short** to **medium-term** effects on the immediate environs.

#### 8.4.2.2 Visual impact

**Construction activity, construction compounds and bridge assembly area**

There will be a requirement for temporary hoarding / fencing, parking, deliveries, lighting, piling rigs, cranes etc. during the Construction Phase. Public access to the green area adjacent to the L3004 Glounthaune Road will be restricted during the Construction Phase. This restriction will give rise to **locally significant, negative** and **short-term** effects on the immediate environs and views in the area.

**Alterations to ground levels utilising soils and materials on site**

There will be a requirement to construct foundations and abutments at two locations for the main bridge span; to the north and south of the N25 road. There will also be a requirement for embankments to be constructed to support the ramped footpath / cycleways to the bridge crossing. These embankments are expected to be constructed using strengthened and reinforced soil methods to minimise the overall land take and import volume. Side slopes of these embankments are proposed to be up to 70 degrees. Sections of the proposed approach paths to the bridge from the embankments will be constructed on concrete piers and crossheads. This will require localised changes to ground levels and removal of excess spoil off-site, resulting in **locally significant, negative** and **short-term** effects on the immediate environs.

In general, construction impacts will be **significant, temporary, negative** and **localised** in nature.

### 8.4.3 Operational Phase

The main characteristics of the Operational Phase of the Proposed Development that have potential for landscape and visual impacts include:

- The presence of a new bridge structure across the rail and road corridor;
- The permanent removal of 12 no. car parking spaces from the Radisson Blu Hotel car park and 32 no. car parking spaces from the Eastgate Business Park car park at Eastgate Road;
- The movement of pedestrians and cyclists across the new bridge; and
- The presence of additional lighting on the new bridge.

#### 8.4.3.1 Landscape impact

The site of the proposed pedestrian and cyclist bridge crossing is in a peri-urban setting characterised by significant national road and railway infrastructure, commercial, retail and light industrial development, low density residential development and local distributor roads and footpaths. Parts of the site and its immediate environs are characterised by green space with linear belts of trees and vegetation associate with road and rail infrastructure. The wider context of the site to the north is characterised by mature trees and hedgerows on the south facing slope of The River Lee Valley. Overall, the site and its setting are of low sensitivity to change given the existing urbanising influences on its character.

Considering the low landscape sensitivity of the site and its context, the Proposed Development will not adversely change the inherent landscape, its significance, or value.

The proposed pedestrian and cyclist bridge will link to existing active travel infrastructure, including the Little Island train station, bus stops on the L3004 Glounthaune Road and the Dunkettle to Carrigtwohill pedestrian and cycle route. The Proposed Development will therefore provide a strategic and essential piece to complete a network of sustainable transport and active travel that is attractive to a wide range of users. In providing this connection, the Proposed Development supports modal shift from private vehicles which are a dominant, negative, feature and influence on the local area. The proposed pedestrian and cyclist bridge will also provide a universally accessible direct linkage to the primary destination of Little Island, away from trafficked areas and through green space, that is a safe alternative to the currently inadequate vehicle dominated route.

Careful consideration has been given to the design of the Proposed Development. The combination of proposed concrete columns and crossheads to support sections of the approach to the main bridge span will reduce impact on existing woodlands and green space. The use of living retaining walls to the embankments supporting access ramps and a bridge design with minimum deck thickness, single span double arches and lattice supports, will reduce the mass of construction and integrate the proposed structures into the landscape setting.

The Proposed Development will therefore have a **significant, positive** and **permanent** impact on the site and its environs.

### 8.4.3.2 Local amenity impact

A green area is situated on the land between the L3004 Glounthaune Road and the Cork City to Middleton Cobh railway line, adjacent to the northern portion of the Proposed Development. It is comprised of open amenity grass and individual trees, a belt of trees along the boundary with the railway line, a set of cycle parking hoops and a path with benches. There is no crossing point to this space from the residential development on the northern side of the road and no dedicated footpath connection to the space from Little Island train station.

The Proposed Development will provide a:

- Dedicated footpath to this space from Little Island train station;
- Link to the Dunkettle to Carrigtwohill pedestrian and cycle route; and
- Landscape enhancement of the amenity space through new tree planting, additional paths and seating, and creation of wet grassland habitat to increase biodiversity and the natural amenity value of this space for people.

On the southern side the Proposed Development will provide a:

- Dedicated pedestrian / cycle path to Eastgate Road and a new crossing on that road for onward connectivity into Little Island;
- Direct access to the proposed bridge from the Radisson Blu Hotel; and
- New tree and ground cover planting within the bridge construction corridor as part of proposed landscape integration and to support biodiversity enhancement.

Considering the proposed enhancements in connectivity and amenity associated with the Proposed Development, the impact will be **moderate**, **positive** and **permanent**.

### 8.4.3.3 Visual impact

The proposed bridge introduces a modern structure into a visual environment that already has a number of modern structures, including concrete walls, metal railings, crash barriers, fly over road bridge, metal gantries and large directional signage. The topography and vegetation associated with the linear infrastructure combined with the built development along the N25 corridor restrict views of the Proposed Development. Considering the low-profile nature of the bridge deck with the overall bridge structure contained within the topography, vegetation and built context to both sides of the N25 corridor, views of the structure will be generally localised in nature. The Proposed Development will be visible from eastern approaches towards Little Island train station on the L3004 Glounthaune Road and the N25, and the R623 bridge as it crosses the N25 at the corner of Eastgate Road, adjacent to the northeast corner of Eastgate Business Park. There is potential for glimpse views of the Proposed Development from the Radisson Blu Hotel and car park on the northern side and from individual residential properties located on the south facing slope north of the site above Factory Hill Road.

Representative viewpoints of the Proposed Development have been prepared from the following locations:

**Open space to the west:** Refer to Figure 1.1.1 in **Appendix 8.2** in **Volume 4** of this EIAR. This viewpoint is located approximately 140m west of the centre of the proposed bridge within the Proposed Development and is representative of receptors approaching from the west along the L3004 Glounthaune Road and the open space itself. The view is characterised by the open amenity grass area, rough gravel footpath, the belt of trees and vegetation defining the boundary of the space and screening the railway line. The concrete post and rail fence is visible along the left of the view with low light industrial buildings visible in the background together with light columns and the elevating road. Individual elements of street furniture and a timber pole with powerlines is visible. The coloured array of recycling containers in the community recycling yard are visible in the background.

The embankment supporting the northern approach ramp to the bridge will be visible adjacent to the path heading east in the green open space (refer to Figure 1.1.2 in **Appendix 8.2** in **Volume 4** of this EIAR). The remaining elevated sections and support columns of the proposed bridge approach as it turns south to cross over the railway line will be visible between the existing and proposed trees in the open space. A new path and the resurfaced existing path will be visible within a diversified landscape mosaic of wet grassland and associated planting in the green space. The green embankment will screen the community recycling facility. The visual impact is considered to be **moderate**, **neutral** and **permanent**.

**R623 Flyover Bridge:** Refer to Figure 1.2.1 in **Appendix 8.2** in **Volume 4** of this EIAR. This viewpoint is located 295m east of the centre of the proposed bridge within the Proposed Development on the fly over road bridge crossing the N25 and the Cork City to Middleton Cobh railway line. This view is representative of receptors moving north / south along the flyover bridge on foot or in a vehicle. The view is characterised by the four-lane dual carriageway of the N25 with the slip roads to the junction serving this road visible in the centre and right of the view. The mixed tree belts and vegetation along the road corridor and the tree cover of the south facing slope of the River Lee Valley combine to create a green setting to the road corridor from this view. Individual residential dwellings are glimpsed between the tree canopy of the south facing slope. Light columns and a concrete wall are visible on the slip road and a gantry over the N25 with large highway signage visible further west.

The single span arches with bridge deck suspended from the network of steel lattice cable will be visible over the N25 in the middle distance in this view (refer to Figure 1.2.2 in **Appendix 8.2** in **Volume 4** of this EIAR). The uppermost point of the arches will project into the skyline but appear below the top of the trees to either side of the N25. The overall structure of the bridge will appear nestled within the infrastructure corridor created by the linear vegetation along it and the tree covered south facing slope to the right of the view. The vegetation along the road / rail corridor screens views of approach ramps, decks and columns and the bridge abutments in this view. It is anticipated that glimpse views of the bridge structure will be visible from individual properties in the middle to upper portions of the south facing slope. The proposed bridge will appear as an added urbanising feature in the view. The visual impact is **moderate**, **negative** and **permanent**.

**Northeast Corner of Eastgate Business Park:** Refer to Figure 1.3.1 in **Appendix 8.2** in **Volume 4** of this EIAR. This viewpoint is located adjacent to the start of the southern approach ramp looking northeast across the public car park towards the Radisson Blu Hotel car park, 215m from the centre of the proposed bridge within the Proposed Development. This view is representative of receptors in the northeast of the business park and passing along Eastgate Road. The existing road is visible in the foreground together with car parking, a footpath and light columns. A green painted service cabinet and a green post and mesh fence is visible on the right of the view. A white concrete utility building is visible on the edge of the car park. Parked cars in the Radisson Blu Hotel car park are visible on a level above the foreground between clipped vegetation and a row of trees on the boundary of the car park. A mix of deciduous woodland and trees form a consistent backdrop to the view screening views beyond the car parking areas.

The proposed pedestrian / cyclist crossing on Eastgate Road will be visible in the foreground (refer to Figure 1.3.2 in **Appendix 8.2** in **Volume 4** of this EIAR). The pedestrian and cycle path extends east along the southern edge of the car park will turn north, gradually rising as it runs along the boundary with the Radisson Blu Hotel car park. The green vegetated embankment supporting the approach path will be visible at the rear of the public car park together with the protective railing. The approach path turns east at the corner of the Radisson Blu Hotel car park, disappearing as it enters the mixed woodland and onward to connect to the new bridge.

The approach path to the bridge runs at grade with the Radisson Blu Hotel car park making it invisible from this location. New tree planting along the boundary between the approach path and the hotel car park will be visible and also between the new path and the southern edge of the public car park. The new bridge is screened by the retained woodland and new tree planting. Taking account of the context of this view and the view itself, the impact is **slight**, **negative** and **permanent**.

#### 8.4.3.3.1 Lighting impact

Lighting of the proposed structure will be integrated into the parapets to light the deck. All lighting will be incorporated into the structure and maintained from the proposed structure thereby avoiding any requirement for access through landscape and woodland at ground level.

Light fittings will be specified and selected to achieve compliance with dark-sky criteria (i.e., no upward lighting), with precise light control capability. The lamps will be low-impact LED with an anti-glare and cut-off facility. Taking account of the night-time context of the site, the visual effects are considered **slight**, **negative** and **long term**.

## 8.5 Mitigation and Monitoring

### 8.5.1 Construction Phase

#### *8.5.1.1 Mitigation*

Avoiding significant landscape and visual impact during construction has been considered from the outset of the design development of the Proposed Development. However, all construction projects have some degree of unavoidable landscape and visual effects for the duration of the Construction Phase.

Prior to the commencement of works, the appointed contractor will update the Construction Environmental Management Plan (CEMP), included as **Appendix 5.1** in **Volume 4** of this EIAR. The purpose of the CEMP is to ensure good working practices are implemented on site, including the mitigation measures set out in this chapter, thereby minimising and managing any potential negative environmental effects.

Specific measures will ensure that:

- Temporary site hoarding will be erected around areas that adjoin public or private land that may be impacted by the works. This includes the:
    - North, east and western site boundary with the L3004 Glounthaune Road, access road to Little Island train station and public green space respectively; and
    - Boundaries with the existing public Eastgate Business Park car park at Eastgate Road and the Radisson Blu Hotel car park.
- Additional protective fencing will be erected at the boundary of proposed works areas to protect retained landscape, planting, features etc. The remaining trees along the railway line embankments, N25 road corridor and the woodland block between the N25 and Radisson Blu Hotel will be protected with fencing in accordance with BS5837:2012: Trees in relation to Design, Demolition and Construction (BSI, 2012) and TII's Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes (TII, 2006). Refer to the Arboricultural Impact Assessment with accompanying tree clearance and tree constraints plans by Heritage Tree Care Ltd., for details of existing trees and tree groups to be removed, retained and the specification of protection measures (refer to **Appendix 8.1** in **Volume 4** of this EIAR). All necessary measures will be taken to avoid non-native, invasive species establishing in the area;
- Site machinery will only operate within the Proposed Development area;
- Storage of materials and temporary stockpiling will only be permitted at the bridge assembly area and construction compounds located at the northern and southern ends of the Proposed Development site;
- Proposed construction which uses the optimum number and arrangement of pile foundations, support columns and bridge abutments to minimise Construction Phase impacts on the landscape, particularly existing trees and woodland blocks;
- Location, arrangement and design of construction and assembly zones so that they use existing hard standing areas and / or minimise construction within existing landscape areas which will require removal and subsequent reinstatement as landscape; and
- Design and construction that minimises requirement for future access under the structure and within woodland / landscape areas, thereby minimising potential disturbance to reinstated landscape areas.

#### *8.5.1.2 Monitoring*

The works will be monitored continuously as part of the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) to ensure the adequate protection of trees, built heritage features, amenity and public realm areas.

Any construction works within close proximity to the retained trees are advised to be undertaken in accordance with approved method statements prepared by the construction contractor under the direct supervision of a qualified consultant Arboriculturist. Therefore, during the construction works, a professionally qualified Arboriculturist is recommended to be retained by the principal contractor or site manager to monitor and advise on any works within the root protection area (RPA) of retained trees to ensure successful retention and planning compliance.

Copies of the tree clearance and tree constraints plans included with the Arboricultural Impact Assessment prepared by Heritage Tree Care Ltd. (refer to **Appendix 8.1** in **Volume 4** of this EIAR) and BS5837:2012: Trees in relation to Design, Demolition and Construction (BSI, 2012) should be kept available on-site during the construction works. All works are to be carried out in accordance with these documents.

On the completion of the construction works, all trees and vegetation retained are to be reviewed by the project Arboriculturist and any necessary remedial tree surgery works required to promote health and safety are to be implemented.

### 8.5.2 Operational Phase

Mitigation of potential impacts of the Proposed Development has been considered from the earliest stages of design development to integrate measures into the design and construction of the bridge and approach ramps. Key measures integrating mitigation include the:

- Selection of a route corridor for the proposed bridge and access ramps that minimises the impact on the existing landscape whilst achieving universal access;
- High quality architectural design of the bridge with a shallow deck and a single span double arch with lattice supports to minimise apparent mass in views towards the structure from east and west; and
- Enhancement of existing landscape within and adjacent the works area to include new tree planting, amenity paths and linkages to active travel and public transport and grassland diversification to enhance the local landscape for nature and amenity for people.

### 8.5.3 Decommissioning Phase

**Chapter 4**, *Description of the Proposed Development* outlines the decommissioning of the Proposed Development. In the event of the proposed bridge and approach ramps and paths being removed, there would likely be significant, negative and long-term effects in removing and reducing the pedestrian and cycle connectivity in the area. The corridor of the structure could be replanted with trees or left to naturally regenerate with riparian vegetation.

## 8.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. Detail on these projects is presented in **Chapter 20,** *Cumulative and Interactive Impacts*, with an overview presented in **Table 8.2**.

**Table 8.2: Cumulative assessment projects**

| Project No. | Project Description |
|---|---|
| 1 | 30 no. bedroom, three-storey extension to the existing Radisson Blu Hotel & Spa, Little Island |
| 2 | Construction of light industrial building, Euro Business Park, Little Island |

The proposed construction of Project 2, a light industrial building in Euro Business Park, is unlikely to be visible together with the Proposed Development and is likely to be perceived as part of the industrial and commercial peri-urban context of Little Island. The only project which may potentially have a cumulative effect is Project 1 which is considered further below.

### 8.6.1 Project 1: Extension to Radisson Blu Hotel

The iNua Hospitality development at Radisson Blu Hotel is comprised of a three-storey extension to the existing hotel at its eastern end providing 30 no. bedrooms with rooftop plant, ancillary works, the omission of two existing hotel rooms at upper floors and omission of a meeting room at ground level to facilitate internal connectivity between the proposed extension and the existing hotel. It is likely to give rise to **moderate**, **negative** and **short-term** cumulative landscape and visual effects during the Construction Phase. The location of the proposed extension to the hotel is separated from the Proposed Development by the existing hotel building and would be screened from view by the built form and established woodland to the north and east. Intervisibility between the Proposed Development and this project is likely to be very low and would be perceived as consistent with the peri-urban context of Little Island leading to **slight**, **negative** and **permanent** cumulative effects during the Operational Phase.

## 8.7 Residual Impacts

The Proposed Development requires the removal of 103 no. individual trees, 5 no. part-groups (i.e., sections of a tree group) and 13 no. tree groups along the route of the proposed bridge and access ramps, primarily within the woodland situated between the N25 and the Radisson Blu Hotel. The estimated total number of trees to be removed on site is 277. This will result in **significant, negative** and **short** to **medium-term** residual landscape and visual effects at construction, which will recede to **moderate, neutral** and **long-term** residual effects as the new landscape planting establishes and matures.

Once complete and operational, the Proposed Development will have an overall **moderate**, **positive** and **permanent** residual effect on the site and its context. Direct benefits will arise from the improved accessibility and connectivity for people to take active forms of travel and public transport, along with the local enhancement of public green space.

There will also be wider indirect benefits to people arising from the Proposed Development through its support of modal shift to sustainable forms of travel, thereby reducing vehicle movements to / from Little Island and the improvement in the local environment for people that flows from this.

## 8.8 References

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## Chapter 09

# Biodiversity

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# 9. Biodiversity

## 9.1 Introduction

This chapter describes the likely significant effects of the Proposed Development on biodiversity, including flora (plants), fauna (animals) and habitats in both the terrestrial and aquatic environment. Mitigation measures are also described, where applicable or appropriate, that avoid or minimise adverse biodiversity effects.

**Chapter 4**, *Description of the Proposed Development* provides a full description of the Proposed Development. An Appropriate Assessment (AA) Screening has also been prepared for the Proposed Development, and this will be submitted to An Bord Pleanála as part of the planning application documentation.

The potential effects on biodiversity in this chapter should be considered in conjunction with the other chapters of the EIAR including **Chapter 4**, *Description of the Proposed Development*, **Chapter 11**, *Air Quality,* **Chapter 12**, *Climate*, **Chapter 16**, *Water*, **Chapter 17**, *Land, Soils, Geology and Hydrogeology* and **Chapter 20**, *Cumulative and Interactive Impacts* as well as the Construction Environmental Management Plan (CEMP) included as **Appendix 5.1** in **Volume 4** of this EIAR.

This chapter was prepared by Carl Dixon MSc (ecological monitoring) and Dr. Sorcha Sheehy PhD (ecology / ornithology). Details of Carl and Sorcha's relevant qualifications and experience are included in **Chapter 1**, *Introduction*.

## 9.2 Assessment Methodology

### 9.2.1 General

The biodiversity assessment addresses the potential likely significant direct, indirect and cumulative effects of the Proposed Development on terrestrial and aquatic biodiversity, including flora, fauna and habitats in proximity to the Proposed Development site. The assessment has been carried out in three stages:

1. Desktop assessment to determine existing information and records in relation to:
    - Sites, species, and habitats protected under Council Directive 92/43/EEC (Habitats Directive), and sites and species protected under Council Directive 2009/147/EC (Birds Directive), within the zone of influence of the Proposed Development and more distant hydrologically linked sites. The Zone of Influence (ZoI) comprises the area within which the Proposed Development may potentially affect the conservation objectives (or qualifying interests) of a Natura 2000 site; and
    - Biodiversity, habitats, and species present near the Proposed Development.
2. Site visits and field surveys by the specialist ecologists to establish the existing ecological conditions within the footprint of the Proposed Development and within the vicinity of all of the Proposed Development elements.
3. Evaluation of the Proposed Development and determination of the scale and extent of potential likely direct and indirect significant effects on biodiversity (i.e., flora, fauna, and habitats) and the identification of appropriate mitigation and monitoring which may be required.

### 9.2.2 Relevant legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Act 1976, as amended, and the European Communities (Birds and Natural Habitats) Regulations 2011. They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (2009/147/EC).

Under this legislation, sites of nature conservation importance are then designated to legally protect faunal and floral species and important / vulnerable habitats.

The relevant categories of designation are as follows:

- Special Areas of Conservation (SAC) are designated under the European Communities (Birds and Natural Habitats) Regulations 2011 to meet the EU Habitats Directive (92/43/EEC);
- Special Protection Areas (SPAs) are designated under the EU Birds Directive (79/409/EEC) amended in 2009 as the Directive 2009/147/EC; and
- Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHA) are listed under the Wildlife (Amendment) Act 2000. A NHA is designated for its wildlife value and receives statutory protection. A list of proposed NHAs (pNHAs) was published on a non-statutory basis in 1995, but these have not since been statutorily proposed or designated.

Relevant European legislation:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive);
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (The Birds Directive);
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (The Water Framework Directive); and
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (The Fish Directive (consolidated)).

Relevant Irish legislation:

- The Wildlife Act 1976, as amended by the Wildlife Act 1976 (Protection of Wild Animals) Regulations, 1980, the Wildlife (Amendment) Act 2000, the Wildlife (Amendment) Act 2010, Wildlife (Amendment) Act 2012, European Communities (Wildlife Act, 1976) (Amendment) Regulations 2017. (The Wildlife Act);
- European Communities (Conservation of Wild Birds) Regulations 1985 (S.I. 291/1985) as amended by S.I. 31/1995;
- European Communities (Natural Habitats) Regulations, S.I. 94/1997 as amended by S.I. 233/1998 & S.I. 378/2005 (The Habitats Regulations);
- Fisheries (Consolidation) Act, 1959 (as amended), hereafter referred to as the Fisheries Act;
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011); and
- Flora (Protection) Order, 2022 (S.I. No. 235/2022).

In addition to the above, in assessing the likely significant effects on the prevailing biodiversity arising from the Proposed Development (including during the Decommissioning Phase), due regard, where relevant, has been given to relevant legislation and guidance, including the following:

- EIA Directive (2014/52/EU);
- Planning and Development Acts 2000, as amended and the Planning and Development Regulations 2001, as amended;
- Wildlife Act 1976, as amended;
- Flora (Protection) Order 2015;
- EU Water Framework Directive 2000/60/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011 (as amended);

- National Biodiversity Action Plan 2017 – 2021;
- EU Biodiversity Strategy for 2030 (EU, 2020);
- EU Strategy on Green Infrastructure (EU, 2013);
- National Biodiversity Action Plan for 2017-2021 (Department of Culture. Heritage and the Gaeltacht, 2017); and
- National Parks and Wildlife Service (NPWS) Threat Response Plans (NPWS, Various).

### 9.2.3 Guidance

This chapter of the EIAR follows the Environmental Protection Agency's Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022). It also takes account of the Draft Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government, August 2018), Guidelines on Ecological Impact Assessment in the UK and Ireland, 2nd edition (Chartered Institute of Ecology and Environmental Management (CIEEM), 2016) and Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1 (CIEEM, 2018).

Reference was also made to the following documents where relevant:

- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Union (EU), 2017);
- Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC (EC Environment Directorate-General, 2018);
- Guidance on integrating climate changes and biodiversity into environmental impact assessment (EU Commission, 2013);
- Assessment of plans & projects in relation to N2K sites – Methodological Guidance (EC, 2021);
- Biodiversity Net Gain Good practice principles for development (CIEEM, 2019);
- Biodiversity Net Gain. A practical guide (CIEEM, 2016);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland (IFI), 2016);
- Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EC, 2021);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority (NRA), 2009);
- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011);
- A Guide to Habitats in Ireland (Fossitt, 2000);
- Guidelines for the treatment of Badgers prior to the construction of National Road Schemes. National Roads Authority, Dublin (NRA, 2005a);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2005b);
- Guidelines for the treatment of bats during the construction of national road schemes (NRA, 2005c);
- Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes (NRA, 2006);
- Guidelines for the treatment of Otters prior to the construction of National Road Schemes (NRA, 2008);

- Bird Census Techniques (Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H., 2000);
- Bird Monitoring Methods - a Manual of Techniques for Key UK Species (Gilbert, G., Gibbons, D.W. & Evans, J., 1998);
- Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed) (Collins, 2016); and
- Bat Mitigation Guidelines for Ireland Volume 2 (F. Marnell, C. Kelleher and E. Mullen, 2022).

### 9.2.4 Desktop study

A desktop study was carried out to collate the available information on the local ecological environment. The purpose of the desktop study was to identify features of ecological value occurring within the Proposed Development site and those occurring near to it which have the potential to be affected by the Proposed Development. A desktop review also allows the key ecological issues to be identified early in the assessment process and facilitates the planning of surveys. Sources of information utilised for this report include the following:

- National Parks and Wildlife Service (NPWS) - www.npws.ie;
- Environmental Protection Agency (EPA) – www.epa.ie;
- National Biodiversity Data Centre (NBDC) – www.biodiversityireland.ie;
- Bat Conservation Ireland - www.batconservationireland.org;
- Birdwatch Ireland - www.birdwatchireland.ie;
- National Biodiversity Action Plan 2017-2021 (NPWS, 2017);
- Cork County Development Plan 2022-2028 (Cork County Council, 2022); and
- Cork Biodiversity Action Plan 2009-2014.

### 9.2.5 Site surveys

This assessment is based on surveys at the Proposed Development site. Site surveys were carried out from February 2022 to May 2023 on several dates, as outlined in **Table 9.1**.

**Table 9.1: Survey types and survey dates**

| Survey type | Survey dates |
|---|---|
| Habitat survey | 8th June 2022, 15th September 2022, 13th March 2023, 14th March 2023, 26th May 2023 |
| Non-volant mammal survey | 8th June 2022, 15th September 2022, 13th March 2023, 14th March 2023 |
| Bat survey | Bat activity surveys: 12th and 15th September 2022<br>Bat / tree survey: 13th 2023, 14th March 2023 |
| Breeding bird survey | 8th June 2022, 15th September 2022, 13th March 2023, 14th March 2023, 26th May 2023 |
| Winter bird survey / vantage point survey | 28th February 2022, 29th February 2022, 15th March 2022, 21st March 2022, 25th November 2022, 3rd December 2022, 28th December 2022, 28th January 2023, 29th January 2023. |

#### *9.2.5.1 Habitats*

Habitats were mapped according to the classification scheme outlined in the Heritage Council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and following the guidelines contained in *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). Habitats were cross referenced with Habitats Directive Annex I habitats. Dates of the main habitat surveys are included in **Table 9.1**. During these surveys, the site was also surveyed for invasive species and rare floral species (Wyse *et al*., 2016; Stace 2019).

#### 9.2.5.2 *Non-volant mammals*
Non-volant mammal surveys followed guidelines from the Harris *et al.* (1989), National Roads Authority (NRA) (2005a) and NRA (2008). All habitats within 150m of the Proposed Development site were examined for signs of mammals, with particular focus on Badger *Meles meles* and Otter *Lutra lutra*. Signs of mammals, including spraints, footprints, or feeding remains, were recorded where present.

#### 9.2.5.3 *Bats*
Dusk bat activity / emergence surveys were carried out in the Proposed Development site during suitable weather conditions (sunset temperatures above 10°C, no rain and no strong wind) on several dates outlined in **Table 9.1**. The surveys followed the guidelines set out in 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)' (Collins, 2016). Surveyors walked around woodland, treelines and aquatic/wetland habitats which might support bats, and habitats which might be affected by the Proposed Development. The surveys were carried out 15 minutes before sunset. Bat activity surveys used Elekon Batloggers, Magenta Bat 4 Precision, EchoMeter Touch 2 PRO bat detectors. The primary purpose of bat surveys was to assess usage of trees and habitats, located within or in close proximity to the Proposed Development site boundary and to identify foraging and / or commuting routes within the Proposed Development site boundary (i.e., woodland, treelines, hedgerow etc.).

A preliminary roost assessment was also carried at ground level on trees earmarked for removal within the Proposed Development site. The aim of this survey was to identify 'potential roosting features (PRFs)' and any evidence indicating the presence of bats i.e., staining, dropping etc. These assessments followed the guidelines set out in 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed)' (Collins, 2016).

#### 9.2.5.4 *Breeding birds*
General bird surveys were carried out in tandem with habitat surveys. Bird surveys were broadly based on the BTO Common Bird Census (CBC) methodology and Breeding Bird Survey (BBS) (Gilbert *et al.,* 1998 and Bibby *et al.,* 2000) which aims to capture a snapshot of breeding bird activity within the survey area. The survey area focused on terrestrial habitats within the planning boundary. All lands within the Proposed Development site were walked so that all habitats within 50m of all potential nesting features were surveyed i.e., woodland, treelines, hedgerows etc. The ornithological surveyor slowly walked through the site, stopping at regular intervals to scan with binoculars and to listen for bird calls or song. Birds were identified by sight and song. All species seen or heard in the survey area and immediate environs were recorded including those in flight. Visits were made during favourable weather conditions.

#### 9.2.5.5 *Wintering birds*
Vantage point surveys for wintering birds overflying the Proposed Development site were carried out between February 2022 and February 2023. These surveys were based on SNH (2017) methodology which is designed to quantify the level of bird flight activity and distribution over the survey area. The vantage point location, on the existing N25 bridge provided excellent visibility of birds overflying the proposed bridge location. Surveys were carried out during good weather conditions, with good visibility and used 8.5×45 binoculars and a Hawke Endurance Ed Spotting Scope 15-45×60 spotting scope. While target species for this survey were wading and wintering birds, all bird species were recorded including passerines, raptors etc. Bird species, flight height and direction were recorded for all species observed.

### 9.2.6 Consultation
The consultation process which informed the scope of this EIAR is described in **Chapter 1**, *Introduction*. Issues raised during the consultation process relating to biodiversity are addressed where relevant within this chapter.

### 9.2.7 Limitations
Standard survey methods were followed. However, any biases or limitations associated with these methods could potentially affect the results collected. Although every effort was made to provide a full assessment and comprehensive description of the study area, natural fluctuations in populations may not be fully reflected due to the instantaneous nature of the field surveys. However, the field surveys together with the

background knowledge provided by the desk study, provides a robust representation of the baseline for the habitats and species within the zone of influence.

## 9.3 Baseline Environment

### 9.3.1 General landscape

The Proposed Development site is located at Little Island, approximately 10km east of Cork City on the N25 Cork to Waterford primary route. The Proposed Development will be located west of the Little Island train station and will cross over the N25 and the railway line, connecting the Little Island train station, the L3004 Glounthaune Road and the Dunkettle to Carrigtwohill pedestrian and cycle route to the Eastgate Business Park in Little Island, Cork. To the north of the Proposed Development lies the L3004 Glounthaune Road and to the south lies the Eastgate Business Park.

The Proposed Development site is located within an area of significant retail, light industrial and residential development. The N25, which bisects the Proposed Development site is a busy road will high levels of traffic and existing lighting. The southern side of the Proposed Development site, which is located within Eastgate Business Park includes areas of car parking associated with the Radisson Blu Hotel, car dealerships and offices to the immediate south, east and west. The northern side of the Proposed Development site is located adjacent to a small public park and recycling centre and railway line. Areas of woodland and treeline are located on the northern and southern boundary of the N25 within the Proposed Development site.

In the wider landscape, wetland and estuarine habitats associated with Cork Harbour are located to the south (Lough Mahon), east (Glounthane Estuary) and west (Dunkettle). Lands to the north of the Proposed Development site are dominated by agricultural grassland and are largely rural in nature.

### 9.3.2 Designated sites / conservation areas

#### *9.3.2.1 European sites*

Special Areas of Conservation (SACs) and candidate SACs (cSACs) are protected under the Habitats Directive 92/43/EEC and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Special Protection Areas (SPAs) are protected under the Birds Directive 2009/147/EC and European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, these sites are referred to as Natura 2000 or European sites.

In accordance with the European Commission Methodological Guidance (EC, 2018), a list of Natura 2000 sites that can be potentially affected by the Proposed Development has been compiled. All SAC, cSAC and SPAs sites which could potentially be impacted by the Proposed Development have been identified. **Table 9.2** lists the relevant Natura 2000 sites, the location of which are shown in **Figure 9.1** and **Figure 9.2** in **Volume 3** of this EIAR.

The Proposed Development does not overlap with any European site. European sites within the potential zone of influence of the Proposed Development site are listed in **Table 9.2**. The Kilcoolishal Stream (also known as the Tibbotstown Stream) runs through the northern side of the Proposed Development site, between the N25 and the railway line. Although the Kilcoolishal Stream is heavily culverted in parts, this ultimately drains into Cork Harbour SPA approximately 2.6km downstream of the Proposed Development site. Surface water run-off during the Construction or Operational Phase of the Proposed Development could potentially flow into Cork Harbour SPA (and Great Island Channel SAC) via the Kilcoolishal Stream. The spread of invasive species during construction could also impact on European sites.

Habitats within or near the Proposed Development site could potentially provide *ex-situ* foraging or roosting grounds for special conservation interest (SCI) species outside the Cork Harbour SPA. SCI species are species for which conservation objectives have been set for this European site. Therefore, construction and operation of the Proposed Development could create disturbance / displacement impacts to SCI birds.

Known bird foraging and roosting habitats for SCI birds are located to the east, west and south of the Proposed Development site. During operation, the bridge could create a collision risk for SCI species for Cork Harbour SPA travelling between foraging / roosting areas.

A potential source-pathway-receptor link has been identified between the source (the Proposed Development) and these receptors (Great Island Channel SAC and Cork Harbour SPA) via a potential pathway (surface water run-off during construction / operation, disturbance / displacement at *ex-situ* foraging habitats, spread of invasive species during construction and collision risk during operation). Further information on these European sites is provided in **Table 9.2**.

**Table 9.2: European sites within the zone of influence of the Proposed Development site**

| European site | Site code | Qualifying interests / special conservation interests | Approximate distance at closest point and potential source-pathway-receptor link |
|---|---|---|---|
| **Special Area of Conservation (SAC)** | | | |
| Great Island Channel SAC | 001058 | Mudflats and sandflats not covered by seawater at low tide [1140]<br><br>Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] | 910m east of the Proposed Development site.<br><br>The Kilcoolishal Stream flows through the Proposed Development site approximately 7.2km upstream of the Great Island Channel SAC.<br><br>Given the location of the Proposed Development relative to the European site boundary, and the identified downstream hydrological connectivity, a potential source pathway connector link has been identified. |
| Blackwater River (Cork / Waterford) SAC | 002170 | Estuaries [1130]<br><br>Mudflats and sandflats not covered by seawater at low tide [1140]<br><br>Perennial vegetation of stony banks [1220]<br><br>Salicornia and other annuals colonising mud and sand [1310]<br><br>Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]<br><br>Mediterranean salt meadows (*Juncetalia irsute*) [1410]<br><br>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]<br><br>Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]<br><br>Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]<br><br>*Margaritifera* (freshwater pearl mussel) [1029]<br><br>*Austropotamobius pallipes* (white-clawed crayfish) [1092]<br><br>*Petromyzon marinus* (sea lamprey) [1095]<br><br>Lampetra planeri (brook lamprey) [1096]<br><br>*Lampetra fluviatilis* (river lamprey) [1099] | 14.3km north. There is no hydrological connection with this SAC. No potential source pathway connector link has been identified. |

| European site | Site code | Qualifying interests / special conservation interests | Approximate distance at closest point and potential source-pathway-receptor link |
|---|---|---|---|
| | | *Alosa fallax fallax* (twaite shad) [1103]<br><br>*Salmo salar* (salmon) [1106]<br><br>*Lutra lutra* (otter) [1355]<br><br>*Trichomanes speciosum* (Killarney fern) [1421] | |
| **Special Protection Area (SPA)** | | | |
| Cork Harbour SPA | 004030 | Little Grebe (*Tachybaptus ruficollis*) [A004]<br><br>Great Crested Grebe (*Podiceps cristatus*) [A005]<br><br>Cormorant (*Phalacrocorax carbo*) [A017]<br><br>Grey Heron (*Ardea cinerea*) [A028]<br><br>Shelduck (*Tadorna tadorna*) [A048]<br><br>Wigeon (*Mareca penelope*) [A050]<br><br>Teal (*Anas crecca*) [A052]<br><br>Pintail (*Anas acuta*) [A054]<br><br>Shoveler (*Anas clypeata*) [A056]<br><br>Red-breasted Merganser (*Mergus serrator*) [A069]<br><br>Oystercatcher (*Haematopus ostralegus*) [A130]<br><br>Golden Plover (*Pluvialis apricaria*) [A140]<br><br>Grey Plover (*Pluvialis squatarola*) [A141]<br><br>Lapwing (*Vanellus vanellus*) [A142]<br><br>Dunlin (*Calidris alpina*) [A149]<br><br>Black-tailed Godwit (*Limosa limosa*) [A156]<br><br>Bar-tailed Godwit (*Limosa lapponica*) [A157] | 800m east of the Proposed Development site<br><br>The Kilcoolishal Stream flows through the Proposed Development site 2.6km upstream of the Cork Harbour SPA.<br><br>Habitats within or near the Proposed Development site could potentially provide ex-situ foraging grounds for SCI species outside the Cork Harbour SPA. Construction and operation of the Proposed Development could potentially create disturbance / displacement impacts for SCI birds.<br><br>During operation, the bridge could create a potential collision risk for SCI species overflying this area.<br><br>Given the location of the Proposed Development relative to the European site boundary and the identified downstream hydrological connectivity as well as the potential for *ex situ* impacts to foraging / roosting habitat and collision risk for SCI species, a potential source pathway connector link has been identified. |

| European site | Site code | Qualifying interests / special conservation interests | Approximate distance at closest point and potential source-pathway-receptor link |
|---|---|---|---|
| | | Curlew (*Numenius arquata*) [A160<br><br>Redshank (*Tringa totanus*) [A162]<br><br>Black-headed Gull (*Chroicocephalus ridibundus*) [A179]<br><br>Common Gull (*Larus canus*) [A182]<br><br>Lesser Black-backed Gull (*Larus fuscus*) [A183]<br><br>Common Tern (*Sterna hirundo*) [A193]<br><br>Wetland and Waterbirds [A999] | |

Great Island Channel SAC stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and compared to the rest of Cork Harbour, is relatively undisturbed. The site is a Special Area of Conservation (SAC) for two habitats listed on Annex I; [1140] Tidal Mudflats and Sandflats and [1330] Atlantic Salt Meadows. The Blackwater River (Cork / Waterford) SAC is not hydrologically connected to the Proposed Development site.

Cork Harbour SPA is a large, sheltered bay system, with several river estuaries – principally those of the Rivers Lee, Douglas, Owenabue and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenabue River Estuary, Whitegate Bay, Ringabella Creek and the Rostellan and Poulnabibe inlets. Cork Harbour is of major ornithological significance, being of international importance for the total numbers of wintering birds (i.e., > 20,000). In addition, it supports nationally important wintering populations of 22 species, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive.

#### *9.3.2.2 Nationally protected sites*

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are national designations under the Wildlife Act 1976, as amended. A Natural Heritage Area (NHA) is designated for its wildlife value and receives statutory protection. These areas are considered nationally important for the habitats present or which holds species of plants and animals whose habitats needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

Proposed Natural Heritage Areas (pNHA) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated. These sites are also of significance for wildlife and habitats. Prior to statutory designation, pNHAs are still subject to limited protection, in the form of:

- Agri-environmental farm planning schemes support the objective of maintaining and enhancing the conservation status of pNHAs;
- There is a requirement for the Forest Service to gain NPWS approval before they will pay afforestation grants on pNHA lands; and
- A recognition of the ecological value of pNHAs by Planning and Licencing Authorities.

No NHAs are located in the vicinity of the Proposed Development site. The pNHAs located in the vicinity of the Proposed Development site are listed in **Table 9.3** and are shown in **Figure 9.3** in **Volume 3** of this EIAR.

**Table 9.3: Proposed Natural Heritage Areas (pNHAs) in the vicinity of the Proposed Development site**

| pNHA | Site code | Overlapping with Natura 2000 site | Approximate distance at closest point and potential source-pathway-receptor link |
|---|---|---|---|
| Great Island Channel pNHA | 001058 | Great Island Channel SAC and Cork Harbour SPA | 400m east (7.2km downstream). Refer to Great Island Channel SAC for site description.<br><br>Potential hydrological connection via the Kilcoolishal Stream. However, given the distance from Proposed Development site this is not significant. |
| Rockfarm Quarry Little Island pNHA | 001074 | None | 1.1km south. Rock Farm Quarry is located c. 9km west of Cork City on Little Island in the River Lee estuary. The area is of considerable interest botanically because of its species diversity and the presence of ''raritie'' for the region, such as the dense-flowered orchid and the Portland Spurge.<br><br>No pathway identified. |
| Dunkettle Shore pNHA | 001082 | Cork Harbour SPA | 1.3km west. This site is located at the mouth of Glashaboy River, where it meets the Lee estuary, on the eastern edge of Cork City. It is adjacent to Glanmire Wood pNHA and is an integral part of Cork Harbour. The site is of value because its mudflats provide an important feeding ground for waterfowl, and it acts as a significant roost for birds in the upper harbour.<br><br>Potential hydrological connection via the Kilcoolishal Stream. A potential source pathway connector link has been identified. |
| Douglas River Estuary pNHA | 001046 | Cork Harbour SPA | 2.2km southwest. This is a large site situated in the north-west corner of Cork Harbour, stretching from Blackrock to Passage West and is an integral part of Cork Harbour. This site occurs within the upper harbour and consists of extensive mudflats, formed from fine silts, bisected by the Douglas River. Damp grassland occurs on part of the southern side, extending to some low islands which are inundated in extreme tides. This site is of interest because it is an essential part of the Cork Harbour complex and contains much higher densities of waders than would be expected from its relative size.<br><br>Potential hydrological connection via the Kilcoolishal Stream. A potential source pathway connector link has been identified. |
| Glanmire Wood pNHA | 001054 | Cork Harbour SPA | 2.7km west. Glanmire Wood occurs on the east bank of the Glashaboy River, immediately south of Glanmire village. The main habitat of interest is mixed broad-leaved woodlands dominated by Oak (*Quercus* sp.), Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*) with a few conifers. This site is of interest because this type of woodland is rare in east Cork.<br><br>No pathway for impact as designated for terrestrial habitats. |
| Cork Lough pNHA | 001081 | No | 8.9km southwest. This small lake is situated in the north-west of Cork City, 1km. north of the River Lee. The site is a pNHA of local importance for its bird community.<br><br>No pathway identified. |
| Monkstown Creek pNHA | 001979 | Cork Harbour SPA | 9.1km south. Monkstown Creek is situated between Monkstown and the major seaport of Ringaskiddy on the western shores of Cork Harbour. The area is of value because its mudflats provide an important feeding area for waterfowl and it is a natural part of Cork Harbour which, as a complete unit, is of international importance for waterfowl. |

| pNHA | Site code | Overlapping with Natura 2000 site | Approximate distance at closest point and potential source-pathway-receptor link |
|---|---|---|---|
| | | | Potential hydrological connection via the Kilcoolishal Stream. However, given the distance from Proposed Development site this is not significant. |
| Leamlara Wood pNHA | 001064 | No | 9.2km northeast. This site is situated 6km north-west of Midleton in the steep sided valley of the Leamlara River. This area is of local importance as there are few areas of semi-natural oak woodland in east Cork, and it is a good example of this community.<br><br>No pathway identified. |
| Lee Valley pNHA | 000094 | No | 10.1km west. This site occupies five separate sections of the valley of the River Lee, immediately to the west of Cork City. The diverse range of intact semi- natural habitats in the Lee Valley makes this a site of regional conservation importance.<br><br>No pathway identified. |
| Whitegate Bay pNHA | 001084 | Cork Harbour SPA | 10.6km southwest. This site is situated in the south-east corner of Cork Harbour, immediately to the west of Whitegate in County Cork. Most of the Whitegate Bay pNHA comprises open marine water, with extensive mudflats exposed at low tide which hold a wide range of waterfowl, in particular Grebes, Diving Ducks and Waders. Many of these used to roost on Long Point, but this area is now occupied by the Aghada Power Station and so many of the birds spend the night in the vicinity of Corkbeg Island. Whitegate Bay usually holds approximately 10% of the winter waterfowl community of Cork Harbour.<br><br>Potential hydrological connection via the Kilcoolishal Stream. However, given the distance from Proposed Development site this is not significant. |
| Ballynaclashy House pNHA | 000099 | None | 11.1km northeast. A maternity roost of Whiskered Bat (*Myotis mystacinus*) has been recorded at Ballynaclashy House pNHA. The foraging range of Whiskered Bat is normally 3.5km from nursery colonies and therefore the Proposed Development is likely to be outside the foraging range of this bat colony.<br><br>No pathway identified |
| Blarney Bog pNHA | 001857 | No | 12.1km west. Blarney Bog is an area of fen situated in the flat valley floor of the River Blarney. The main habitats of the area are lowland wet grassland and freshwater marsh/ fen. The area as a whole is used by a variety of bird species.<br><br>No pathway identified. |
| Lough Beg pNHA | 001066 | Cork Harbour SPA | 13.6km south. Lough Beg is a constituent part of Cork Harbour, occurring south of Ringaskiddy in the lower harbour. As part of the Harbour complex, Lough Beg plays a part in supporting internationally important numbers of waders (over 20,000) and of two particular species, the Black-tailed Godwit (peak in l99l/92: 2,077) and Redshank (l,859). There are also nationally important flocks of nineteen others. Wildfowl are relatively numerous as compared to other parts of the Harbour, but the area is perhaps more valuable as a secure roosting site for flocks of all shorebirds when their feeding areas on the mudflats are covered by the tide.<br><br>Potential hydrological connection via the Kilcoolishal Stream. However, given the distance from Proposed Development site this is not significant. |

| pNHA | Site code | Overlapping with Natura 2000 site | Approximate distance at closest point and potential source-pathway-receptor link |
|---|---|---|---|
| Carrigshane Hill pNHA | 001042 | None | 13.9km east.<br><br>This area is important as a representative of the herb rich community grassland community found near the exposed limestone – a habitat under threat from quarrying. The presence of Thick- leaved Stonecrop adds further interest to this site.<br><br>No pathway identified. |
| Blarney Castle Woodland pNHA | 001515 | No | 14.3km west<br><br>This site is situated approximately 1km southwest of Blarney, in the grounds of Blarney Castle. The base rich woodland is an example of a habitat not widely found in Cork where acid uplands predominate.<br><br>No pathway identified. |
| Blarney Lake pNHA | 001798 | No | 14.4km west<br><br>This site is situated approximately 1km southwest of Blarney, close to Blarney Castle. This site contains an interesting wetland community which is one of three closely situated rich and varied sites.<br><br>No pathway identified. |

The Proposed Development site is potentially hydrologically connected to a number of pNHAs within Cork Harbour, including the Great Island Channel pNHA, Dunkettle Shore pNHA and Douglas River pNHA. While there are other pNHAs located within the Cork Harbour area e.g., Monkstown Creek pNHA, Whitegate Bay pNHA, Lough Beg pNHA given the distance from the Proposed Development site, no potential pathway for impact on these other pNHAs have been identified (refer to **Table 9.3** and **Figure 9.3** in **Volume 3** of this EIAR). No other significant pathways to NHA / pNHA sites in the vicinity of the Proposed Development site have been identified.

#### *9.3.2.3 Ramsar sites*

The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. A key commitment of Ramsar Contracting Parties is to identify and place suitable wetlands onto the List of Wetlands of International Importance. Cork Harbour is listed as a Ramsar site, which is a non-statutory designation.

#### *9.3.2.4 Important bird areas*

Important Bird and Biodiversity Areas (IBAs) are sites selected as important for bird conservation because they regularly hold significant populations of one or more globally or regionally threatened, endemic or congregator bird species or highly representative bird assemblages. The European IBA programme aims to identify, monitor, and protect key sites for birds all over the continent. It aims to ensure that the conservation value of IBAs in Europe (now numbering more than 5,000 sites or about 40% of all IBAs identified globally to date) is maintained, and where possible enhanced. The programme aims to guide the implementation of national conservation strategies, through the promotion and development of national protected-area programmes.

Through their designation they aim to form a network of sites ensuring that migratory species find suitable breeding, stop-over and wintering places along their respective flyways.

The function of the Important Bird Area (IBA) Programme is to identify, protect and manage a network of sites that are important for the long-term viability of naturally occurring bird populations, across the geographical range of those bird species for which a site-based approach is appropriate. Refer to **Table 9.4**. The Proposed Development site lies approximately 800m west of Cork Harbour IBA (Site Code: IE088).

The Cork Harbour IBA site qualifies for designation under the following IBA Criteria (2000):

- A4iii - The site is known or thought to hold on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabirds of one or more species;
- B1i - The site is known or thought to hold ≥ 1% of a flyway or other distinct population of a waterbird species;
- B2 - The site is one of the most important in the country for a species with an unfavourable conservation status in Europe and for which the site-protection approach is thought to be appropriate;
- C3 - The site is known to regularly hold at least 1% of a flyway population or of the EU population of a species threatened at the EU level (not listed on Annex 1 of The Birds Directive);
- C4 - The site is known to regularly hold at least 20,000 migratory waterbirds and / or 10,000 pairs of migratory species of one or more species; and
- C6 - The site is one of the five most important in the European region in question for a species or subspecies considered threatened in the European Union.

**Table 9.4: Summary of Cork Harbour IBA trigger species**

| Species | Current IUCN red list category | Season | Year(s) of estimate | Population estimates | IBA criteria triggered |
|---|---|---|---|---|---|
| Eurasian Curlew (*Numenius arquata*) | NT | Winter | 1995 | 1,669 individuals | B2 |
| Bar-tailed Godwit (*Limosa lapponica*) | NT | Winter | 1996 | 456 individuals | B2 |
| Black-tailed Godwit (*Limosa limosa*) | NT | Winter | 1996 | 1,399 individuals | B1i, C3 |
| Dunlin (*Calidris alpine*) | LC | Winter | 1995 | 12,050 individuals | B1i, B2, C3 |
| Common Redshank (*Tringa tetanus*) | LC | Winter | 1996 | 1,344 individuals | B1i, C3 |
| Common Tern (*Sterna hirundo*) | LC | Breeding | 1995 | 102 breeding pairs | C6 |
| A4iii Species group–- waterbirds | n/a | Winter | - | 20,000 individuals | A4iii, C4 |

### 9.3.3 Flora

The site of the development lies within Ordnance Survey (OS) National Grid 10km square W77. The National Parks and Wildlife Service (NPWS) rare plant database lists two protected plant species within W77 i.e., Meadow Barley (*Hordeum secalinum*), Chives (*Allium schoenoprasum*). These species are protected by the Flora (Protection) Order 2022 (S.I. No. 235 of 2022). A number of endangered and threatened species have also been recorded in W77 as listed in **Table 9.5**. However, no rare, threatened or legally protected plant species, as listed in the Irish Red Data Book (Wyse Jackson *et al.*, 2016; Stace 2019) were recorded within the Proposed Development site.

**Table 9.5: NBDC listed endangered and protected flowering species for W77**

| Flowering plant species | Latin name | Designations / status (Wyse Jackson *et al.*, 2016) |
|---|---|---|
| Chives | *Allium schoenoprasum* | Flora Protection Order (S.I. No. 235 of 2022) and Vulnerable |
| Little-robin | *Geranium purpureum* | Endangered |
| Meadow Barley | *Hordeum secalinum* | Flora Protection Order (S.I. No. 235 of 2022) and Endangered |
| Common Toadflax | *Linaria vulgaris* | Near threatened |
| Corn Marigold | *Glebionis segetum* | Near threatened |
| Cornflower | *Centaurea cyanus* | Near threatened (wating list) |
| Milk Thistle | *Silybum marianum* | Near threatened |

Source NBDC 09/03/23

### 9.3.4 Habitats

Habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication, Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011). The terrestrial and aquatic habitats within or adjacent to the Proposed Development site were classified using the classification scheme outlined in the Heritage council publication A Guide to Habitats in Ireland (Fossitt, 2000) and cross referenced with Annex I Habitats where required. The survey results are representative of the habitats within the Proposed Development site and include the dominant and characteristic species of flora.

The ecological value of habitats has been defined using the classification scheme outlined in the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) which is included in **Appendix 9.1** in **Volume 4** of this EIAR. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape. Habitats that are considered to be good examples of Annex I and Priority habitats are classed as being of International or National Importance. Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance. Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value) and sites containing small areas of semi-natural habitat or maintain connectivity between habitats are considered to be of Local Importance (lower value).

An overview of habitats recorded within the site is shown in **Image 9.1**. The habitats recorded onsite as well as their ecological value is detailed in **Table 9.6**. Site photographs are included below. No rare plant species were recorded within the works area during the site survey.

**Table 9.6: Habitats recorded within Proposed Development site boundary and their relative values**

| Habitat | Comments | Ecological value (NRA guidelines) |
|---|---|---|
| **Buildings and artificial surfaces BL3 / Amenity grassland GA2** | The N25 national route, the Cork City to Cobh railway line and parking areas associated with the Radisson Blu Hotel and the train station are classified as artificial surfaces which are of minimal ecological value. The areas of amenity grassland which surround these developments are regularly maintained, with existing palisade fences, streetlighting and other artificial surfaces area.<br><br>Species noted within area include common grass species as well as Dandelion *Taraxacum officinale*, Spear thistle *Cirsium vulgare*, Groundsel *Senecio vulgaris* Yorkshire fog *Holcus lanatus* and Cleavers *Galium aparine*. In proximity to the recycling area in the car park, there is some Buddleia *Buddleia davidii* and immature Willow *Salix* sp.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | Local importance (lower value) |
| **Mixed broadleaved woodland WD1** | On the southern boundary of the N25 there a relatively large block of broadleaved woodland between the road and the Radisson Blu Hotel access road / car park. Woodland cover is dense, creating heavy shade. A drain flows through a section of this woodland east to west.<br><br>There are several trees mature trees within this woodland including Beech *Fagus sylvatica,* Ash *Fraxinus excelsior* and Lime *Tilia cordata* on the southern edge of this habitat close to the hotel. A review of historical mapping indicates that these trees were part of the landscaping associated with the period dwelling (Castle View) which is evident on the older maps. However, there is no woodland evident to the north of the drainage ditch on the older OS maps with open fields shown on the relevant maps (OS historical map, 25 inch)<br><br>This southern section of woodland is characterised by older trees which are quite widely spaced with a heavily shaded. The understorey dominated by Ivy *Hedera helix* with Lord and ladies *Arum maculatum* and a dense stand of the non-native species Japanese Laurel *Aucuba japonica*.<br><br>The northern section of this woodland is of more recent origin and has developed on an area that was historically farmland. The species in this planted woodland is diverse and includes Willow *Salix* sp., Sitka Spruce *Picea sitchensis*, Alder *Alnus glutinosa*, Ash and Poplar *Populus* sp. The trees are closely spaced with few side branches and the understorey is heavily shaded. Many of these trees are leaning, fallen or in poor condition.<br><br>Under story species include immature Sycamore, Elder *Sambucus nigra* with occasional Hawthorn *Crataegus monogyna* and Holly *Ilex aquifolium.*<br><br>Shade levels in the ground layer are high, with Ivy being the dominant species. Understory species include Chilean Myrtle *Luma apiculate,* Bramble *Rubus* sp., Hartstongue fern *Asplenium scolopendrium*, Male fern *Dryopteris filix-mas*, Lady Fern *Athyrium filix-femina* and Honeysuckle *Lonicera* sp. Immature Sycamore are very common and over time are likely to dominate the canopy. There is a wetter area close to the N25 which | Local importance (higher value) |

| Habitat | Comments | Ecological value (NRA guidelines) |
|---|---|---|
| | supports some mature Willow which have been cut back. During wet weather, some ponded surface water was evident.<br><br>In general, the woodland structure in this area is relatively poor with a high percentage of non-native species. Sycamore is likely to become dominant over time. However, as a mixed woodland which is not highly disturbed by recreational usage, it does provide a refuge for fauna and is a habitat that is not prevalent in the local landscape.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | |
| **Drainage Ditches FW4 / Depositing River FW2** | Within the block of broadleaved woodland between the N25 and the Radisson Blu Hotel access road, there is a linear, drain running east-west. This drain is heavily shaded with minimal flows during dry weather.<br><br>The Kilcoolishal Stream also is located along the southern boundary of the railway track. The Kilcoolishal Stream in this area of more characteristic of a drainage ditch. However, as this has been mapped as a stream by the EPA, the classification of FW2 has been used. In general, this watercourse is heavily shaded by woodland within the Proposed Development site. Adjacent to the railway line there are some more open areas of habitat. Flows here are sluggish with dense masses of Duckweed *Lemna minor* and emerging vegetation such as Reeds *Phragmites* sp., Water parsnip *Sium suave*, Sweet grass *Hierochloe odorata*.<br><br>A deep drainage ditch also runs along the northern boundary of the railway line and near the Railway line car park. This ditch has minimal flows and with high levels of shade from adjoining trees, many of which actually grow within the channel itself. As indicated by the trees within the channel, the fluctuations in water level vary considerably with high levels during flood events. This drain is hydrologically connected to the adjoining wet willow woodland. Aquatic vegetation is largely absent. Duckweed *Lemna sp*. forms dense mats in places and some water Starwort *Callitriche* sp. occurs.<br><br>Within the southern woodland, there is an open channel with standing water. This drainage ditch is heavily shaded with dense rotting wood and leaf litter.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | Local importance (higher value) |
| **Treeline WL2 Mixed broadleaved woodland WD1** | Running between the Kilcoolishal Stream and the N25 there is a narrow band of woodland, some of which was planted as part of the landscaping scheme for the N25. Hazel is prominent with Buddleia, also present. Other species recorded include Hawthorn, Chilean myrtle, Privet *Ligustrum ovalifolium* and Blackthorn *Prunus spinosa*. The understory has a dense covering of Winter heliotrope *Arctostaphylos luciana* and Ivy *Hedera helix* with some Bramble. Stands of immature Japanese Knotweed *Reynoutria japonica* were recorded within this habitat.<br><br>It is noted that there are older trees which may pre-date the landscape scheme running along the bank of the Kilcoolishal Stream. These include Hawthorn and Holly. The Hawthorn supports moderate levels of ivy.<br><br>To the north of the railway track there is a treeline and species recorded in this area include Alder, Grey willow *Salix cinerea*, Ash, Hazel and Hawthorn.<br><br>Immature planted Ash with occasional Willow run along the boundary of the eastern side of the railway car park as well as immature Alder along the south of the car park.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | Local importance (higher value) |
| **Wet willow woodland WN6** | An area of wet woodland is located largely outside the Proposed Development area. This habitat floods during periods of wet weather. The woodland is dominated by Willow with some Alder. Hawthorn is occasional on drier ground and some Ash saplings were also recorded.<br><br>The understory composition depends on the degree of water logging with Bramble and Hawthorn common on dryer areas. Winter heliotrope is common within dryer areas and | Local importance (higher value) |

| Habitat | Comments | Ecological value (NRA guidelines) |
|---|---|---|
| | along the woodland boundary with amenity grassland. Within waterlogged areas species recorded include Remote sedge *Carex remota.* Moss coverage on trees is high and some fern such as Hartstongue and Soft shield fern also occur. Other species include Wood dock *Rumex sanguineus*, Cleavers, Soft rush *Juncus effusus*, Herb Robert *Geranium robertianum*, Hard fern. Lords and ladies, Honeysuckle, Ivy and Soft shield fern.<br><br>This is a relatively uncommon habitat which floods very regularly and is hydrologically connected to the drain which runs along the railway track.<br><br>Japanese Knotweed was recorded on the eastern periphery of this woodland area.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | |
| **Amenity grassland GA2 / Scattered tree and parkland WD5** | Low value grassland with a mix of common grass and herbaceous species. The largest area of this habitat is located just north of the railway track. Smaller areas of amenity grassland area associated with car parks to the south of the N25.<br><br>This habitat supports common herbaceous and grass species including Broadleaved dock *Rumex obtusifolius*, Red fescue *Festuca rubra,* Yorkshire Fog, Dandelion, Eyebright *Euphrasia rostkoviana*, Ribwort Plantain *Plantago lanceolata*, Oxeye Daisy Leucanthemum vulgare, Common mouse-ear *Cerastium fontanum* and Creeping buttercup *Ranunculus repens*. It is regularly maintained, and biodiversity is generally low. Within this habitat there are small number of planted trees, i.e., one semi mature Willow on the periphery of the woodland area and some smaller recently planted Oak. Semi-mature Sycamore, Birch and Beech are also present. In immediate proximity to the railway line, there is a small number of older mature Willow. The main stems are relatively old with younger regrowth and accumulated deadwood material at their base. This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | Local importance (lower value) |
| **Dry meadow and grassy verge GS1** | Linear sections of this habitat type occur along the margins of the N25. This habitat supports a mixture of early successional herbaceous species and common grass species.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | Local importance (lower value) |
| **Hedgerow WL1** | There is a well-maintained planted hedgerow in the central median of the N5. A planted Beech hedgerow is located on the southwestern boundary of the Radisson Blu Hotel car park. Wild Clematis *Clematis virginiana* was also recorded in this area.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | Local importance (lower value) |
| **Scrub WS1** | An area of dense scrub is located along the southern boundary of the Railway line car park. This is area is dominated by Nettle, Bramble, Winter heliotrope, Cleavers and Bindweed *Convolvulus* sp.<br><br>This habitat is not a qualifying habitat for European sites and is not an Annex I habitat under the Habitats Directive. | Local importance (lower value) |

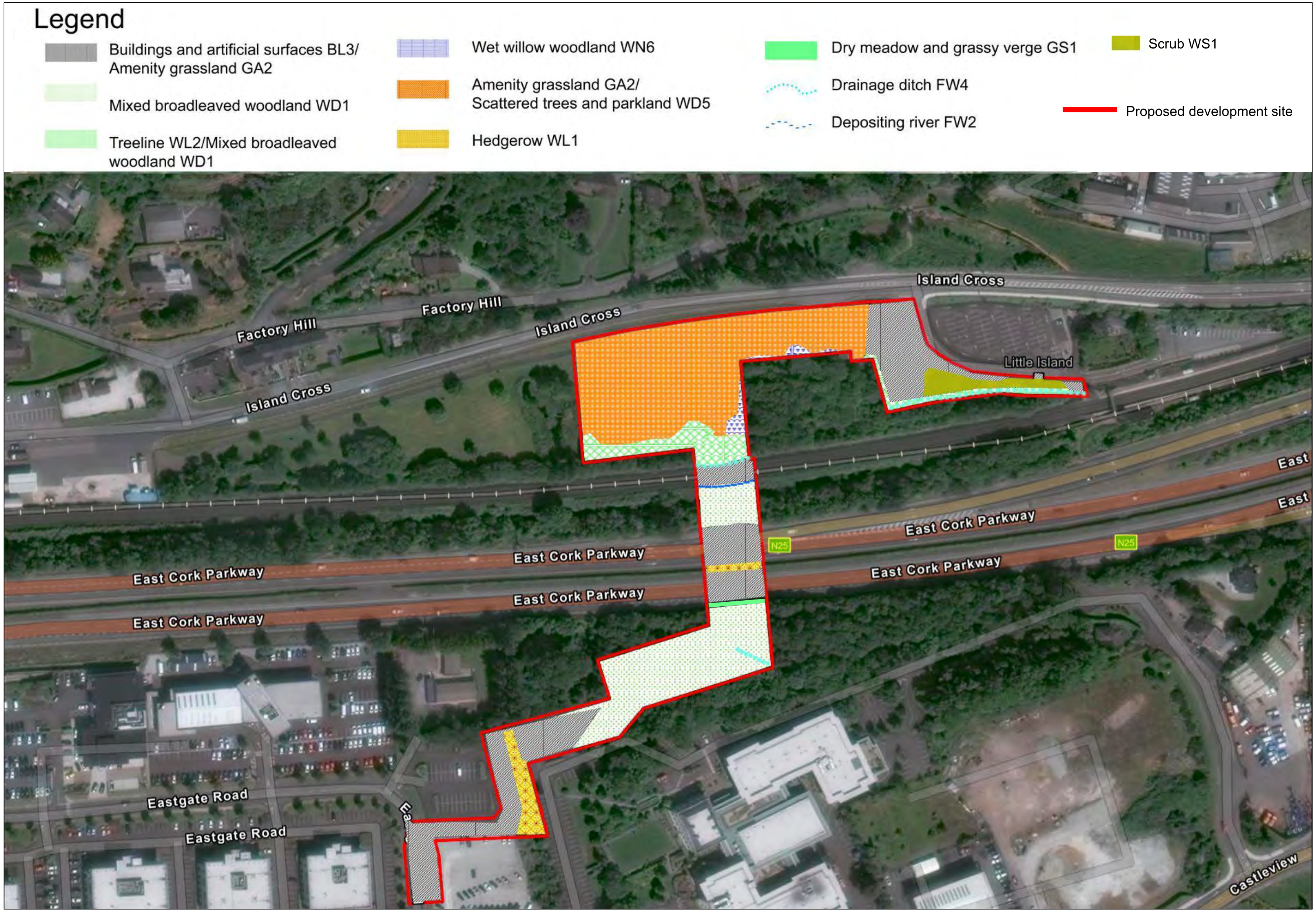


Image 9.1: Habitats recorded within the Proposed Development site

| | |
|---|---|
|  Plate 1. Older widely spaced trees in southern woodland |  Plate 2. Woodland area with Japanese Laurel prevalent |
|  Plate 3. Southern woodland |  Plate 4. Drainage ditch in southern woodland |
|  Plate 5. Radisson Blu Hotel car park looking from car park towards woodland |  Plate 6. Hedgerow within Radisson Blu Hotel car park |

**Plate 7. Amenity grassland near northern boundary**

**Plate 8. Amenity grassland on northern boundary with woodland**

**Plate 9. Willow within amenity grassland**

**Plate 10. Wet woodland with high water levels**

**Plate 11. Dense bramble and Winter heliotrope on woodland/amenity grassland boundary**

**Plate 12. Trees along amenity grassland**

**Plate 13. Treeline growing along and within drainage ditch near railway line**

**Plate 14. Kilcoolishal Stream**

**Plate 15. Woodland between N25 and Kilcoolishal Stream**

**Plate 16. Hedgerow in N25 median**

**Plate 17. Bramble scrub and treeline along railway line car park**

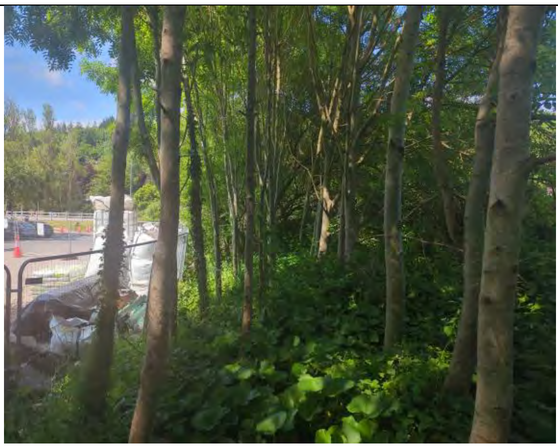

**Plate 18. Immature Ash and winter heliotrope near railway line car park**

### 9.3.5 Invasive species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and / or re-growth from plant fragments; (2) rapid growth patterns; and (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and (3) have an adverse effect on landscape quality. The NBDC lists a number of both aquatic and terrestrial high impact invasive species which have been recorded within grid square W77, the 10km OS grid square which overlaps with the Proposed Development site. Refer to see **Table 9.7**.

**Table 9.7: High impact invasive species recorded in W77**

| Common name | Latin name |
|---|---|
| Canada Goose | *Branta canadensis* |
| Ruddy Duck | *Oxyura jamaicensis* |
| Cherry Laurel | *Prunus laurocerasus* |
| Common Cord-grass | *Spartina anglica* |
| | *Fallopia japonica x sachalinensis = F. x bohemica* |
| Giant Hogweed | *Heracleum mantegazzianum* |
| Giant Knotweed | *Fallopia sachalinensis* |
| Giant-rhubarb | *Gunnera tinctoria* |
| Indian Balsam | *Impatiens glandulifera* |
| Japanese Knotweed | *Fallopia japonica* |
| Parrot's-feather | *Myriophyllum aquaticum* |
| | *Rhododendron ponticum* |
| Harlequin Ladybird | *Harmonia axyridis* |
| American Mink | *Mustela vison* |
| Brown Rat | *Rattus norvegicus* |
| Fallow Deer | *Dama dama* |
| Feral Ferret | *Mustela furo* |
| House Mouse | *Mus musculus* |
| Sika Deer | *Cervus nippon* |

Source: NBDC database March 2023

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000, where it states that:

*'Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, ['refers only to exotic species thereof'] [...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.'*

The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed, as follows: *"any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence."*

The third schedule high-risk invasive species Japanese Knotweed was recorded along the northern side of the N25 and the edge of woodland habitat on the north of the railway line. Refer to **Image 9.2**.

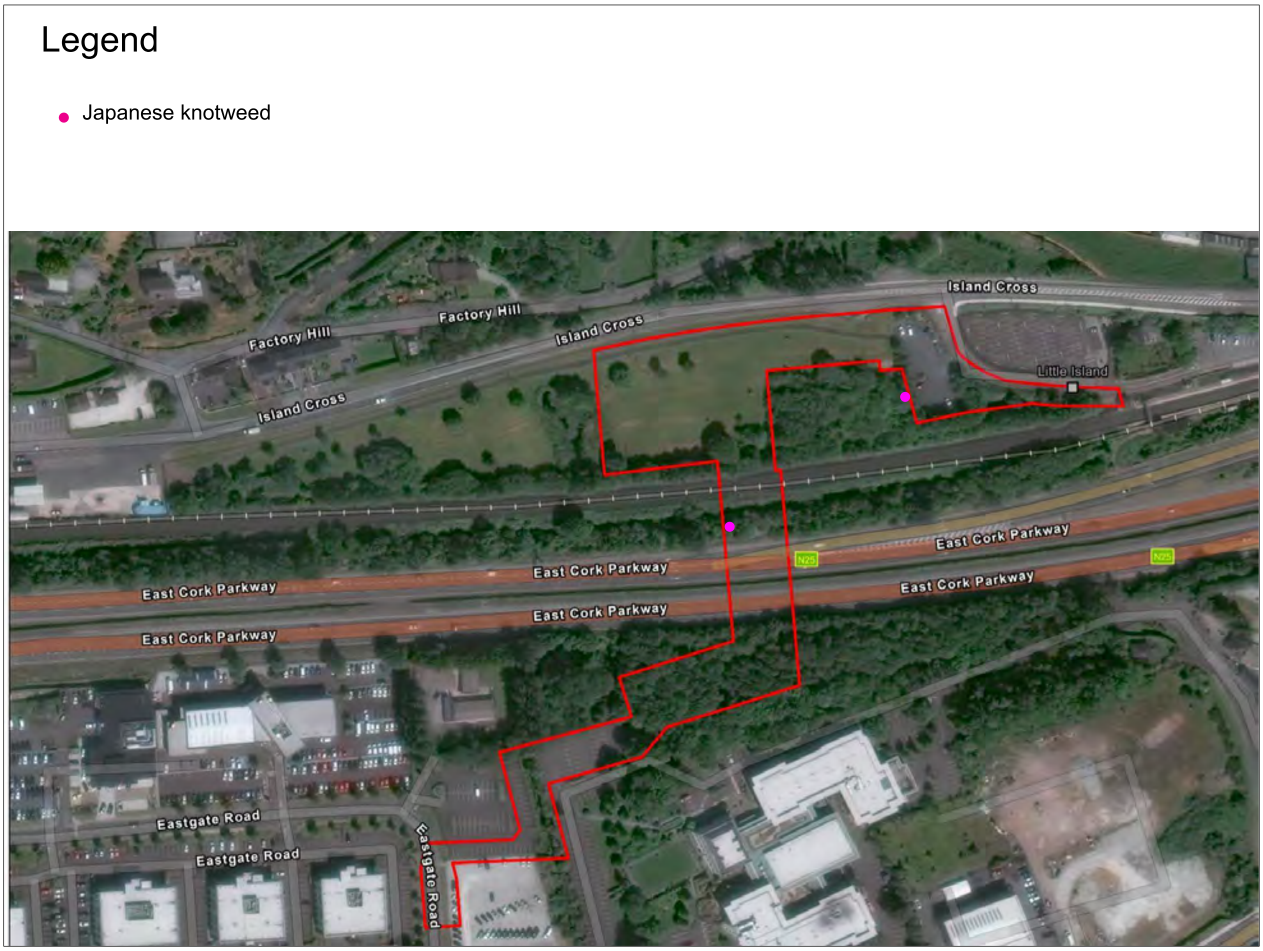


**Image 9.2: Location of Japanese Knotweed within the study area**

Three other invasive species were recorded within the study area. The medium impact species, Buddleia (*Buddleia davidii)* and Wild Clematis (*Clematis virginiana)* were recorded within broadleaved woodland. The low impact species Winter Heliotrope (*Arctostaphylos Luciana*) has as scattered distribution throughout the study area. It is noted that these species are not included in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, their presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (S.I. 477 of 2011).

### 9.3.6 Fauna

#### *9.3.6.1 Otter*

According the NBDC, Otter have been recorded on 31 occasions within hectad W77, most recently in September 2018. However, there are no records of Otter in the vicinity of the Proposed Development site.

No signs of Otter were recorded during the site survey, which included all suitable habitats within 150m of the Proposed Development boundary. There is a section of the Kilcoolishal Stream located within the Proposed Development site as well as several small drainage ditches connecting to the stream. The Kilcoolishal Stream and a number of other streams within the Tibbotstown sub catchment i.e., Woodstock Stream and Anngrove Stream, have not been monitored by the EPA due to their small size and therefore their status to support a diverse aquatic community is unknown. There are no records for Eel (Anguilla anguilla), Lamprey (*Lampetra* sp.) or salmonids within the Kilcoolishal Stream (CCC, 2021).

Furthermore, this stream is heavily culverted in the vicinity of the Proposed Development site. The data available suggest that this stream and its drainage ditches have limited potential to support fish species and subsequently are of low value for Otter.

While aquatic and wetland habitats can support Common Frog, which is a prey species for Otter, the drainage ditches, stream and wet woodland areas are heavily shaded throughout the Proposed Development site and are unlikely to support breeding amphibians. The significant levels of disturbance along the road and rail network are likely to further reduce the value of any habitats adjoining these areas. However, the wet willow woodland within the Proposed Development site is a relatively uncommon habitat and this has the potential to provide habitat for Otter. This habitat is largely impenetrable and therefore provides an important refuge on the periphery of an area that is highly disturbed. Overall, the Proposed Development site is of low to negligible value for Otter.

#### *9.3.6.2 Bats*

A review of existing bat records within W77 (NBDC) showed that the Irish bat species listed in **Table 9.8** have been recorded. The remaining Irish bat species have not been recorded in the local area to date such as Nathusius's Pipistrelle *Pipistrellus nathusii* and Lesser Horseshoe Bat *Rhinolophus hipposideros* and are unlikely to occur. Lesser Horseshoe Bat is the only species of bat listed on Annex II of the Habitats Directive (Directive 92/43/EEC). The closest record for Lesser Horseshoe Bat is approximately 18km west of the Proposed Development site (NBDC records).

**Table 9.8: Presence of Irish bat species within grid squares W77**

| Common name | Scientific name | Presence |
|---|---|---|
| Lesser Noctule | *Nyctalus leisleri* | Present |
| Pipistrelle | *Pipistrellus pipistrellus sensu lato* | Present |
| Soprano Pipistrelle | *Pipistrellus pygmaeus* | Present |
| Daubenton's Bat | *Myotis daubentonii* | Present |
| Natterer's Bat | *Myotis nattereri* | Present |
| Brown Long-eared Bat | *Plecotus auritus* | Present |
| Whiskered Bat | *Myotis mystacinus* | Present |
| Lesser Horseshoe | *Rhinolophus hipposideros* | Absent |
| Nathusius's Pipistrelle | *Pipistrellus nathusii* | Absent |

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A preliminary roost assessment of trees earmarked for removal was carried out. 103 no. individual trees, 5 no. part-groups (i.e., sections of a tree group) and 13 no. tree groups have been selected for removal to facilitate the Proposed Development. The estimated total number of trees to be removed on site is 277. The preliminary roost assessment found that trees at the site are largely of negligible to low potential for roosting bats as they lack the significant roost features such holes, cracks, crevices, dethatched bark and detached Ivy, which could provide roosting opportunities. No signs of bats were recorded within the trees such as rub marks, staining or droppings. One tree (T524), a semi-mature lime with a large rotten crevice at the base was determined to have moderate potential for roosting bats. Further detail on the preliminary roost assessment is included in **Appendix 9.2** in **Volume 4** of this EIAR. Although foraging activity was observed in the vicinity of woodland and treelines, no activity indicative of direct emergence of bats was recorded. However, bats can use trees as temporary roosts and therefore the presence of occasional bats cannot be altogether excluded.

There are a number of linear features and areas of semi-natural habitat within the Proposed Development site including woodland, treelines, railway line and the Kilcoolishal Stream. It is noted that existing lighting along the N25 and within other built-up areas may deter foraging by some bat species and will impact on the foraging / roosting value of these areas.

Bat activity surveys focused in particular on the area of woodland to the south of the N25 which was considered the habitat with the highest potential for roosting and foraging bats and along the area of wet woodland to the north of the railway. Although woodland habitat is somewhat isolated in the context of the wider landscape, it is of local value as a block of semi-natural habitat which is dark and undisturbed.

Four bat species were recorded foraging / commuting within and adjacent woodland habitat to the south of the N25 habitat, i.e., Common and Soprano Pipistrelle, Leisler's and Brown Long-eared. It considered probable that 1-2 individuals of each species were foraging within the woodland and along its boundary. In the car parking area adjacent to the Radisson Blu Hotel, within the Proposed Development site, regular foraging activity of Common and Soprano pipistrelle was also recorded. Some overlap between the pipistrelle bats recorded foraging along the woodland boundary and car park area was noted.

Leisler's Bat were recorded sporadically during the survey, with one signal early in the survey period and four closely spaced signals at a later time. No prolonged foraging behaviour was recorded, and the signals are probably indicative of bats commuting or foraging within the wider landscape.

Bat surveys were also carried out on the northern side of the N25 to assess activity patterns. Soprano Pipistrelle (one individual) was recorded foraging along the drain which runs parallel to the N25. No bat activity was recorded in the planted woodland area along the edge of the N25. It is noted that this area is subject to high levels of light pollution by passing cars and lighting along the N25 route.

There is an existing treeline along the boundary of the railway line and an area of wet willow woodland is also a prominent habitat feature. Three species were recorded in this area, namely Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat. Foraging by both pipistrelle species was sporadic along the linear treeline on the northern boundary of the railway line. The amenity grassland was not utilised during the survey. Sporadic signals for Leisler's Bat were indicative of some generally foraging, with occasional overflying of the site. Some foraging by Soprano and Common Pipistrelle was recorded along the boundary of the wet woodland area, although activity was sporadic.

In general, the area with the highest level of activity was the woodland area to the south of the N25 which provides a local foraging resource for three bat species, namely Brown Long-eared, Common and Soprano Pipistrelle with some overflying Leisler's also recorded. Usage of the habitats to the north of the railway is of lower intensity with some activity recorded along the Kilcoolishal Stream, treeline, railway line and along the boundary of the wet willow woodland. Therefore, the habitats within the Proposed Development site are of local importance, higher to lower value, for bat species.

#### *9.3.6.3 Other mammals*

18 other species of terrestrial mammal have been recorded within grid square W77. Nine of which are protected under the Irish Wildlife Act; namely Badger (*Meles meles*), Pygmy Shrew (*Sorex minutus*), Red Squirrel (*Sciurus vulgaris*), Hedgehog (*Erinaceus europaeus*), Irish hare (*Lepus timidus hibernicus*), Irish Stoat (*Mustela erminea hibernica*), Pine Marten (*Martes martes*), Fallow Deer (*Dama dama*) and Sika Deer (*Cervus nippon*).

##### *Badger*

According the NBDC, Badger have been recorded on 33 occasions within hectad W77, most recently in May 2015. However, there are no records of Badger in the vicinity of the Proposed Development site.

No signs of Badger were recorded during the site surveys. While Badgers will forage in woodland habitats, the isolated nature of potential foraging areas, particularly on the southern side of the N25, means that they are highly unlikely to fall within Badger foraging territories. Significant levels of disturbance and fencing along the N25 would further restrict Badger access to habitats within the Proposed Development site. Overall, the Proposed Development site is of negligible value for Badger.

*Fallow deer*

Ireland's second largest deer species and are the most widespread of the deer, found in nearly every county of the island. In Ireland, the Fallow Deer mainly resides in mature deciduous or mixed woodlands which are close to open grassland. Fallow has been recorded on one occasion within W77 but is not likely to occur within or in the vicinity of the Proposed Development site. The Proposed Development site is of negligible value for Fallow Deer.

*Hedgehog*

Listed on Appendix III of the Berne Convention and can be found throughout Ireland, with male Hedgehogs having an annual range of around 56 hectares. Hedgehog have been recorded on 56 occasions in W77, most recently in May 2021. Given the habitats present within the Proposed Development site, this area has been classified as local importance (lower value) for Hedgehog.

*Irish stoat*

Irish Stoats occur in most habitats with sufficient cover, including urban areas, for example rat infested rubbish dumps. However, studies have shown that they occur most often in wooded areas, and readily climb trees. Irish Stoat has been recorded on 10 occasions, most recently in July 2016. Given their wide range of habitat usage and the habitats present within the Proposed Development site, this area has been classified as local importance (lower value) for Irish Stoat.

*Red squirrel*

Red Squirrel is listed on Appendix III of the Berne Convention and can be found throughout Ireland. Red Squirrel is known to occur in the wider area (NBDC records) and have been recorded on 72 occasions within W77. However, while they could potentially use habitats at the site, given the isolated nature of these habitats, the Proposed Development site is of negligible value for Red Squirrel.

*Irish hare*

Irish Hare is listed on Appendix III of the Berne Convention, Annex V(a) of the EC Habitats Directive (92/43/EEC) and as an internationally important species in the Irish Red Data Book. Irish Hare is adaptable and lives in a wide variety of habitats. It typically reaches its highest densities on farmland, particularly where there is a mix of grassland and arable fields along with hedgerows and other cover. Irish Hare have been recorded on four occasions within W77, most recently in May 2017. However, given the habitats present at the Proposed Development site, this area has been classified as of negligible value for Irish Hare.

*Pygmy shrew*

Pygmy Shrew is common throughout mainland Ireland and has a preference for habitats such as hedgerows and grasslands; they have also been found utilizing stone walls. Pygmy Shrew has been recorded on five occasions in W77, most recently in January 2016. Given the habitats present within the Proposed Development site, this area has been classified as local importance (lower value) for Pygmy Shrew.

*Sika deer*

Sika Deer is the smallest of the three deer species now resident in Ireland. They are non-native species with the first Irish population introduced to the Powerscourt estate in county Wicklow in 1860 then to Killarney four years later. They are protected under the Wildlife Act in the republic and under the 1985 Wildlife Order in Ulster although they are listed as a quarry species and can be hunted under license. Sika deer are mainly associated with woodland areas which have open grasslands nearby. The Proposed Development site is of negligible value for Sika Deer.

*Pine marten*

Pine Marten are listed Annex V of the EU Habitats Directive 1992 and Appendix III of the Bern Convention 1979, are habitat specialists, requiring forest or scrub habitat to exist in an area. They are adept at climbing trees as they have powerful non-retractable claws. The species is primarily active at night and individuals live in territories that can vary in size from 50 hectares to 400 hectares. Males typically have bigger territories than females and there can be partial overlap between adjacent territories. Pine Marten have been recorded in W77 on three occasions, most recently in December 2021. The site is of negligible value for Pine Marten. However, while they could potentially use habitats at the site, given the isolated nature of these habitats the Proposed Development site is of negligible value for Pine Marten.

#### *9.3.6.4 Breeding birds*

The NBDC has recorded 16 Annex I bird species within hectad W77 i.e., Bar-tailed Godwit (*Limosa lapponica*), Kingfisher (*Alcedo atthis*), Common Tern (*Sterna hirundo*), Corn Crake (*Crex crex*), Dunlin (*Calidris alpina*), Golden Plover (*Pluvialis apricaria*), Great Northern Diver (*Gavia immer*), Hen Harrier (*Circus cyaneus*), Little Egret (*Egretta garzetta*), Little Gull (*Larus minutus*), Mediterranean Gull (*Larus melanocephalus*), Merlin (*Falco columbarius*), Peregrine Falcon (*Falco peregrinus*), Red-throated Diver (*Gavia stellata),* Short-eared Owl (*Asio flammeus*) and Whooper Swan (*Cygnus cygnus*). There are no breeding habitats for these Annex I species within the Proposed Development site. While some species could potentially overfly and / or forage in the area e.g., Peregrine Falcon and Merlin, there are no valuable foraging habitats for these Annex I species within the Proposed Development site.

Bird surveys were carried out in summer / autumn 2022 and spring 2023. Species recorded within the Proposed Development site are listed in **Table 9.9**.

**Table 9.9: Birds recorded at the Proposed Development site**

| Species | | Birds Directive Annex | BOCCI* | |
|---|---|---|---|---|
| | | I | Red List | Amber List |
| Blackbird | *Turdus merula* | | | |
| Blue Tit | *Cyanistes caeruleus* | | | |
| Chaffinch | *Fringilla coelebs* | | | |
| Chiffchaff | *Phylloscopus collybita* | | | |
| Dunnock | *Prunella modularis* | | | |
| Great Tit | *Parus major* | | | |
| Jackdaw | *Corvus monedula* | | | |
| Magpie | *Pica pica* | | | |
| Mistle Thrush | *Turdus viscivorus* | | | |
| Robin | *Erithacus rubecula* | | | |
| Rook | *Corvus frugilegus* | | | |
| Song thrush | *Turdus philomelas* | | | |
| Starling | *Sturnus vulgaris* | | | X |
| Swallow | *Hirundo rustica* | | | X |
| Woodpigeon | *Columba palumbus* | | | |
| Wren | *Troglodytes troglodytes* | | | |

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

Most bird species recorded within the Proposed Development site were common green listed (Gilbert *et al.*, 2021) species such as Chaffinch *Fringilla coelebs*, Chiffchaff *Phylloscopus collybita*, Robin *Erithacus rubecula*, Rook *Corvus frugilegus*, Blackbird *Turdus merula*, Song thrush *Turdus philomelas*, Wren *Troglodytes troglodytes* and Woodpigeon *Columba palumbus*. Two Amber list, birds of conservation concern i.e., Swallow and Starlings, were recorded during site surveys.

The most valuable breeding habitat for birds are the area of woodland to the south of the N25, the wet willow woodland and the treelines to the north of the N25 near the railway line. Woodland areas in particular are largely impenetrable and provide important refuges in what is an otherwise disturbed area. Areas of amenity grassland, provide small areas of foraging habitat for woodland edge species such as Blackbird and Robin. Waterlogged areas could potentially provide habitat for aquatic bird species such as Moorhen and Mallard. Overall, the Proposed Development site is of Local importance (higher value) for breeding birds.

### *9.3.6.5 Wintering birds*

*Irish Wetland Bird Survey (I-WeBS)*

The Irish Wetland Bird Survey (I-WeBS) was initiated in the Republic of Ireland in the winter of 1994/95. The survey is coordinated by the I-WeBS office based at BirdWatch Ireland, under contract to the NPWS. The primary objective of I-WeBS is to monitor the numbers and distribution of waterbird populations wintering in the Republic of Ireland, and the survey focuses on wintering waterbirds, as opposed to autumn and spring migrants.

The Proposed Development site in located in proximity to Cork Harbour SPA. A review of I-WeBS data shows that the Proposed Development site is located in proximity to a number of I-WeBS survey subsites i.e., Dunkettle, Glounthane Estuary / Slatty Waters, East Lough Mahon and Carrrigrennan). I-WeBS data for these sites from 2016-2021 is included **in Appendix 9.3** in **Volume 4** of this EIAR. The locations of these I-WeBS subsites in proximity to the Proposed Development site are shown in **Image 9.3**.

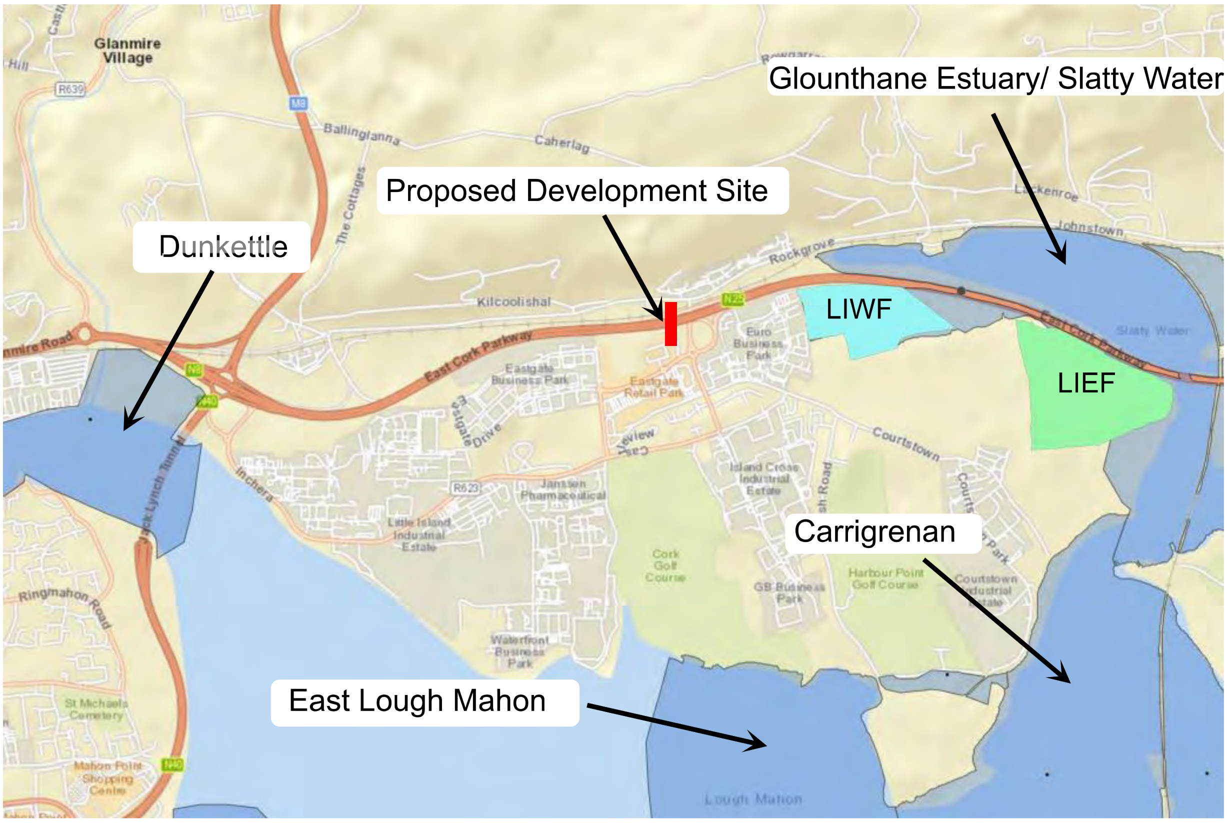


**Image 9.3: I-WeBS survey subsites in proximity to the Proposed Development site**

These results show that nationally important number of wintering Black-tailed Godwit use Dunkettle as well as large numbers of Oystercatcher *Haematopus ostralegus*, Curlew *Numenius arquata*, Redshank *Tringa totanus*, Dunlin, Black-headed Gull *Chroicocephalus ridibundus* and Lesser Black-backed Gull *Larus fuscus*. Nationally important numbers of wintering Shelduck *Tadorna tadorna*, Wigeon *Mareca penelope*, Teal *Anas crecca*, Little Egret, Little Grebe *Tachybaptus ruficollis*, Golden Plover, Lapwing *Vanellus vanellus*, Dunlin, Black-tailed Godwit, Curlew, Redshank as well as large numbers of Oystercatcher and Black-headed Gull use Glounthane / Slatty waters. In Carrigrennan and Lough Mahon, Oystercatcher, Dunlin, Black-headed Gull and Cormorant *Phalacrocorax carbo* occur in the largest numbers.

While the intertidal and coastal habitats within the SPA boundary provide core foraging / roosting habitats for SCI birds, some SCI will forage or roost inland on agricultural fields outside the SPA boundary. According to Gittings (2017), nine SCI species regularly feed on agricultural fields in significant numbers around Cork Harbour: Wigeon, Golden Plover, Lapwing, Oystercatcher, Curlew, Black-tailed Godwit, Black-headed Gull, Common Gull and Lesser Black-backed Gull. There are another six species that can use fields, but these species do not usually occur in significant numbers i.e., Shelduck, Teal, Grey Heron, Little Grebe, Dunlin and Redshank. There are a number of fields within Little Island which have been used historically as foraging and roosting areas for wading birds and waterfowl (Gittings, 2017). The closest of these, known as Little Island West Fields (LIEF in **Image 9.3**), is located approximately 830m east of the Proposed Development site. This area includes two low-lying fields on the northern side of Little Island, adjacent to the western end of the Glounthane Estuary. These fields were previously intensively managed as improved grassland, but recent aerial photography indicates some scrub encroachment has occurred over the last number of years in the absence of continued management. These fields have not been routinely counted since the winter of 2005/06, due to the growth of vegetation along the N25 (which have obscured the fields from the vantage points previously used).

As noted above the habitats within the Proposed Development site are largely woodland, treeline and manmade habitats. There are no large areas of grassland within the site boundary which would provide suitable roosting or foraging areas of wading birds and waterfowl. While small numbers of waders and gulls could potentially occasionally forage on the small area of amenity grassland to the north of the railway line, this is a highly disturbed area which will not provide critical habitats for these species.

*Vantage point surveys*

Given the proximity of the Proposed Development site to known foraging and roosting areas, the Proposed Development site and bridge could potentially be located within a commuting route for wading birds and waterfowl. Therefore, vantage point surveys were carried out to identify if the location of the proposed bridge creates a potential collision risk for flocks of wading birds and waterfowl. The results of the vantage point surveys, which were carried out in winter 2022 and 2023, are included in **Appendix 9.4** in **Volume 4** of this EIAR.

Generally, small numbers of birds and small flocks of birds (approximately 1-3 individuals) were recorded overflying the Proposed Development site. No wading bird species were recorded, and no large flocks of birds were recorded during any of the surveys. Passerine species such as Hooded Crow *Corvus cornix*, Jackdaw *Corvus monedula* and Rook were the most commonly recorded species. Small numbers of gulls were recorded i.e., Black-headed Gull usually as individuals or pairs of birds. Herring Gull *Larus argentatus* were also recorded in small numbers. Other species recorded included Buzzard *Buteo buteo*, Starling and Woodpigeon. Birds were generally recorded flying at a height of below 50m. Vantage points were carried out from the existing N25 bridge, and it is noted that no birds were recorded flying under the bridge.

#### *9.3.6.6 Reptiles and amphibians*

According to records held by the NBDC, Common Frog (*Rana temporaria*) and Smooth Newt (*Lissotriton vulgaris*) have been recorded within grid square W77 (NDBC). Common Frog is listed on Annex V of the EU Habitats Directive and is protected under the Wildlife Acts. Common Frogs spend most of their lives on land, living and hunting in damp pastures, open woodlands or other habitats with suitable cover and generally not far from a pond or stream.

Smooth Newt (*Lissotriton vulgaris*) is commonly encountered near waterbodies. Adult newts are actually terrestrial, only returning to waterbodies to breed. They tend to prefer habitats that offer protection from desiccation, such as long grass, woodland and scrubland. Newts will over-winter in refugia such as woodpiles and rotting logs, which offer them some protection from the elements.

No amphibians were recorded during site surveys. While aquatic and wetland habitats can support amphibians, the drainage ditches, wet-willow woodland and Kilcoolishal Stream are heavily shaded throughout the Proposed Development site and are unlikely to support breeding Common Frog. The Proposed Development will not support breeding Smooth Newt. Overall, the Proposed Development site is of low to negligible value for amphibian species.

The reptile species Common Lizard (*Zootoca vivipara*) and Red-eared Terrapin (*Trachemys scripta*) have also been recorded within W77 (Source NBDC). Common Lizard is Ireland's only native terrestrial reptile and is so protected under the Wildlife Act. Ideal habitats for the species are south-facing, damp tussocky grassland, scrub covered hillsides, dunes or banks, and woodland tracks, and it also resides in peat bogs, dry grasslands and heathlands. Red-eared Terrapin is a non-native medium impact invasive species. Temperatures in excess of 20 degrees for 50-100 days are thought to be required for successful incubation of eggs, which are unlikely to occur in Ireland for the foreseeable future. Overall, the heavily shaded semi-natural habitats and manmade habitats which dominate the Proposed Development site is of negligible value for reptile species.

#### *9.3.6.7 Other species*

There is a section of the Kilcoolishal Stream located within the Proposed Development site as well as several small drainage ditches connecting to the stream. The Kilcoolishal Stream and a number of other streams within the Tibbotstown sub catchment i.e., Woodstock Stream and Anngrove Stream, have not been monitored by the EPA due to their small size and therefore their status to support a diverse aquatic community is unknown. There are no records for Eel, Lamprey or salmonids within the Kilcoolishal Stream. Furthermore, this stream is heavily culverted in the vicinity of the Proposed Development site. The data available suggest that this stream and its drainage ditches have limited potential to support fish species.

The NBDC database was consulted for records of rare or threatened invertebrate species in the 2km OS grid square in which the Proposed Development site is located i.e., W77L. There are no records of threatened invertebrate species within W77L. Whilst no site is without invertebrate interest, it is considered unlikely that the Proposed Development site would support protected invertebrate species given the common and manmade habitats which dominate the Proposed Development site.

## 9.4 Potential Impacts

Annex III of the amended Directive 2014/52/EU requires that the EIAR should assess:

- The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
- The nature of the impact;
- The transboundary nature of the impact;
- The intensity and complexity of the impact;
- The probability of the impact;
- The expected onset, duration, frequency and reversibility of the impact;
- The cumulation of the impact with the impacts of other existing and / or approved projects; and
- The possibility of effectively reducing the impact.

Potential effects of the Construction, Operational and Decommissioning Phases of the Proposed Development on terrestrial and aquatic biodiversity include:

- Potential effects on habitats;
- Potential effects on non-volant mammals;
- Potential effects on bats;
- Potential effects on birds (breeding and wintering);
- Potential effects on amphibians and reptiles;
- Potential effects on other species;
- Potential effects as a result of changes in air quality; and
- Potential effects from non-native invasive species.

When describing changes / activities and impacts on ecosystem structure and function, important elements to consider include positive / negative, extent, magnitude, duration, frequency and timing, and reversibility.

Section 3.7 of the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2022) provides standard definitions which have been used to classify the effects in respect of ecology. This classification scheme is outlined in **Table 1.1** in **Chapter 1**, *Introduction*.

### 9.4.1 Do-Nothing Scenario

Most of the habitats to be affected have been significantly modified from their natural state by human activity. In the absence of development, it is expected that the lands within the planning boundary would largely remain under the same management regimes. In pockets of semi-natural habitats within the site boundary, the general pattern of succession from grassland to scrub to woodland would be expected to continue. Overall, no significant changes to the habitats within the boundary are likely to occur, in the "do nothing" scenario.

### 9.4.2 Construction Phase

#### *9.4.2.1 Designated sites*

A Report for Screening for Appropriate Assessment (AA) (which accompanies this planning application) has been prepared. This report investigated the potential for the Proposed Development to have significant effects on European sites (SAC / cSAC / SPA) either alone or in combination with other plans or projects. This report concluded that there would be no significant impact on conservation objectives of Natura 2000 sites from the construction of the Proposed Development (in the absence of mitigation).

Similarly, no significant effects on NHAs / pNHAs have been identified i.e., Dunkettle Shore pNHA, Douglas River Estuary pNHA.

#### *9.4.2.2 Habitats*

Direct impacts on habitats as a result of construction works are described in **Table 9.10**. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape. The classification scheme below for the value of habitats and the impacts on them is detailed in the NRA publication Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) (refer to **Appendix 9.1** in **Volume 4** of this EIAR). No rare or protected floral species were recorded within the Proposed Development site and no impact of rare of protected flora has been identified.

**Table 9.10: Potential impacts on habitats within the Proposed Development site**

| Habitat | Ecological value (NRA Guidelines) | Potential impacts |
|---|---|---|
| **Buildings and artificial surfaces BL3 / Amenity grassland GA2** | Local importance (lower value) | Small areas of these low value habitats will be removed during construction works.<br><br>Negative, imperceptible, long-term |
| **Mixed broadleaved woodland WD1** | Local importance (higher value) | Two areas of this habitat will be removed during construction works on both the north and south of the N25 (as per Site A and Site B tree clearance plans in the Arboricultural Impact Assessment Report – refer to **Appendix 8.1** in **Volume 4** of this EIAR). This will result in the removal of mature trees, semi-mature trees and tree groups. Further detail on trees within the site are included in **Appendix 9.2** in **Volume 4** of this EIAR<br><br>Negative, moderate, long-term |
| **Drainage Ditches FW4 / Depositing River FW2** | Local importance (higher value) | Construction works will be carried out along the Kilcoolishal Stream near the northern railway line. In the absence of mitigation, impacts may occur to the profile of stream and drainage ditches.<br><br>Negative, slight to moderate, short-term |
| **Treeline WL2 / Mixed broadleaved woodland WD1** | Local importance (higher value) | An area of this habitat will be removed during construction works (as per Site B tree clearance plans in the Arboricultural Impact Assessment Report – refer to **Appendix 8.1** in **Volume 4** of this EIAR). This will result in the removal of two tree groups which include mature, semi-mature and juvenile trees. Further detail on this is included in **Appendix 9.2** in **Volume 4** of this EIAR.<br><br>Negative, moderate, long-term |
| **Wet willow woodland WN6** | Local importance (higher value) | This habitat will be largely avoided. However, a small areas on the boundary of this habitat will be affected by construction works.<br><br>Negative, slight, long-term |
| **Amenity grassland GA2 / Scattered tree and parkland WD5** | Local importance (lower value) | Areas of these low value habitats will be removed during construction works. A small number of mature non-native trees will be removed within this habitat.<br><br>Negative, slight, long-term |
| **Dry meadow and grassy verge GS1** | Local importance (lower value) | Small areas of these low value habitats will be removed during construction works.<br><br>Negative, not significant, long-term |
| **Hedgerow WL1** | Local importance (lower value) | A section of this non-native hedgerow will be removed.<br><br>Negative, not significant, long-term |

#### *9.4.2.3 Invasive Species*

The third schedule high impact invasive Japanese Knotweed was recorded at the Proposed Development site.

Japanese Knotweed is a member of the Polygonaceae (docks and rhubarb family), native to Japan and northern China. It has however, become widely distributed throughout Europe, North America, Canada, New Zealand and Australia. Dispersal typically occurs through rhizome fragments being transported in soil by humans or to a lesser extent, through passive mechanical means such as in floodwaters. Dispersal is also achieved through vegetative reproduction from plant fragments. The plant typically occurs along roadsides, riverbanks and waste ground in Ireland where it forms dense, monotypic stands. Japanese Knotweed causes a range of problems due to prolific and dense growth habit including blocking sight-lines on roads, damage to paving and structures, erosion of riverbanks and flood defence structures, damage to archaeological sites, loss and displacement of native habitats and species.

Buddleia / Wild Clematis and Winter Heliotrope are classified respectively as a medium-risk and low-risk invasive species by the NBDC. Both species are included in the NRA 'Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads' (NRA, 2010) as these species have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and are likely to be encountered during road schemes. Generally Wild Clematis appears to be more vigorous in its introduced range than in native regions. While no impacts have been documented in Ireland, it is considered a serious pest in New Zealand and listed as a weed in North America. No precise studies have been done on the level of impact of Buddleia, likely due to its long history of naturalisation but it is likely to displace native plants where it is present. Winter Heliotrope is a low impact species which is largely recorded on inland unvegetated or sparsely vegetated habitats, artificial habitats and woodland.

In the absence of mitigation, construction works i.e., machinery and personnel, could potentially disturb stands of Japanese Knotweed as well as other invasive species and spread these species to other habitats within and outside the Proposed Development site. The effects of the spread of invasive species to locally valuable nearby habitats near the works area are predicted to be negative, moderate and long-term in the absence of mitigation measures.

#### *9.4.2.4 Otter*

No signs of Otter activity were recorded within 150m of the Proposed Development site. The majority of habitats within the Proposed Development are of negligible value for Otter i.e., isolated pockets of woodland, amenity grassland and artificial surfaces. While in theory these habitats would provide areas of cover for Otter, given the absence of foraging habitats along the south of the N25 and the isolated nature of the woodland in this area, the loss of this habitat would be imperceptible to Otter. Construction works in the vicinity of the Kilcoolishal Stream are likely to prevent Otter accessing this area. It is noted that the Kilcoolishal Stream with its sluggish, low flows and considerable culverting has limited potential to support fish and / or provide foraging habitat for Otter.

Construction works could potentially indirectly affect fish stocks within the Kilcoolishal Stream via impacts on water quality. However, as noted above, the Kilcoolishal Stream has limited value for fish and Otter. Potential impacts on surface water and aquatic species are discussed in further detail in Section 9.4.2.10 and in **Chapter 16**, *Water*.

Increased human presence and / or noise and vibration associated with construction works, has the potential to temporarily displace commuting or foraging Otter. Otters are known to tolerate human disturbance (Bailey and Rochford, 2006; Irish Wildlife Trust, 2012). Any Otters passing through this area are already habituated to considerable disturbance from traffic, lighting and general human activity. Core construction works will be undertaken during normal daylight working hours and given that Otters are generally nocturnal in habit temporary displacement of Otter from the area during construction works is unlikely to impact the local Otter populations.

The impact of construction works on Otter from the loss of low to negligible value habitats and disturbance is predicted to be negative, imperceptible and long-term at a local geographic level.

#### *9.4.2.5 Bats*

There are no buildings located within the Proposed Development site boundary. No trees with potential to support significant bat roosts were recorded within the site boundary. However, one tree with moderate potential roosting value will be removed. Whilst no bat roosts were detected, the presence of occasional bats in mature and semi-mature trees earmarked for removal cannot altogether be excluded and in the absence of mitigation and therefore direct impacts on bats cannot be ruled out.

Treelines, woodland and other linear habitat features can provide high value habitat for bats linking roost sites outside the site to foraging areas and facilitating the dispersal of bats into the wider landscape. Treelines, woodland etc are also an important landscape features for commuting bats, as bats prefer to travel in the shelter of such features to reduce predation. Loss of such habitats affects the ability of bats to travel safely from roosting sites to foraging areas. A gap of as little as 10m may force some species to seek an alternative commuting route and even change roosting sites.

The woodland habitat on the southern side of the N25 has high local value as bat foraging habitat. Three bat species were recorded foraging in this area i.e., Brown Long-eared Bat, Common Pipistrelle, Soprano Pipistrelle as well as commuting Leisler's Bat. However, this is unlikely to provide significant connectivity to the surrounding landscape as this is isolated from surrounding habitats by the N25 and parking / industrial areas to the east, south and west. The treeline and woodland habitat on the northern boundary of the N25 have better connectivity to the surrounding landscape. However, levels of bat foraging activity were lower in this area and only the more common bat species i.e., Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat, were recorded in this area.

103 no. individual trees, 5 no. part-groups (i.e., sections of a tree group) and 13 no. tree groups have been selected for removal to facilitate the Proposed Development. The estimated total number of trees to be removed on site is 277. This will lead to the loss of high to moderate locally valuable bat foraging habitats. Given the isolated nature of the woodland habitat, this is unlikely to affect connectivity to the wider area. While Common and Soprano Pipistrelle forage in a range of habitats and are commonly recorded, Brown Long-eared Bat displays a preference for deciduous woodland and therefore, foraging habitats in the vicinity of the site are more limited. Therefore, impacts on Brown-long Eared Bat may be more significant than other bat species recorded.

Core construction works will be largely carried out during daylight hours and therefore no significant disturbance impacts from lighting during construction works have been identified.

Overall, the loss of semi-natural habitat during construction will reduce the foraging / commuting habitats available for bats. The impact on foraging bats will be negative, moderate and long term at a local geographic level.

#### *9.4.2.6 Other mammals*

No other protected mammal species were recorded within the Proposed Development site. While there were no confirmed field signs of Hedgehog, Irish Stoat or Pygmy Shrew, these species are largely nocturnal, and field signs are less frequently observed than for other mammals. Given the habitats onsite they could potentially occur.

The habitats to be affected are common and there is no evidence to indicate that the Proposed Development areas are of particular value for these species in the context of the surrounding countryside. However, construction works could potentially impact on mammal commuting routes around the site. Effects on these species during construction due to loss of habitat, habitat fragmentation and increased noise and disturbance are predicted to be negative, slight and short-term at a local geographic level in the absence of mitigation.

#### *9.4.2.7 Breeding birds*

The most significant impacts on breeding birds will be direct impacts during the Construction Phase through habitat loss, fragmentation and modification. As noted above, woodland, treeline, hedgerow and small areas of grassland habitat will be removed during construction works. The proposed works will remove areas of largely undisturbed habitat in an area where this type of habitat is rare. No red list species were recorded during site surveys. The amber list species i.e., Starling and Swallow as well as green list species such as Blackbird, Wren and Robin, are likely to use alternative grassland and hedgerow/treeline habitats in the vicinity during construction works. In the absence of mitigation, potential impacts include disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites and foraging habitat.

During the Construction Phase, increased noise and disturbance is likely to disturb and / or displace breeding birds from the site. Given the baseline noise levels along the N25, noise levels from construction works will not be significant outside the site boundary. The birds recorded at the Proposed Development site are common birds which are typical of the urban / suburban habitats onsite. Given the existing levels of noise and disturbance at the site, from traffic, human activity, dog walkers, etc, species which use the site are likely to be largely habituated to human activity and disturbance. Given the mobile nature of birds, the common nature of habitats within the site and the availability of alternative foraging habitat in the immediate vicinity, the impact from disturbance will be slight during the Construction Phase at a local level.

In the absence of mitigation, potential impacts on breeding birds include disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites and foraging habitat. In the absence of mitigation the impact on breeding birds will be negative, moderate and long-term at a local level.

#### *9.4.2.8 Wintering birds*

The most significant impacts on wintering birds during construction works would be disturbance impacts. As noted above there are no valuable habitats for wintering birds within the Proposed Development site. Therefore, no impact on wintering wading birds and waterfowl from habitat loss is predicted to occur.

The Proposed Development site is located over 830m from the closest known foraging or roosting habitat for wintering birds. A range of noise levels have been identified as potentially causing disturbance to waterbirds. Cutts *et al.* (2013) identified general threshold noise levels for varying degrees of impacts, which also take into account habituation effects. Cutts *et al.* (2013) state that *"noise between 55-72dB in some highly disturbed areas e.g., industrial or urban areas and adjacent to roads, may feature a low level of disturbance provided the noise level is regular as birds will often habituate to a constant noise level"*. Cutts *et al.* (2013) also carried out a comprehensive review of visual disturbance to waterbirds during construction work. This study suggests that typical response distances to visual disturbance vary with species i.e., from 110.5m for Oystercatcher to 275m for Curlew. These are distances at which alert responses occur in birds that are not habituated to disturbance, and disturbance response distances are highly variable within species. Flight responses will generally occur at much closer distances, while birds that are habituated to disturbance will also tolerate much closer activity. Therefore, a 300m buffer around the works area provides an indication of the maximum distance over which general disturbance impacts could occur. Laursen *et al.* (2005), Holloway (1997), Liley *et al.* (2011) and Bregnballe *et al*. (2009), which examined a range of species including ducks, geese and diving birds also concluded that disturbance effects will not extend outside 300m.

While the intertidal and coastal habitats within the SPA boundary provide core foraging / roosting habitats for SCI birds, some SCI will forage or roost inland on agricultural fields outside the SPA boundary. Grassland areas within Little Island have been used historically as foraging and roosting habitat for wading birds and waterfowl. However, the Proposed Development site is located over 830m from the closest known foraging or roosting habitat for wintering birds i.e., grassland to the east of the Proposed Development site. Surveys during the breeding season and wintering bird season (2022/2023) found no evidence that the Proposed Development, or lands in the vicinity of the Proposed Development site, are used by significant numbers of SCI birds. While small numbers of Black-headed Gull were occasionally recorded overflying the site, there are no habitats of value for these species in the vicinity of the works area. No flocks of wading birds or waterfowl were recorded overflying or foraging in the area during site surveys. The Proposed Development site is located adjacent to the existing N25, railway line, parking areas, pedestrian areas etc. Any birds which use this area are already habituated to high levels of noise and disturbance.

Given the distance from known foraging / roosting areas, the existing noise environment at the Proposed Development site, the absence of valuable habitats within or in the vicinity of the Proposed Development site, there is no potential for the Proposed Development to create significant disturbance or displacement impacts to wintering birds around Cork Harbour during construction works.

#### *9.4.2.9 Reptiles and amphibians*

Maintenance works of the drainage ditches within the Proposed Development site could potentially lead to a temporary loss of low value aquatic habitat. However, as noted above, drainage ditches at the site are heavily shaded and largely unsuitable for Common Frog. Although unlikely given the low value of this habitat, in the absence of mitigation, construction works could lead to direct mortality or injury to this species. The impact on this species during construction will be negative, not significant and temporary at a local geographic level.

Impacts of reptiles will be neutral, imperceptible and short-term.

##### *9.4.2.10 Other species*

During construction, there is potential for siltation and pollution of the Kilcoolishal Stream, from runoff during construction works e.g., runoff and erosion from site earthworks and stockpiles, spillage of fuels and lubricant, dewatering of ramp piers / abutments, concrete spillage. There is potential, therefore, for the generation of sediment laden or polluted water runoff associated with the Construction Phase of the works. Given the location of the works, there is potential for runoff to the Kilcoolishal Stream in the absence of mitigation. This could result in impacts on water quality and aquatic ecology.

Temporary disturbance could potentially occur due to noise and vibration during bridge piling operations, including the driving of the support piles for the bridge abutments. As noted above, works required during bridge construction and main structure of the bridge will be precast.

Overall, construction works have the potential to result in a negative, slight and temporary impact to aquatic species / fisheries at a local level in the absence of mitigation measures.

The loss of semi-nature habitats at the site will reduce habitats for terrestrial invertebrates in the short-term. Impacts on terrestrial invertebrates will be neutral, imperceptible and short-term at a local level.

##### *9.4.2.11 Air*

Construction activities are likely to generate some dust emissions, particularly during the site clearance and excavation stages. However, no sensitive habitats are located in the vicinity of the site and no significant impacts from dust emissions during construction are predicted to occur.

### 9.4.3 Operational Phase

##### *9.4.3.1 Designated sites*

A Report for Screening for Appropriate Assessment (AA) (which accompanies this planning application) has been prepared. This report investigated the potential for the Proposed Development to have significant effects on European sites (SAC / cSAC / SPA) either alone or in combination with other plans or projects. This report concluded that there would be no significant impact on conservation objectives of Natura 2000 sites from the operation of the Proposed Development (in the absence of mitigation).

Similarly, no significant operational effects on NHAs / pNHAs have been identified i.e., Dunkettle Shore pNHA, Douglas River Estuary pNHA.

##### *9.4.3.2 Habitats*

Maintenance works may be required on occasion along boundary habitats. However, no significant operational impacts on terrestrial habitats have been identified.

##### *9.4.3.3 Invasive species*

No operational impacts identified.

##### *9.4.3.4 Otter*

The proposed bridge structure will be elevated over the N25 and its surrounding habitats and will be supported by concrete piers / piles. There is no potential for the proposed bridge or its associated structures to create a barrier to Otter movement.

During operation, there will be increased noise and disturbance along the new bridge and walkways. While the Proposed Development site is located in a highly disturbed setting adjacent to the N25, parking areas, railway line and footpaths, there are pockets of undisturbed habitat within this area included the woodland habitat to the south of the N25, as well as the wet woodland and treelines to the north of the N25. Although there is evidence that nocturnal mammals, such as the Otter, can be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich and Longcore, 2005), as discussed above in relation to construction impacts, Otter are relatively tolerant of human and traffic disturbance. Given the existing setting, and the low value of the existing habitats for Otter, disturbance associated with the operation of the Proposed Development will not have significant disturbance / displacement impacts on Otter.

During operation, surface water runoff could potentially indirectly affect fish stocks and aquatic invertebrates via impacts on water quality. Potential impacts on surface water and aquatic species are discussed in further detail in Section 9.4.3.10.

Overall, the impact on Otter during the Operational Phase is predicted to be negative, not significant and long-term at a local geographic level.

#### *9.4.3.5 Bats*

Habitat fragmentation due to the loss of the foraging and commuting habitat has the potential to continue to impact local bat populations during the Operational Phase of the Proposed Development. Replacement planting (as outlined in the landscape masterplan included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR) of areas of native woodland and hedgerows will provide some replacement habitat for foraging bats in areas where habitat has been removed.

Lighting deters some bat species such as Brown Long-eared Bat, from foraging (Azam *et al.,* 2018). Studies have shown that illumination levels as low as 0.06 lux can influence the behaviour of bats. Even a full moon night (0.02 lux) can reduce bat activity within more sheltered, darker wildlife corridors and foraging areas (e.g., woodlands). It is noted that Pipistrelle species appear to be more tolerant of light and disturbance (Speakman, 1991; Stones *et al.*, 2009; Haffner, 1986). Leisler's Bats will also opportunistically feed on such insect gatherings in lit areas (Bat Conservation Ireland, 2010). However, it is noted that more recently research suggests that even in light opportunistic foraging species, foraging activity may be impacted by increased lighting (Hooker *et al*., 2022).

The lighting scheme for the Proposed Development has considered best practice, as published by the UK Bat Conservation Trust (2018), in respect of mitigation strategies, to minimise the impact of outdoor lighting upon bat populations. However, lighting requirements for the development will mean that light spillage within the retained woodland habitat on the south of the N25 will reduce its habitat value for foraging bats, in particular light-sensitive species such as Brown Long-eared Bat. Light trespass onto the retained woodland habitats could potentially prevent Brown Long-eared Bat from foraging in this area during operation.

The Impact on bats during the Operational Phase is predicted to be negative, moderate and long-term at a local level.

#### *9.4.3.6 Other mammals*

Increased activity and human presence, noise and additional lighting has the potential to disturb or displace other mammal species such as Hedgehog, Pygmy Shrew and Irish Stoat from foraging habitats during the Operational Phase. The removal of woodland and treeline habitat will reduce areas of cover for mammal species. Replacement planting (as outlined in the landscape masterplan included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR) of areas of native woodland and hedgerows will provide some replacement habitat for small mammals in areas where habitat has been removed.

Impacts on other mammals during operation are predicted to be negative, slight and long-term at a local level.

### *9.4.3.7 Breeding birds*

As noted above, the Proposed Development site does not provide significant habitat for birds of conservation concern. However, habitat fragmentation due to the loss of the foraging and commuting habitat has the potential to continue to impact local populations of common bird species during the Operational Phase of the Proposed Development.

Replacement planting (as outlined in the landscape masterplan included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR) of areas of native woodland and hedgerows will provide some replacement habitat for breeding birds in areas where habitat has been removed.

The impact on birds during operation is predicted to be negative, slight and long-term at a local level.

### *9.4.3.8 Wintering birds*

While there is anecdotal evidence that birds collide with bridges, there are limited published studies on the collision of birds with bridges and no published studies which calculate the rate or bird collision with bridges. For the most part, research on collision risk to birds has focused on the manmade structures where a significant risk has been identified either to human or bird welfare e.g., wind turbines, buildings with large areas of glass, powerlines, aircraft, communication towers. There remains a dearth of research and / or data on collision rates with bridges in spite of a significant number of studies on bird collision with a large range of structures particularly in the last number of years with the advent of self-published literature e.g., PlusOne.

Bridges by their nature are often located in areas where high numbers of birds congregate around rivers and / or estuaries. However, information regarding mortality as a result of direct collisions with bridges is sparse. During a review of over 1,500 abstracts or summaries of published reports on bird mortality in relation to man-made structures (from Stanton and Kilcik, 2018) there were no publications documenting bird collisions with, or bird mortality due to, collisions with bridges or bridge cables (Arup, 2002; Parsons Brinckerhoff, 2011). Bird deaths associated with bridges are usually a result of the powerlines strung across bridges (Weston, 1966; Podolsky, 1998; Arup 2002; Parsons Brinckerhoff, 2011) or during periods of inclement weather when birds are affected by the bridge lighting (Nilsson and Green, 2011) or after individuals are downed during strong winds (Owens and James, 1991; Jacobson, 2005).

The Proposed Development site is located in proximity to Cork Harbour and there are known foraging / roosting areas for wintering birds to the east, west and south of the site. However, winter vantage point survey carried out in 2022 and 2023 found no evidence that the Proposed Development site is located within a commuting or flightline for these species. Small numbers of gulls were recorded overflying the site as well as common passerine species such as crows. However, given that these birds are already overflying and not colliding with the existing N25 bridge, these birds are not at a significant collision risk from the proposed bridge.

Operational impacts on wintering birds are predicted to be a neutral, imperceptible and long-term at a local level.

### *9.4.3.9 Reptiles and amphibians*

No operational impacts on reptiles and amphibians have been identified. Impacts will be neutral, imperceptible and long-term.

### *9.4.3.10 Other species*

There will be no bridge supports located within the Kilcoolishal Stream and therefore no impact on hydraulic flows and / or fish passage during the Operational Phase. SuDS measures as outlined in **Chapter 16**, *Water* have been designed to ensure that there will be no change in runoff rates to the Kilcoolishal Stream during operation. The proposed bridge is for pedestrian and cycle traffic only and there will be no risk of hydrocarbon runoff associated with operation.

Given the operational design measures, the impacts on fish and aquatic invertebrate species in receptors are predicted to be neutral, imperceptible and long-term at a local level.

No significant impact on terrestrial invertebrates has been identified during operation. However, new habitats created in the landscape design will have a positive, slight and long-term impact at a local level.

##### *9.4.3.11 Air*

The Proposed Development is for a pedestrian bridge and cycle path. No significant operation air emissions will occur and there will be no adverse impact on identified ecologically sensitive receptors.

### 9.4.4 Decommissioning

The design life of the proposed new pedestrian and cyclist bridge is 120 years. During the potential future decommissioning works, it is proposed that the bridge will be removed in a reverse fashion to the proposed construction sequence. Decommissioning will follow construction best practices significant impacts are predicted to occur.

## 9.5 Mitigation and Monitoring

### 9.5.1 Construction Phase

The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts. The following mitigation measures will be implemented.

#### *9.5.1.1 General mitigation measures*

**Chapter 5**, *Construction Strategy* provides an outline of the general activities associated with the construction of the Proposed Development. A CEMP has been prepared for the Proposed Development and is included as **Appendix 5.1** in **Volume 4** to this EIAR. Prior to commencement of works, the Contractor will further develop the CEMP and agree its content with CCC. Once agreed with CCC, the CEMP will be implemented, and site clearance works will be carried out and fencing erected along the Proposed Development boundary.

All construction staff, including all sub-contracted workers, will be notified of the sensitive nature of onsite habitats, the Kilcoolishal Stream and nearby designated sites, and will also be made aware that no construction waste of any kind (rubble, soil, etc.) is to be deposited in these protected areas and that care must be taken with liquids or other materials to avoid spillage.

All personnel involved with the Proposed Development will receive an onsite induction relating to construction and operations and the environmentally sensitive nature of habitats on and adjacent to the Proposed Development site and to re-emphasise the precautions that are required as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures.

All staff and subcontractors have the responsibility to:

- Understand the importance of mitigating potential pollution onsite, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
- Respond in the event of an incident to avoid or limit environmental impact;
- Report all incidents immediately to the project manager;
- Monitor the workplace for potential environmental risks and alert the site manager if any are observed; and
- Co-operate as required, with site inspections.

#### 9.5.1.2 Water quality

A Surface Water Management Plan will be incorporated into the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) by the Contractor. Specific controls / mitigation measures will be put in place to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase.

Works in the vicinity of the Kilcoolishal Stream will be carried out in the summer months, when water levels and flows within the stream are minimal. In the eventually that the stream is not dry, construction works to the section of the Kilcoolishal stream crossing the construction boundary (approximately 28m) will be bunded on either side with earthen bunds and silt screens. Water would be over pumped in the flow direction. Environmental control measures will be implemented during construction in line with standard guidelines (i.e., 'The Control of Water Pollution from Construction Sites' (CIRAI, 2001) and "The Control of Water Pollution from Linear Construction Projects' (CIRIA, 2006)) for best practice measures for controlling water pollution. The Report for Screening for AA submitted as part of the planning application concluded that the proposed project, in the absence of mitigation, and either alone or in-combination with other plans and / or projects, does not have the potential to significantly affect any European Site, in light of their conservation objectives. The environmental control measures which will be implemented relate to the minimisation of localised potential impacts.

Apart from the area of the Kilcoolishal Stream directly affected by the bridge construction (i.e., Irish Rail portal frame), a buffer strip of 10m will be implemented around the stream with no works taking place in this area. Where this is not possible, in particular for the construction of the Irish Rail portal frame, the streambed and stream banks of the Kilcoolishal Stream in this location will be reprofiled and reinstated following construction and the bunds and silt traps removed.

No plant or tools will be washed in the stream, should it contain water. Spill kits will be permanently on hand and kept close to the works areas. Staff will be trained in how to use the spill kits correctly.

Details of water quality mitigation measures are also included in **Chapter 16**, *Water*.

#### 9.5.1.3 Noise and vibration

The employment of good construction management practice, as described in the CEMP, included as **Appendix 5.1** in **Volume 4** of this EIAR, and in **Chapter 10**, *Noise and Vibration*, will minimise the risk of adverse impacts from the noise and vibration during the Construction Phase.

Mitigation measures will be employed to ensure that potential noise and vibration impacts at nearby sensitive receptors due to construction activities are minimised. The preferred approach for controlling construction noise is to reduce source levels where possible.

The CEMP will be updated by the contractor, prior to construction, to include any specific conditions attached to the approval and other specific construction information, but will at a minimum, include the measures described in **Chapter 10**, *Noise and Vibration*.

#### 9.5.1.4 Lighting

Lighting associated with the site works could cause disturbance / displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success.

During construction, lighting mitigation measures will follow 'Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers' (Bat Conservation Ireland, 2010).

Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Where possible, construction lights will be switched off when not in use; and

- Lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on woodland on the southern and northern boundary of the N25. There will be no directional lighting focused on these sensitive habitats and cowling and focusing lights downwards will minimise light spillage.

Core construction works will take place during hours of daylight to minimise disturbance to any nocturnal mammal species.

#### *9.5.1.5 Protection of habitats*

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 1st March to the 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Site clearance including vegetation clearance will be undertaken within the Proposed Development boundary and in accordance with the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR). Trees and vegetation will not be removed between 1st March and 31stAugust, to avoid direct impacts on nesting birds. Tree removal will be carried out in accordance with the Arboricultural Impact Assessment (refer to **Appendix 8.1** in **Volume 4** of this EIAR). Trees to be retained will be identified and protected to avoid accidental damage during the Construction Phase.

Site drainage will be provided at the construction compounds to collect surface water runoff, which will be directed into the existing local drainage network. Surface water or contaminants within the site compounds will not be released from the site to any waters or the bed and banks of any waters (including ground water). Refer to **Chapter 16**, *Water* for further details on mitigation measures for water.

To prevent incidental damage by machinery or by the deposition of spoil during site works, woodland, hedgerow, tree and scrub vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. Tree protection measures are included in the Arboricultural Impact Assessment Report (refer to **Appendix 8.1** in **Volume 4** of this EIAR). The project ecologist will specify appropriate protective fencing where required.

Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete.

A landscape masterplan is included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR.

#### *9.5.1.6 Invasive species*

Prior to the commencement of construction works an invasive species survey will be undertaken within the Proposed Development boundary by a competent expert to determine if invasive species listed under Part 1 of the Third Schedule of S.I No. 477 of 2011 have established in the area in the period between pre-planning and post consent. In the event that invasive species are identified within the works area, a site-specific Invasive Species Management Plan (ISMP) will be developed and implemented by a competent specialist on behalf of the contractor.

In addition, in order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011), biosecurity measures will be implemented throughout the Construction Phase to ensure that the introduction and translocation of invasive species is prevented. The appointed project ecologist will carry out a toolbox talk which will identify invasive species and will also implement biosecurity measures such as the visual inspection of vehicles for evidence of attached plant or animal material prior to entering and leaving the works area. Stringent biosecurity measures will be implemented throughout the works. The best practice principles of Check-Clean-Dry guidance of the Non-Native Species Secretariat (NNSS, 2017), IFI biosecurity protocols (IFI, 2010) and Waterways Ireland Marine Notice No. 39/2017 shall be followed during these works to ensure that invasive non-native species are not introduced into the Proposed Development site.

*Japanese knotweed*

Japanese Knotweed was recorded within the Proposed Development site. The following site hygiene and mitigation measures will be followed during construction to ensure that Japanese Knotweed is effectively removed from the site and is not spread outside of the site during construction works.

*Site hygiene at contaminated areas*

Construction equipment, vehicles and footwear may provide a vector for the spread of invasive species. Maintaining site hygiene at all times in an area affected by invasive species is essential to prevent further spread.

The following site hygiene measures will be implemented for the contaminated area:

- Understand the potential extent of the rhizome (root) system underground – up to seven metres horizontally and three metres vertically;
- Where possible, the contaminated area will be avoided and fenced off, or the extent of the rhizomes clearly marked;
- If possible, the use of machinery with tracks will avoid contaminated areas. Movement of machinery between contaminated and non-contaminated areas must be controlled and adequate power washing measures implemented;
- Areas where contaminated soil is to be stockpiled on site will be clearly identified and marked out;
- Designated entry and exit points will be identified for personnel on foot and for small mobile equipment. A delineated access track, to be maintained free of Japanese Knotweed, will be established through the site to minimise the spread of Knotweed species by permitted vehicles accessing the site;
- Vehicles, including footwear and tools, leaving the site will be inspected for any plant material and washed down (using a pressure washer) in a dedicated vehicular wheel wash down facility, which will drain into a contained area within the site. Particular care is required with tracked machines;
- Vehicles used in the transport of contaminated material will be visually checked and washed down into a contained area before being used for any other work, either in the same area or on a different site;
- Only vehicles required for essential works, including site investigation works, will be brought on site and the number of visits minimised as much as practicable;
- Material gathered in the dedicated wash down contained areas will be appropriately disposed of off-site;
- For any subsoil or topsoil entering the site, the supplier will be required to provide an assurance that it is free of Japanese Knotweed;
- All site personnel will be made aware of measures to be taken and will be informed of the requirements of the ISMP; and
- Site hygiene signage, in relation to the management of invasive species, will be erected.

*Management options*

In addition to the possible advance treatment works and pre-construction survey, when the works areas become available to the contractor for enabling works, areas identified as requiring specific invasive species treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread within the Proposed Development site or beyond.

There are a number of management options that may be implemented to control and prevent the spread of invasive species. These are presented in the sections below.

Those involved in the application of herbicides / pesticides will be competent to do so and, consequently, will have sufficient training, experience and knowledge in the area of herbicides / pesticides application.

All staff involved in the application of herbicides / pesticides will have received appropriate training, which may include achieving competency certification in the safe use of herbicides / pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area. The following management options will be used i.e., chemical control and / or excavation and chemical treatment onsite:

*Chemical treatment*

The control of Japanese Knotweed will require the use of herbicides, which can pose a risk to human health, to non-target plants or to wildlife. To ensure the safety of herbicide applicators and of other public users of the site, it is essential that a competent and qualified person carries out the herbicide treatment. A qualified and experienced contractor will be employed to carry out all treatment work.

The contractor will follow the detailed recommendations of the following documents for the control of invasive species and noxious weeds:

- Chapter 7 and Appendix 3 of the TII Publication: The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010);
- Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2015); and
- Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges (NPWS, 2008).

These documents include measures to aid the identification of relevant species, with details for the timing, chemicals and methodology for chemical control, and for measures to avoid environmental damage during the use of herbicides.

Chemical treatment involves the application of an herbicide to invasive species plant such as Japanese Knotweed stands without any excavation or removal of the plant material. The preferred types of herbicides to be used in the treatment of Knotweed are Glyphosate and 2,4-D Amine.

If herbicide is applied as the treatment option, it may need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective.

Glyphosate is non-persistent and can be used near water, but it is not selective (i.e., it is a broad spectrum chemical and will impact all plant species) whereas 2,4-D Amine can be persistent for up to one month, and can also be used near water but is more selective on certain plants. The selection of chemical by the contractor and supervising ecologist will depend on seasonal factors, site conditions, proximity to water, surrounding habitats etc.

The most effective time to apply Glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient.

Reapplication rates will depend on site specific considerations including the extent of the infestation, its location, and the time of year treatment commences. Details of the proposed chemical treatment plan will be included in the updated ISMP based on the proposed work programme.

Foliar treatment (spraying) is usually applied with a sprayer such as a knapsack sprayer or a larger spray system. It is important to use a treatment dye to identify clearly all areas treated. Foliar treatment is an efficient way to treat large monocultures of invasive plants, or to spot-treat individual plants that are difficult to remove mechanically such as Japanese Knotweed.

In the case of Japanese Knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment will be required usually within ten days, before the internal vascular system is no longer capable of translocating the herbicide to the root system.

While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as Japanese Knotweed possesses many stomata openings on the leaf under surface. Dead stems can be cut, removed and burned on / off site in accordance with the relevant legislation.

The stem injection method is sometimes used for Japanese Knotweed control. This treatment requires a higher concentration of the active ingredient than is used in foliar applications. It involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into each of the canes approximately 20-30cms from the base of each cane (between the 1st and 2nd nodule).

Subsequently, approximately 10ml of herbicide mix is injected into each cane at a ratio of 5:1 through the use of a specialist stem injection tool. The application of glyphosate-based products by injection is most effective when applied in the early Autumn (mid to late Sept). Regrowth will occur in subsequent years, albeit much less vigorously, which will require follow up treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

To ensure that the use of herbicides does not contravene legislation, the contractor must comply with Circular Letter NPWS 2/08 *Use of Herbicide Spray on Vegetated Road Verges* (NPWS, 2008) on dealing with the application on to non-target areas.

*Excavation and chemical treatment on-site*

This option employs both physical and chemical methods of treatment. This method is employed in situations where treatment of invasive species, in particular Japanese Knotweed, is required to be completed in a relatively short timeframe. Generally, digging up the rhizomes and re-cultivating it stimulates plant growth and will result in more successful herbicide application and management.

In summary, this management method requires cutting and killing of the surface plant. The cut material must be left on top of plastic sheeting until dried out and subsequently monitored for any sign of regrowth. Storage of cut material should not take place within flood risk zone of a river. The cut material should not be placed in a green waste recycling bin. Once dried out, the material should be burned on site in accordance with the relevant legislation. The surface of the affected area should be raked with tines to remove crowns and surface material, and in order to break up the rhizomes, bringing them to the surface, which will stimulate leaf production. This will make the plant more vulnerable to herbicide treatment. The more rhizomes that are brought to the surface, the more growth will occur, allowing for a more successful treatment. An excavator can be used to scrape the surface crowns and rhizomes into a pile and then to cultivate the ground to stimulate rhizomes to produce a higher density of stems for treatment. Reapplication of herbicide may be required for up to five years after initially application, subject to the site-specific management plan.

*Buddleia, Wild Clematis and Winter Heliotrope*

It is noted that the amber list species Buddleia, Wild Clematis and Winter Heliotrope were also recorded at the Proposed Development site. As noted in Section 9.4.2.3, there is no statutory obligation to remove these species. However, should it be concluded that they should be removed, the below treatment methods are recommended. These species are straightforward to control using a mixture of mechanical removal and herbicide treatment.

*Buddleia*

Buddleia favours disturbed sites, where physical grubbing of plants can provide ideal conditions for the germination of seeds. Therefore, care needs to be taken to ensure re-vegetation of controlled areas is undertaken swiftly. The branches of Buddleia are capable of rooting as cuttings, so care should also be taken to ensure material is disposed of in a manner to avoid this risk.

As mature plants occur within the proposed works area, the preferred method of treatment is cutting back to a basal stump or grubbing out followed by chemical treatment. Herbicide applications will consider sensitive receptors such as watercourses and locally important habitats such as woodland and must only be applied in line with manufacturers recommendations.

Recommended practice for the application of herbicides requires cutting back of plants to a basal stump during active growth (late spring to early summer) which is then treated (brushed on) immediately with a systemic weed killer mix (Starr *et al.*, 2003). Foliar application of triclopyr or glyphosate may be adequate for limited infestations of younger plants but should be followed up at 6 monthly intervals until the supervising ecologist can certify that the plant is no longer extant within the works area.

Best practice biosecurity measures should be implemented for works in proximity to the stream and drainage ditches. All wet gear or machinery which has previously come into contact with watercourses should be checked for any silt or mud, plant material or animals. It then should be cleaned and finally dried. Disinfectant or hot water (over 65ºC) should be used to clean all equipment followed by a 24 hour drying period. This should be adopted as standard practice in all freshwaters.

<u>Wild Clematis</u>

Wild Clematis is straightforward to control using a mixture of mechanical removal and herbicide treatment. Alternative methods of control are discussed below.

This species can be controlled by both mechanical control and herbicides, though typically its control relies on a combination of both i.e., cut-stump application.

Small seedlings can be readily pulled by hand. Larger stems have to be cut, the roots grubbed out and the material placed off the ground so it cannot take root again.

A number of chemicals have been used effectively against Wild Clematis in New Zealand, including glyphosate, though control invariably takes more than one year (New Zealand Department of Conservation, 2005). Control should be undertaken during active growth. For mature plants, the vines should be cut back to ground level or waist height in winter or spring and the subsequent re- growth can be then foliar sprayed. This method will avoid impacting on the host plant the vine may be covering.

For larger specimens, the plant can be cut at the base with a straight horizontal cut. Herbicide is then applied immediately to the wound with a paint brush, eye dropper or small squeeze bottle. On larger stems it is only necessary to wipe herbicide around the outer rim of the cut. The plants should be left in situ until they are dead. Where plants are not killed in a single application, wait until re growth before re spraying.

Triclopyr can also be used as a foliar spray or as a spot treatment. This should be applied in summer during active growth before senescence, when it is not very hot or during drought. Following control, regular monitoring will be required with appropriate follow-up to deal with re-growth or new seedling germination over a period of 2–3 years.

<u>Winter Heliotrope</u>

*Physical control*

Due to the extensive rhizome network, physical removal of winter heliotrope is really only practical on a limited scale. Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from fragments of roots, it may be best to tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant. Other means of disposal include burial of material at a depth of at least 2m, incineration or disposal to licensed landfill. There is no evidence that the material would withstand composting though this approach would probably only be suitable for limited infestations.

*Chemical control*

An application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008), though the Royal Horticultural Society (2008) recommends spraying in mid-summer or later but before the foliage begins to die back.

### *9.5.1.7 Bats*

During the site works, general mitigation measures for bats will follow Marnell *et al.* (2022), Kelleher and Marnell (2006) and NRA (2005c). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats or prevent avoidable effects resulting from significant alterations to the immediate landscape. All mitigation measures including detailed method statements will be agreed with the NPWS prior to commencement of works, which could affect any bat populations on site.

Mature and immature trees will be removed prior to construction. Although mature trees with the potential to be of significant value as bat roosts are absent from the site, the following precautionary measures will be implemented during the removal of semi-mature and mature trees:

- The project ecologist will work with the contractor to ensure that trees earmarked for retention are adequately protected;
- Tree-felling will ideally be undertaken in the period September to late October / early November. During this period, bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken;
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted;
- Tree will be retained where possible and no ‘tidying up’ of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety;
- Treelines outside the Proposed Development area but adjacent to it, and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage;
- During construction, directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused on watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage; and
- If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS.

As noted in Section 9.5.1.4, construction lighting mitigation measures will follow recommendations outlined in Bat Conservation Ireland (2010) and Bat Conservation Trust (2018).

### *9.5.1.8 Birds*

As noted in Section 9.5.1.5, where practicable, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Proposed Development site boundary. If works are carried out during the breeding season, a pre-construction survey will be carried out by the project ecologist and if birds are detected, appropriate mitigation measures will be implemented.

### *9.5.1.9 Common frog*

As a precautionary measure, a visual search of the drainage ditches and the Kilcoolishal Stream will be carried out in the days prior to commencement of construction works and any frogs will be removed to alternative habitats elsewhere within the landholding. This will be carried out under licence from the NPWS and under supervision of the project ecologist.

### 9.5.2 Operational Phase

#### *9.5.2.1 Lighting during operation*

The primary lighting mitigation which will be implemented for this project relates to bats, as these are considered the most sensitive species in relation to night-time lighting. It is noted however that the mitigation proposed will also lessen in the impact in relation other nocturnal species such as Pygmy Shrew and Otter.

The external lighting design concept is to illuminate lighting levels as outlined within BS EN 12464-2:2014 (BSI, 2014). The bridge and walkways will have required lux levels for safe access. The following measures will also be included to minimise impacts on foraging bats where possible:

- LED type lanterns, of the warm white type, have been specified, with a Colour Temperature of 3000 kelvin, as these are considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations;
- LED luminaires have been specified due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Lanterns are of the fully cut off type with no light output above the horizontal plane; and
- Screening by existing trees and newly planted trees will limit light spillage onto boundary habitats.

#### *9.5.2.2 Biodiversity enhancement*

Disturbed areas will be planted using appropriate native woodland and hedgerow mixes. A landscape masterplan has been included with the application with further detail on tree, woodland and hedgerow planting locations (refer to Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR).

It is proposed that four bat boxes will be installed at the Proposed Development site i.e., bat box pro or similar. These bat boxes will be located along mature woodland at the south of the site and within the wet willow woodland at the north of the site.

It is proposed that six bird nesting boxes (various types including open fronted, entrance hole and kestrel nest boxes) will be installed at the Proposed Development site. These will be located on mature and suitable semi-mature trees within the Proposed Development site boundary.

Log piles are suitable for invertebrates, small mammals and birds, and can be easily installed in wooded areas of parks or open spaces. These stacks of logs are piled up and allowed to rot down. Left undisturbed, they will support a good range of biodiversity. These will be positioned within newly landscapes areas within the Proposed Development site.

It is noted that some planting has been specified in the landscape masterplan (refer to Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR). Natural recolonisation should also be allowed to proceed outside of the planted areas. This will ensure that such areas are colonised by a mixture of native species from the surrounding landscape. These species will be appropriate to the local conditions.

Natural woodland has a complex structure with a mix of different layers at different heights and which are subject to different light regimes. This structure of canopy, sub-canopy and shrub layer can be replicated by including a suitable mix of species which grow at different rates, and which reach different heights at maturity. It is also important to plant sufficient trees to allow dense cover to develop in certain parts of the site. It is noted that areas of cover within which there is little disturbance, even if such areas are small, can be important for open exposed sites and sites with a high degree of human disturbance. For example, they provide areas where mammals can safely hide during the day. Such areas can be developed by ensuring that paths are naturally diverted away from certain identified areas which can then be allowed to develop a denser vegetation.

## 9.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

The cumulative impacts of the Proposed Development and nearby consented projects on biodiversity are discussed in **Table 9.11**.

**Table 9.11: Cumulative impacts of the Proposed Development**

| Development | Project details | Potential cumulative impacts |
|---|---|---|
| 224837<br>Approved - Conditional<br><br>Decision received 08/06/2022 | 30 no. bedroom, three-storey extension to the existing Radisson Blu Hotel & Spa, Little Island.<br><br>iNua Hospitality General Partner Limited t/a Radisson Blu Hotel Cork applied for the construction of 30-bedroom, three storey extension to the existing hotel. The Proposed Development makes provision for internal alterations to the existing hotel to accommodate the proposed extension, including the omission of 2 existing hotel rooms at upper floors, omission of meeting room at ground floor level, and all ancillary works including rooftop plant. The Proposed Development consists of works within the curtilage of a Protected Structure | In the event that the Construction Phase of the Proposed Development was to overlap with this project, potential localised cumulative impacts could arise.<br><br>Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in the CEMP which is included as **Appendix 5.1** in **Volume 4** of this EIAR. These measures will ensure that no significant cumulative noise / disturbance effects or habitat loss for local fauna will occur during construction works. No potential cumulative operational impacts from noise and disturbance have been identified.<br><br>Following mitigation, no significant adverse impacts from changes in local water quality were identified during the Construction or Operational Phase of the Proposed Development. Therefore, no cumulative impacts for water have been identified.<br><br>It is noted that tree removal has been minimised in this project, which will remove 7 semi-mature trees. No significant cumulative impacts from habitat loss have been identified.<br><br>Following the implementation of mitigation measures, no significant cumulative effects have been identified. |
| 225935<br><br>Approved - Conditional<br><br>Decision received 05/04/2023 | Construction of light industrial building, Euro Business Park, Little Island.<br><br>South of Ireland Sustainable Energy Federation applied for permission to construct a light industrial building divided into 4 separate units to provide an integrated supply for, Solar Voltaic Panels, Energy Management Systems, Domestic Battery and Heat Pump installations, with additional parking and associated site works | In the event that the Construction Phase of the Proposed Development was to overlap with this project, potential localised cumulative impacts could arise.<br><br>Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in the CEMP which is included as **Appendix 5.1** in **Volume 4** of this EIAR. These measures will ensure that no significant cumulative noise / disturbance effects or habitat loss for local fauna will occur during construction works. No potential cumulative operational impacts from noise and disturbance have been identified.<br><br>Following mitigation, no significant adverse impacts from changes in local water quality were identified during the Construction or Operational Phase of the Proposed Development. Therefore, no cumulative impacts for water have been identified.<br><br>While no detail on tree removal / habitat loss was included with this application, the site is located within an existing industrial setting and no significant impacts from cumulative habitat loss have been identified.<br><br>Following the implementation of mitigation measures, no significant cumulative effects have been identified. |

## 9.7 Residual Impacts

### 9.7.1 Designated sites

Potential impacts on designated Natura 2000 sites (SAC / cSAC / SPA) are specifically addressed in the Report for Screening for Appropriate Assessment (AA) This report concluded the following:

*"The Proposed N25 Pedestrian and Cycle Bridge, Little Island, Cork, either alone or in-combination with other plans and / or projects, does not have the potential to significantly affect any European Site, in light of their conservation objectives.*

*Therefore, a Stage 2 Appropriate Assessment is deemed not to be required."*

Similarly, no significant effects on NHAs / pNHAs will occur.

### 9.7.2 Habitats

The removal of areas of mature and semi-mature trees within the mixed-broadleaved woodland and treeline habitats at the Proposed Development site will have a negative, moderate and short to medium-term impact at a local level. Some areas of the site will be replanted with native species and as these trees mature, they will provide high value habitat. Wet willow woodland habitat on the north of the site will be largely avoided by construction works and retained. Temporary impacts will occur within the Kilcoolishal Stream and drainage ditches. However, these areas will be reinstated following construction works – refer to Section 9.5.1.2.

The removal of low value habitats such as low value hedgerow, amenity grassland and small areas of dry meadows and grassy verge will have a negative, not significant and short-term impact. However, these lower value habitats will be largely replaced by landscape planting as outlined in the landscape masterplan, included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR.

The residual effects from habitat loss are predicted to be negative, moderate and short to medium-term at a local level.

### 9.7.3 Invasive species

No residual impacts have been identified.

### 9.7.4 Otter

The Proposed Development site is of low value for Otter. Given the limited Otter use of this area and the lack of direct impacts on aquatic habitats, following water quality mitigation the impacts during construction are predicted to be negative, imperceptible and short-term.

Otters are generally nocturnal in habit and in many circumstances can tolerate high levels of human presence and disturbance. Otters which use this area are also habituated to comparable levels of disturbance and no significant disturbance impacts are predicted to occur during operation of the Proposed Development.

No significant residual impacts on Otters have been identified.

### 9.7.5 Bats

Overall, the loss of semi-natural woodland habitats, particularly on the southern boundary of the N25, will reduce the foraging / commuting habitats available for bats. While replanting in this area with native woodland will partially replace the habitat which has been removed, light spillage will continue to impact on this woodland area in the long-term. This is likely to reduce the value of this woodland habitat for foraging bats. Light trespass onto the retained woodland habitats could potentially prevent Brown Long-eared Bat from foraging in this area during operation. Common bat species, which are more tolerant of light spillage i.e., Common and Soprano Pipistrelle and Leisler's Bat are likely to continue to forage with retained and newly planted habitats.

Newly planted areas along the northern side of the N25 will provide new foraging areas for bats within the Proposed Development site as these habitats mature. However, given the levels of disturbance, lighting and the smaller numbers of bats foraging to the north of the N25, this is likely to provide low value foraging habitat for bats. The provision of bat boxes will provide potential roosting sites for bats within the Proposed Development site.

The residual impacts on bats will be negative, slight to moderate and long term.

### 9.7.6 Other mammals

The habitats to be affected are common and there is no evidence to indicate that the Proposed Development areas are of particular value for these species in the context of the surrounding countryside. During the Construction Phase, disturbance and site clearance works are predicted to have a negative, slight and short-term impact on other mammal species.

Mammals are generally nocturnal in habit and in many circumstances can tolerate high levels of human presence and disturbance. Mammals which use this area are also habituated to comparable levels of disturbance and no significant disturbance impacts are predicted to occur during operation of the Proposed Development.

Newly landscaped areas within the Proposed Development site will provide alternative foraging and areas of cover for small mammals as the planting matures. Log piles will provide refuges for small mammals in newly landscape areas.

The residual impact on small mammals is predicted to be negative, not significant and long-term.

### 9.7.7 Breeding birds

In the short to medium term, the loss of common habitats associated with site clearance works and disturbance will have a slight, negative impact on breeding birds. However, as newly planted and enhanced habitats within the Proposed Development site mature, this impact will be reduced. Bird boxes will also provide nesting habitat for a range of common bird species.

The residual impact on birds is predicted to be negative, not significant and long-term at a local level.

### 9.7.8 Wintering birds

No significant residual impacts on wintering birds have been identified.

### 9.7.9 Reptiles and amphibians

Although unlikely, given the overgrown nature of the site and low biodiversity value of watercourse / drainage ditches, short-term disturbance of the drainage ditches and Kilcoolishal Stream at the site could potentially have a temporary, negative impact on amphibian species. As a precaution, mitigation measures have been specified to prevent direct impacts on amphibians.

Residual effects on amphibians are predicted to be neutral, imperceptible and long-term.

No residual effects on reptiles have been identified.

### 9.7.10 Other species

The Kilcoolishal Stream provides limited potential for fish, due to significant culverting and sluggish flows. Mitigation measures will ensure that the stream and drainage ditches at the site are reprofiled following construction. There will be no significant residual effects on this watercourse as a result of the Proposed Development.

Construction mitigation measures and operational design measures will ensure that the residual effect on fish and aquatic invertebrate species in receptors is neutral, imperceptible and long-term at a local level.

The loss of semi-nature habitats at the site will reduce habitats for terrestrial invertebrates in the short-term. However, the landscape plan, included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this

EIAR, which includes use of native trees and pollinator species, will provide new and enhanced habitats for invertebrate species.

The residual effect on terrestrial invertebrates is predicted to be neutral, imperceptible and long-term.

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# Chapter 10
# Noise and Vibration

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# 10. Noise and Vibration

## 10.1 Introduction

This chapter assesses the potential significant impacts on noise and vibration resulting from the construction, operation and decommissioning of the Proposed Development.

The assessment includes an assessment of construction noise and vibration emissions and considers the likely significant impacts on the noise and vibration environment as a result of the operation and decommissioning of the Proposed Development.

## 10.2 Methodology

### 10.2.1 Study area

The study area that has been considered for the noise and vibration assessment encompasses the Proposed Development and nearby sensitive receptors that may be affected during construction, operation and decommissioning of the Proposed Development.

The locations of the Proposed Development and nearby sensitive receptors are illustrated in **Image 10.1**.

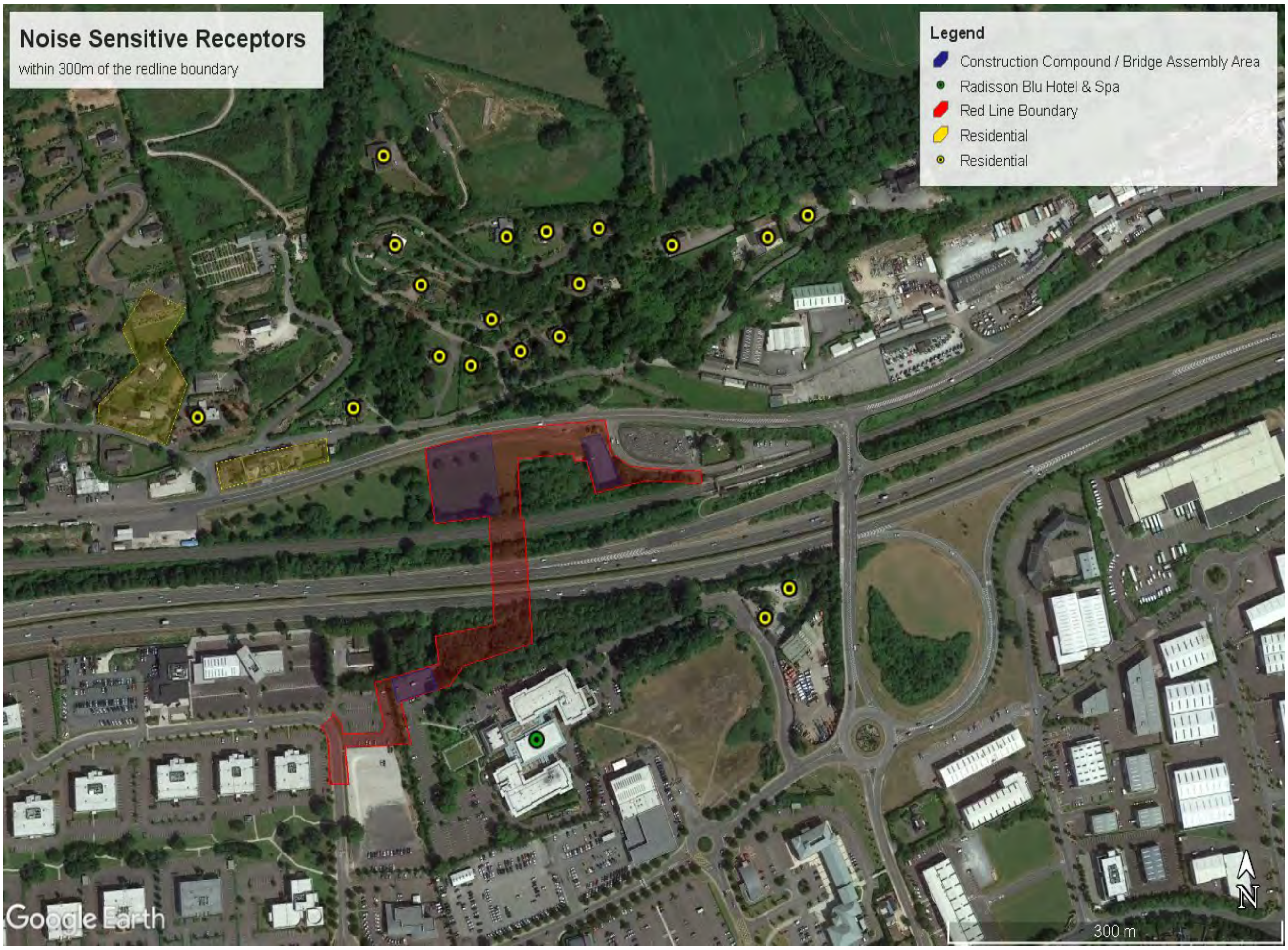


**Image 10.1: Sensitive receptors within 300m of the redline boundary. Source: Google Earth.**

### 10.2.2 Guidance and legislation

Guidance and legislation of relevance to this assessment are outlined below.

**The National Planning Framework 2040 (2018)**

The National Planning Framework (NPF) (GoI, 2018) is the Irish Government's high-level strategic plan for future growth and planning. This includes Policy Objective 65 which states the following with regards to noise:

*"Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans".*

**Environmental Protection Agency (EPA) Office of Environmental Enforcement (OEE) 'Guidance Note for Noise: Licence Applications, Survey and Assessments in Relation to Scheduled Activities' (NG4)**

The EPA *'Guidance Note for Noise: Licence Applications, Survey and Assessments in Relation to Scheduled Activities'* (EPA, 2016) provides guidance for licensed sites with the assessment of their potential and actual noise impact on the local environment and sets out recommended noise limit criteria at noise sensitive locations. While the onshore 220kV substation does not fall within the NG4 schedule of activities, the noise limit criteria have been considered as relevant upper thresholds for the EIAR operational noise assessment.

**Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment' (2014)**

IEMA's *'Guidelines for environmental noise impact assessment'* (IEMA, 2014) provides guidelines to address the key principles of noise impact assessment and are applicable to all development proposals where noise impacts are likely to occur.

**British Standard 5228:2009+A1:2014**

BS 5228-1 *'Code of practice for noise and vibration control on construction and open sites. Noise'* (BSI, 2014) provides a 'best practice' guide for noise control and includes Sound Power Level (Lw) data for individual plant as well as a calculation method for noise from construction activities. BS 5228-2 *'Code of practice for noise and vibration control on construction and open sites. Vibration'* (BSI, 2014) provides comparable 'best practice' for vibration control, including guidance on the human response to vibration.

**Transport Research Laboratory (TRL) Report 429 'Groundborne Vibration Caused by Mechanised Construction Works' (2000)**

TRL Report 429 *'Groundborne Vibration Caused by Mechanised Construction Works'* (TRL, 2000) provides methods for predicting the environmental impact of vibration caused by the operation of mechanised construction plant.

**Transport Infrastructure Ireland (TII) (previously National Roads Authority (NRA)) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (TII, 2004)**

The TII publication *'Guidelines for the Treatment of Noise and Vibration in National Road Schemes'* (TII, 2004) contains information on permissible construction noise and vibration levels for various hours of operation.

**Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes (TII, 2014)**

The TII publication *'Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes'* (TII, 2014) is based on the lessons learned from post EIA noise evaluations studies and research undertaken on the design of noise barriers. It provides advice and information for use by acousticians, and it is also relevant for traffic, motorway and pavement engineers. The advice supplements and should be read in conjunction with the original noise guidelines.

### 10.2.3 Assessment methodology

Information relating to the construction activities for the Proposed Development is provided in **Chapter 5**, *Construction Strategy*. This information informs the assessment of construction noise and vibration impacts. The assessment of construction impacts considers estimated noise levels at receptors and their sensitivity to noise (where relevant).

#### *10.2.3.1 Construction noise*

An assessment of the predicted construction noise is carried out based on the construction methodology and noise source levels in BS5228-1 (BSI, 2009). This is considered an appropriate method to assess construction noise prior to the appointment of a contractor and confirmation of work methods and plant / equipment to be used. The impact assessment methodology is discussed below.

There are no published statutory guidelines on noise levels from construction sites in Ireland. The construction noise assessment therefore makes reference to guidance from BS5228-1. Annex E of BS5228-1 provides example criteria for the assessment of construction noise impacts, with these presented in **Table 10.1**. These criteria have been used to assess the potential significant impacts from construction noise.

**Table 10.1: BS5228-1 Construction noise categories and thresholds based on measured noise levels**

| Assessment category and threshold value period | Threshold value, $L_{Aeq,\,T}$ dB | | |
|---|---|---|---|
| | Category A[A] | Category B[B] | Category C[C] |
| Day time (07:00 – 19:00 on weekdays, 07:00 – 13:00 on Saturdays) | 65 | 70 | 75 |
| Evening time (19:00 – 23:00 on weekdays, 13:00 – 23:00 on Saturdays, and 07:00 – 23:00 on Sundays) | 55 | 60 | 65 |
| Night-time (23:00 – 07:00 on all days) | 45 | 50 | 55 |

A. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dBA) are less than these values.

B. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dBA) are the same as Category A values.

C. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dBA) are higher than Category A values.

Based on the measured noise levels at nearby sensitive receptors, potential significant impacts were assessed against the threshold values presented in **Table 10.2**.

**Table 10.2: BS5228-1 threshold of potential significant impacts at noise sensitive receptors (BS5228-1+A1:2014)**

| Time period | Day and times | Threshold value ($L_{Aeq,\,T}$) dB |
|---|---|---|
| Day | Weekdays 07:00 – 19:00<br>Saturday 07:00 – 13:00 | 65 |
| Evening | Weekday 19:00 – 23:00<br>Saturday 13:00 – 23:00<br>Sunday 07:00 – 23:00 | 55 |
| Night | All days 23:00 – 07:00 | 45 |

Although significant impacts due to construction activities may be determined through an assessment based on exceedances of the defined thresholds for construction noise, additional consideration of significance for construction activities is undertaken through a qualitative discussion of the following:

- Duration of activities
- Frequency of events; and
- Sensitivity of receptors.

Where an exceedance of the construction noise criteria, as outlined in **Table 10.2**, is predicted, the impacts associated with the noise increase is rated in accordance with **Table 10.3**.

**Table 10.3: Likely impact associated with the exceedance of construction noise criteria**

| Extent of Noise Effect (Exceedance of Assessment Criteria) | Noise Impact Magnitude | Magnitude Rating |
|---|---|---|
| Less than 3 dBA | No significant change / imperceptible | Neutral to slight impact |
| Increase of 3 – 5 dBA | Slight increase | Slight to moderate impact |
| Increase of 6 – 10 dBA | Moderate increase | Moderate to major impact |
| Increase of more than 10 dBA | Substantial increase | Significant impact |

**Table 10.4** outlines the duration and frequency of effects, based on EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

**Table 10.4: Duration and frequency of impacts**

| Impact type | Duration |
|---|---|
| Momentary impact | Impacts lasting from seconds to minutes |
| Brief impact | Impacts lasting less than a day |
| Temporary impact | Impacts lasting less than a year |
| Short-term impact | Impacts lasting one to seven years |
| Medium-term impact | Impacts lasting seven to fifteen years |
| Long-term impact | Impacts lasting fifteen to sixty years |
| Permanent impact | Impacts lasting over sixty years |

#### *10.2.3.2 Construction vibration*

An assessment of the construction vibration is carried out based on information about the proposed construction methods.

BS5228-2 provides guidance on the impacts on humans from vibration. **Table 10.5** presents the PPV (peak particle velocity) vibration levels and provides a semantic scale for the description of construction vibration impacts on human receptors based on guidance in BS5228-2.

**Table 10.5: BS5228-2 threshold of potential significant impact at dwellings (BS5228-2:2009+A1:2014)**

| PPV Level | Description |
|---|---|
| 0.14 to < 0.3 mm/s | Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration. |
| 0.3 to < 1.0 mm/s | Vibration might be just perceptible in residential environments. |
| 1.0 to < 5.0 mm/s | It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents. |
| >= 5.0 mm/s | Vibration at this level is likely to be intolerable for any more than a very brief exposure. |

For residential receptors and other medium sensitivity receptors, a negative impact has been defined as a PPV of 0.3 mm/s or higher during the daytime. The onset of a significant negative impact has been defined as a PPV of 1.0 mm/s or higher in the daytime. It is likely that residential receptors are more sensitive to vibration at night and therefore significant negative impact is likely to occur at a PPV of 0.3 mm/s or higher during the night-time periods.

In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels are controlled to those specified for human annoyance (i.e., 1.0 mm/s) then it is highly unlikely that buildings will be damaged by construction vibration.

#### *10.2.3.3 Traffic volumes (Construction and Operation)*

The TII *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (TII, 2004) state increases in Annual Average Daily Traffic (AADT) flows of less than 25% during the Construction and Operational Phases are unlikely to result in significant noise and vibration effects.

No routes are expected to experience increases in daily traffic of greater than 25% – refer to **Chapter 7**, *Traffic and Transportation* for further details. Therefore, there is no requirement for a detailed assessment.

## 10.3 Baseline Environment

A baseline environmental noise survey was conducted nearby the Proposed Development to quantify the existing noise environment in the vicinity of the noise sensitive receptors that may be affected by the Proposed Development. The survey was carried out on a weekday and during time periods which were selected to provide a typical snapshot of the existing baseline noise environment.

A baseline survey of vibration along the Proposed Development was not undertaken as existing levels in the vicinity of the Proposed Development are not expected to be of a sufficient magnitude to cause disturbance to people or structural damage to property. Furthermore, vibration was not perceptible at any of the noise survey locations during the baseline environmental noise survey.

### 10.3.1 Survey periods

An attended baseline environmental noise survey was conducted at three locations on 25th July 2023 between 12:00 and 16:30hrs.

### 10.3.2 Measurement locations

The measurement location descriptions are noted in **Table 10.6** and illustrated in **Image 10.2**:. The monitoring microphone was attached to a tripod extending approximately 1.5m above ground level and positioned approximately 3.5m away from any reflective surface in accordance with the EPA Guidance, NG4 (EPA, 2016). Measurement locations at residential properties were positioned at property boundaries.

**Table 10.6: Baseline noise monitoring locations**

| Survey Location | Description |
|---|---|
| NML1 | Outside the residential properties on Factory Hill to the north of the Proposed Development |
| NML2 | Outside the Radisson Blu Hotel |
| NML3 | Outside the residential properties on Factory Hill to the west of the Proposed Development |

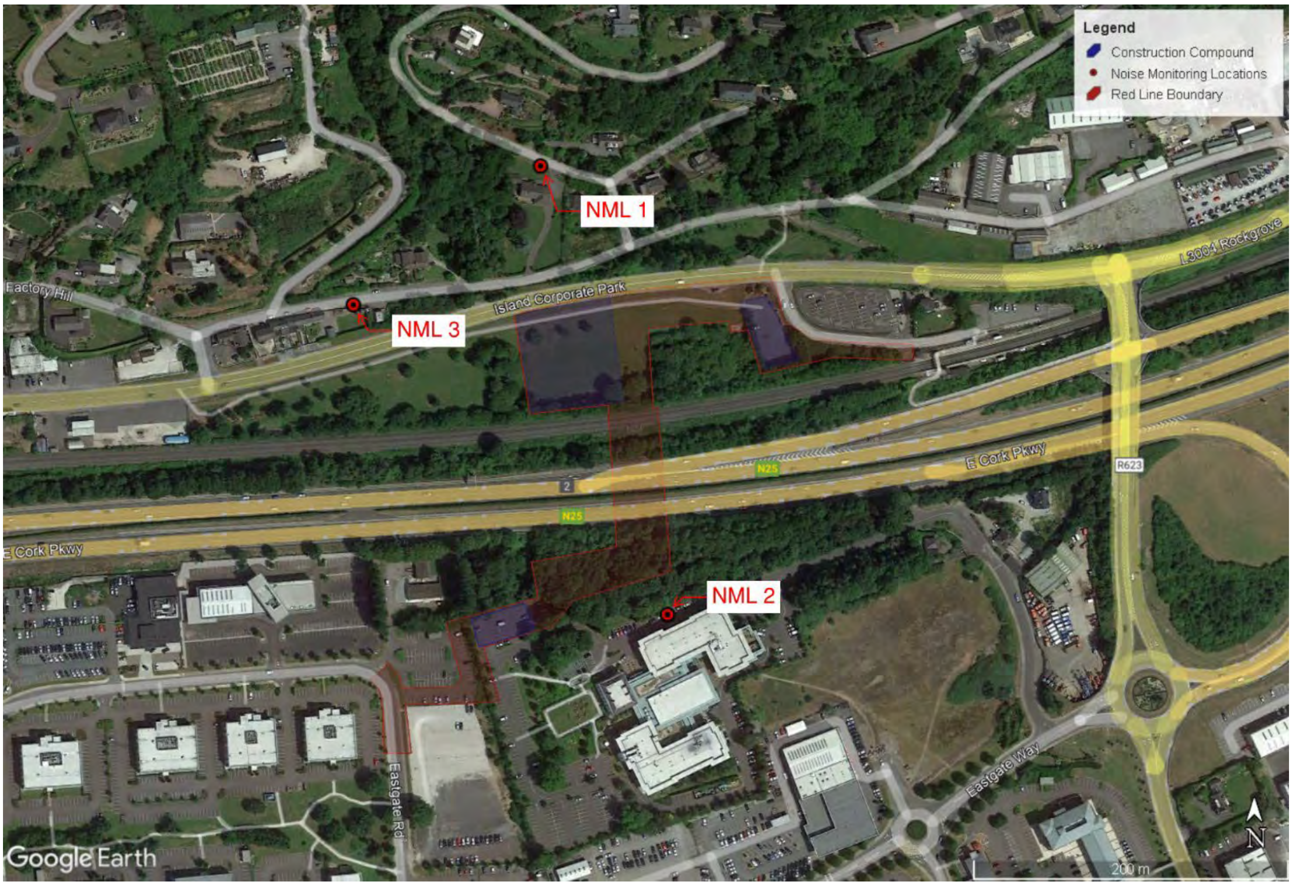


**Image 10.2: Baseline noise monitoring locations**

## 10.3.3 Instrumentation

Measurements were carried out using the equipment detailed in **Table 10.7**. The sound level meter and microphone are Type 1 conforming to BS EN 61672-1:2013 (BSI, 2013). A calibration check of the sound level meter and microphone was carried out before and after use, with no significant drift in meter response. The meter is calibrated in line with International Electrotechnical Commission (IEC) requirements and is traceable to international standards. A windshield was used to provide the microphone with effective wind protection to ensure that local meteorological conditions did not impact on the monitoring.

**Table 10.7: Instrumentation details**

| Manufacturer | Type Number | Serial Number | Description |
|---|---|---|---|
| Brüel & Kjær | 2250 | 2602664 | Sound level meter |
| Brüel & Kjær | 4189 | 2600946 | 1/2” polarised microphone |
| Brüel & Kjær | 4231 | 3011816 | Sound pressure level calibrator |

## 10.3.4 Procedure

Measurements were conducted at each location for a period of one hour. The results were noted onto an environmental noise survey record sheet immediately following each sample and were also saved to the instrument memory for later analysis, where required. Survey personnel noted the primary noise sources contributing to noise build-up.

## 10.3.5 Weather

The weather during the survey period was dry with a mild temperature of 18°C for the duration of the survey. Winds were light and ranged from 2 m/s – 4 m/s. Meteorological details are outlined in **Table 10.8**.

**Table 10.8: Meteorological data during the survey (Source: Met Eireann and onsite measurements)**

| Date | Period | Temp (℃) | Wind speed (m/s) | Rainfall (mm) | Cloud Cover Overhead (%) |
|---|---|---|---|---|---|
| 25/07/2023 | Day | 18 | NML1: 2 m/s NEE<br>NML2: 3m/s NNE<br>NML3: 4 m/s NNE | None | 60 |

### 10.3.6 Measurement parameters

The noise survey results are presented in terms of the following parameters;

- $L_{Aeq}$ is the equivalent continuous sound level. It can be considered as the 'average' and is used to describe a fluctuating noise in terms of a single noise level over the sample period. It is typically used as a descriptor for ambient noise;
- $L_{A10}$ is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise; and
- $L_{A90}$ is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2 x $10^{-5}$ Pa.

### 10.3.7 Results of the noise survey

**Table 10.9** presents the results of the attended measured noise levels for each of the three survey locations.

The results of the survey have indicated that baseline noise levels at all locations assessed are dominated by existing traffic flows along the N25 and L3004 Glounthaune Road.

At location NML1, the noise climate was dominated by road traffic movements on the N25. Other noise sources included traffic on the local road, bird song, wind in trees and a train horn noise. A JCB digger and tractor trailer passed directly by the sound level meter in this location and made a brief but loud noise. Ambient noise levels were measured at 62 dB $L_{Aeq}$. Background noise levels were measured to be 54 dB $L_{A90}$.

At location NML2, the noise climate was dominated by road traffic movements on the N25. Other noise sources included birdsong, wind in trees, cars entering and leaving the Radisson Blu Hotel car park, a train horn, a plane passing overhead, and low-level noise from the gym adjacent to the monitoring location. For the final 2 minutes of the measurement a lawnmower could be heard as Radisson Blu Hotel staff were attending the outdoor green areas. Ambient noise levels were measured at 65 dB $L_{Aeq}$. Background noise levels were measured to be 62 dB $L_{A90}$.

At location NML3, the noise climate was dominated by road traffic movements on the N25 and the traffic on L3004 Glounthaune Road. Other noise sources included traffic passing on the local Factory Hill Road, a train horn, somebody recycling glass, birdsong, wind in trees, and distant construction noise. The JCB digger and tractor trailer also passed while monitoring at this location. Although the noise level was high, it was short lived. Ambient noise levels were measured at 60 dB $L_{Aeq}$. Background noise levels were measured to be 55 dB $L_{A90}$.

**Table 10.9: Baseline noise monitoring results**

| Location | Start time and duration of the survey | $L_{Aeq}$ (dB) | $L_{A10}$ (dB) | $L_{A90}$ (dB) | $L_{Amax}$ (dB) | Notes |
|---|---|---|---|---|---|---|
| NML1 | 25/07/2023 12:00 (60 mins) | 62 | 58 | 54 | 89 | Free-field |

| Location | Start time and duration of the survey | $L_{Aeq}$ (dB) | $L_{A10}$ (dB) | $L_{A90}$ (dB) | $L_{Amax}$ (dB) | Notes |
|---|---|---|---|---|---|---|
| NML2 | 25/07/2023 13:40 (60 mins) | 65 | 67 | 62 | 78 | Free-field |
| NML3 | 25/07/2023 15:12 (60 mins) | 60 | 60 | 55 | 84 | Free-field |

### 10.3.8 Noise sensitive receptors

The guidance defines noise sensitive receptors as locations including residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e., locations where members of the public are likely to be regularly present. There are a number of noise sensitive receptors in proximity to the Proposed Development. The following are the properties present within 300m of the Proposed Development which are considered 'sensitive' in terms of noise:

- Radisson Blu Hotel & Spa, approximately 50m south of the Proposed Development; and
- Multiple residential properties to the north and northwest of the Proposed Development, with the closest located approximately 80m north of the Proposed Development.

Most properties surrounding the Proposed Development site are industrial developments. There are currently no hospitals, schools or places of worship within 300m of the Proposed Development.

Sensitive receptors in the wider area include Cork Golf Club, approximately 570m south of the Proposed Development, the Little Island National School, approximately 580m southwest of the Proposed Development, the Time of Wonder Montessori School, approximately 600m southeast of the Proposed Development, St. Lappan's Church, approximately 640m southwest of the Proposed Development and the Little Island Dental Surgery, approximately 670m southeast of the Proposed Development.

## 10.4 Potential Impacts

### 10.4.1 Do nothing scenario

In the scenario where the Proposed Development does not proceed as planned, none of the impacts set out in this chapter would occur. Under the 'do nothing' scenario, the existing baseline presented in Section 10.3 is likely to persist and no significant impacts would arise in the absence of other developments.

### 10.4.2 Construction Phase

#### *10.4.2.1 Noise*

The Construction Phase of the Proposed Development will be carried out in eight stages of construction – refer to **Chapter 5**, *Construction* for further details. There is potential for noise generation from various activities during construction, such as site clearance, excavation, piling and concrete works, the operation of plant and construction vehicles.

From a construction noise assessment perspective, three main overarching stages have been assessed which encompass all works during the Construction Phase, namely; site clearance and preparation, construction and deliveries. Some works, such as tree felling, may be carried out as advance works. Should this occur, these activities are not expected to exceed the predicted noise levels outlined in Section 0.

The noise associated with the construction works has the potential to impact on the neighbouring residential and commercial properties for the 18-month duration of the construction works. Potential impacts will be localised in nature.

Typical noise levels for construction plant are given in BS5228-1 (BSI, 2014). The assumed construction plant items for the stages detailed above are presented in **Table 10.10**.

**Table 10.10: Assumed construction plant for site clearance and preparation, construction and deliveries**

| Item of Plant | BS 5228-1 data reference | Sound power level (dB(A)) (from BS 5228-1) | % on-time (i.e., proportion of day operating) | No. of plant items |
|---|---|---|---|---|
| ***Site clearance and preparation*** | | | | |
| Tracked excavator | C 1-10 | 113 | 50 | 1 |
| Dump truck (empty) | C2-31 | 115 | 20 | 1 |
| Dozer | C2-36 | 109 | 50 | 1 |
| Dumper | C4-4 | 104 | 40 | 1 |
| Dumper | C4-6 | 107 | 40 | 1 |
| Mini excavator with hydraulic breaker | C5-2 | 111 | 10 | 1 |
| ***Construction*** | | | | |
| Vibratory piling rig | C3-8 | 116 | 20 | 1 |
| Cement mixer truck | C4-18 | 103 | 10 | 1 |
| Tracked mobile crane | C4-50 | 99 | 20 | 1 |
| Tower crane | C4-49 | 105 | 20 | 1 |
| Wheeled mobile telescopic crane | C4-38 | 106 | 20 | 1 |
| ***Deliveries*** | | | | |
| Articulated dump truck (tipping fill) | C2-32 | 102 | 20 | 1 |
| Lorry | C2-34 | 108 | 20 | 1 |

It is considered unlikely that night time piling works will be required. Nonetheless, a separate night time piling assessment has been undertaken to assess this potential worst-case scenario. **Table 10.11** outlines the equipment that would be used in the cases of rotary bored piling and continuous flight auger piling being undertaken. Should night time piling occur, trucks will also be required along with a generator for lighting. Should night time piling occur, it will be limited to localised areas surrounding the N25 and the Irish Rail track and will take place during a limited number of pre-planned time windows.

**Table 10.11: Assumed construction plant for night time piling**

| Item of Plant | BS 5228-1 data reference | Sound power level (dB(A)) (from BS 5228-1) | % on time | No. of plant items |
|---|---|---|---|---|
| Crane mounted auger | C.3:16 | 107.4 | 80 | 1 |
| Large rotary bored piling rig | C.3:14 | 111.6 | 80 | 1 |
| Diesel generator | C.4:86 | 93.5 | 100 | 1 |
| Articulated dump truck | C.4:2 | 105.8 | 90 | 1 |

#### 10.4.2.1.1 Predicted construction noise levels

Predicted construction noise levels are presented in **Table 10.12**. These predicted levels have assumed a worst-case scenario of all plant listed in **Table 10.10** operating simultaneously from 10 - 50% of the time.

**Table 10.12: Predicted unmitigated construction noise levels at noise sensitive receptors**

| Noise sensitive receptor | Distance from works to Proposed Development (m) | Predicted noise level for site clearance and preparation, $L_{Aeq}$ [dB] | Predicted noise level for site construction, $L_{Aeq}$ [dB] | Predicted noise level for deliveries, $L_{Aeq}$ [dB] |
|---|---|---|---|---|
| Radisson Blu Hotel | 50 | 72 | 68 | 60 |
| Residential properties to the north of the Proposed Development | 80 | 68 | 64 | 56 |
| Residential properties to the north and northwest of the Proposed Development | 300 | 56 | 52 | 45 |

It is noted that for the Radisson Blu hotel, which is located approximately 50m from the Proposed Development, an exceedance of the threshold noise level is predicted for daytime works. On this basis, in the absence of mitigation measures, this noise sensitive receptor may be subject to a moderate to major, negative, short-term impact during the Construction Phase.

For the residential properties to the north of the Proposed Development, which are located approximately 80m from the Proposed Development, in the absence of mitigation measures, they may be subject to negative, moderate to major, short-term impact during the construction phase.

For the residential properties to the north and northwest of the Proposed Development, located 300m or greater from the Proposed Development, in the absence of mitigation measures, they may be subject to a negative, slight to moderate, short-term impact during the Construction Phase.

The above impact ratings have been determined by comparing the predicted construction noise levels in **Table 10.12** with the existing ambient noise levels ($L_{Aeq}$) in **Table 10.9** and applying the impact ratings from **Table 10.3** and **Table 10.4**.

Predicted noise levels for the night time piling assessment are outlined in **Table 10.13**.

**Table 10.13: Predicted unmitigated night piling noise levels at sensitive receptors**

| Piling method | Sound pressure level at 50m (dBA) | Sound pressure level at 100m (dBA) | Sound pressure level at 200m (dBA) | Sound pressure level at 300m (dBA) |
|---|---|---|---|---|
| Crane mounted auger | 67 | 61 | 55 | 52 |
| Large rotary bored piling rig | 70 | 64 | 58 | 54 |

Note: Both methods include Diesel Generator and Articulated Dump Truck.

For the Radisson Blu hotel, which is located approximately 50m from the Proposed Development, an exceedance of the threshold noise level is predicted for night-time piling works. When the worst-case piling scenario is assessed, in the absence of mitigation measures, this noise sensitive receptor may be subject to a negative, significant, temporary impact if night-time piling is required.

For the residential properties to the north of the Proposed Development, which are located approximately 80m from the Proposed Development, when the worst-case piling scenario is assessed, in the absence of mitigation measures, they may be subject to a negative, significant, temporary impact if night-time piling is required.

For the residential properties to the north and northwest of the Proposed Development, located 300m or greater from the Proposed Development, when the worst-case piling scenario is assessed, in the absence of mitigation measures, they may be subject to a negative, moderate to major, temporary impact if night-time piling is required.

#### *10.4.2.2 Vibration*

There is the potential for nearby sensitive receptors to be impacted by vibration during the Construction Phase. A variety of items of plant and vehicles will be in use which may potentially result in vibration emissions, such as excavators, piling rigs, lifting equipment and dump trucks. There will be vehicular movements to and from the site that will make use of existing roads and site access points.

In the case of the Proposed Development, the plant that is most likely to result in vibration emissions is the piling equipment. Empirical data has been selected from BS-5228-2 (BSI, 2014) to identify whether there is potential for vibration emissions to impact on local receptors.

The sensitive receptor locations remain as defined in the construction noise assessment. It should be noted that the closest sensitive receptor to the piling works is estimated to be 50m from the Proposed Development. Continuous flight auger (CFA) piles or rotary bored piles at suitable depth and spacing will be specified in order to avoid the excessive noise and vibrations in close proximity to the surrounding sensitive receptors. The advantage of selecting CFA piles is they are virtually vibration free.

Foundations for all structures, except the embankments, are proposed to be bored reinforced concrete piles. Piling methods that are least likely to give rise to unacceptable vibrations such as CFA piles are proposed to be used as outlined in **Chapter 5**, *Construction Strategy*.

BS5228-2 (BSI, 2014) empirical vibration data is presented in **Table 10.14**. BS5228-2 notes that complaints are likely to occur where vibration levels are above 1.0 mm/s PPV at residential receptors.

**Table 10.14: BS5228-2 empirical vibration data**

| Piling Type | Distance (m) | Range of PPV (mm/s) |
|---|---|---|
| Rotary bored (BS 5228-2 D.6) | 10 | 0.3 – 3.2 |
| Continuous Flight Auger (BS 5228 D.6) | 20 | 0.1 - 0.3 |

As can be seen in **Table 10.14**, piling is not expected to emit vibrations that may cause damage or annoyance. Given the low level of predicted vibration, the potential impact at nearby sensitive receptors, in the absence of mitigation measures, will be not significant and short-term.

### 10.4.3 Operational Phase

The Operational Phase of the Proposed Development has the potential to generate a positive impact on noise and vibration due to a modal shift from private car to more sustainable modes, resulting in a possible decrease in traffic noise and vibration. No negative Operational Phase impacts are likely to occur.

### 10.4.4 Decommissioning Phase

As outlined in **Chapter 4**, *Description of the Proposed Development*, the design life of the Proposed Development is 120 years. During the potential future decommissioning works, it is proposed that the bridge will be removed in a reverse fashion to the proposed construction sequence.

The main bridge span and approach spans will be decommissioned by cutting the concrete decking and steel spans into a number of large sections. This will be done either in situ or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry.

Noise and vibration impacts will be generated by the decommissioning activities. The decommissioning activities will be similar to the proposed construction activities, albeit they will occur over a shorter duration. The primary noise and vibration causing activity will be the cutting and removal of large sections of the concrete decking and steel spans. The impacts will be no greater than those presented for the Construction Phase in Section 10.4.2

## 10.5 Mitigation and Monitoring

This section describes the measures that will be taken to minimise the potential for noise and vibration disturbance to the surrounding area during the construction and Operational Phases of the Proposed Development.

### 10.5.1 Construction Phase

The below good industry practice will be employed to minimise, control and manage potential noise and vibration impacts at nearby sensitive receptors during the Construction Phase.

Standard practice construction techniques and methods will be implemented to ensure construction noise and vibration levels remain within acceptable limits. The works shall be carried out in accordance with the requirements of BS 5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites (BSI, 2014).

These are documented within the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR. The following provisions, although not exhaustive, will be adhered to where practicable throughout the Construction Phase:

- Vehicles and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers, maintained in good and efficient working order and operated in such a manner as to minimise noise emissions. The contractor will ensure that all plant complies with the relevant statutory requirements;
- Machines in intermittent use will be idling or throttled down to a minimum when not in use;
- Compressors will be fitted with properly lined and sealed acoustic covers which will be kept closed whenever in use. Pneumatic percussive tools will be fitted with mufflers or silencers;
- Equipment which breaks concrete, brickwork, or masonry by bending, bursting, or “nibbling” will be used in preference to percussive tools. Where possible, the use of impact tools will be avoided where the site is close to occupied premises;
- Rotary drills and bursters activated by hydraulic, chemical, or electrical power will be used for excavating hard or extrusive material;
- Wherever possible, equipment powered by mains electricity will be used in preference to equipment powered by internal combustion engine or locally generated electricity;
- No part of the works nor any maintenance of plant will be carried out in such a manner as to cause unnecessary noise except in the case of an emergency when the work is absolutely necessary for the saving of life or property or the safety of the works;
- Plant will be maintained in good working order so that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum;
- Noise emitting machinery which is required to run continuously will be housed in a suitable acoustically lined enclosure; and
- During the Construction Phase, the appointed contractor will carry out noise and vibration monitoring at representative noise and vibration sensitive receptors to evaluate and inform the requirement and / or implementation of noise and vibration management issues. Noise monitoring will be conducted in accordance with ISO 1996-1 (ISO, 2016) and ISO 1996-2 (ISO, 2017). The selection of monitoring locations will be based on the nearest representative noise and vibration sensitive receptors to the working area.

It is recommended that an acoustic barrier be installed as mitigation for all working areas, which will reduce noise levels overall by 10 dB.

### 10.5.2 Operational Phase

As no negative Operational Phase impacts are expected to arise, no mitigation or monitoring measures are required.

### 10.5.3 Decommissioning Phase

The mitigation and monitoring measures as described above for the Construction Phase will be updated to reflect best practice at the time, and will be implemented for the Decommissioning Phase, as required.

## 10.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been proposed within the surrounding area that may give rise to cumulative impacts (refer to **Chapter 20**, *Cumulative and Interactive Impacts*).

The identified projects are:

- Three storey extension to the existing Radisson Blu Hotel & Spa, Little Island; and
- Construction of light industrial building, Euro Business Park, Little Island.

The construction of the light industrial building in Euro Business Park, Little Island is greater than 300m from the Proposed Development and can therefore be scoped out of this cumulative assessment.

The 30 no. bedroom extension to the Radisson Blu Hotel & Spa, Little Island has been granted conditional planning permission. Due to the proximity of this project to the Proposed Development, there is potential for cumulative noise and vibration impacts should its Construction Phase overlap with the Construction Phase of the Proposed Development.

In the event of any concurrent noisy construction activity being carried out on the site of the Proposed Development and the adjacent Radisson Blue Hotel & Spa site, the Project Supervisor Construction Stage (PSCS) will ensure that controls and mitigation measures are implemented as set out in Section 10.5.1 to ensure that no significant cumulative impacts will arise at nearby sensitive receptors.

No potential for cumulative impacts were identified during the Operational Phase.

## 10.7 Residual Impacts

### 10.7.1 Construction Phase

A summary of the residual impacts of construction noise for the worst-case construction stage considered (i.e., site clearance and preparation) is presented in **Table 10.15**.

It is assumed that an acoustic barrier will be installed as mitigation for all working areas which will reduce noise levels by approximately 10dB.

**Table 10.15: Summary of residual impacts from construction noise**

| Noise sensitive receptor | Existing noise level (dB) | Predicted noise level (pre-mitigation), $L_{Aeq}$ [dB] | Potential impact (pre-mitigation) | Predicted noise level (post mitigation), $L_{Aeq}$ [dB] | Predicted impact (post mitigation) |
|---|---|---|---|---|---|
| Radisson Blu Hotel (at 50m) | 65 | 72 | Moderate to major, negative impact. Short-term. | 62 | Neutral to slight impact. Short-term. |
| Residential properties to the north of the Proposed Development (at 80m) | 62 | 68 | Moderate to major, negative impact. Short-term. | 58 | Neutral to slight impact. Short-term. |
| Residential properties to the north and northwest of the Proposed Development (at 300m) | 55 | 56 | Neutral to slight, negative impact. Short-term. | 46 | Neutral to slight impact. Short-term. |

A neutral to slight, short-term residual impact is predicted at the Radisson Blu Hotel, the residential properties to the north of the Proposed Development and the residential properties to the northwest of the Proposed Development, once mitigation measures have been implemented.

Predicted noise levels in this report are worst case, with all construction plant operating simultaneously during the worst-case stage – i.e., site clearance and preparation. It is unlikely that the predicted noise level will occur over the full construction period.

**Table 10.16** outlines the residual impacts for the worst-case scenario if night time piling is required and if rotary bored piling is used as the chosen piling method. As no baseline night time noise survey was undertaken, the existing night time noise levels presented in **Table 10.16** were obtained from the EPA $L_{night}$ road noise maps (EPA, 2023).

**Table 10.16: Summary of residual impacts from night time piling works**

| Assessment topic / receptor | Existing noise level (dB) | Predicted noise level (pre-mitigation), $L_{Aeq}$ [dB] | Potential impact (pre-mitigation) | Predicted noise level (post mitigation), $L_{Aeq}$ [dB] | Predicted impact (post mitigation) |
|---|---|---|---|---|---|
| 50m | 55 | 70 | Significant negative impact. Temporary. | 60 | Slight to moderate impact. Temporary. |
| 100m | 50 | 64 | Significant negative impact. Temporary. | 54 | Slight to moderate impact. Temporary. |
| 200m | 50 | 58 | Moderate to major negative impact. Temporary. | 48 | Neutral to slight impact. Temporary. |
| 300m | 45 | 54 | Moderate to major negative impact. Temporary. | 44 | Neutral to slight impact. Temporary. |

A negative, slight to moderate, short-term residual impact is predicted at noise sensitive receptors located less than 100m from the Proposed Development, while a neutral to slight negative, short-term residual impact is predicted at noise sensitive receptors located 200m or greater from the Proposed Development, once mitigation measures have been implemented.

### 10.7.2 Operational Phase

The Operational Phase of the Proposed Development has the potential to generate a positive residual impact on noise and vibration due to a modal shift from private car to more sustainable modes, resulting in a possible decrease in traffic noise and vibration. No negative residual Operational Phase impacts are likely to occur.

### 10.7.3 Decommissioning Phase

No significant negative residual noise and vibration impacts are expected as a result of the decommissioning of the Proposed Development.

## 10.8 References


British Standard Institute (BSI) (1990). British Standard (BS) 7385: 1990: Evaluation and measurement for vibration in buildings. Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings.

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Transport Infrastructure Ireland (TII) (previously National Roads Authority (NRA)) (2014). Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1.

<u>Directives and Legislation</u>

S.I. No. 140/2006 – European Communities (Environmental Noise) Regulations 2006.

N25 Little Island Pedestrian and Cyclist Bridge
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# Chapter 11

# Air Quality

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# 11. Air Quality

## 11.1 Introduction

This chapter assesses the potential significant effects on air quality resulting from the construction, operation and decommissioning of the Proposed Development.

The air quality assessment includes a qualitative assessment of construction air emissions and considers the likely significant effects on the atmospheric environment as a result of the operation and decommissioning of the Proposed Development.

## 11.2 Assessment Methodology

Air quality assessments are concerned with the presence of airborne pollutants in the atmosphere. The likely significant effects of the Proposed Development on air quality have been assessed by considering the background concentration levels of pollutants in the atmosphere and the potential for construction, operational and decommissioning effects associated with the Proposed Development.

This assessment has been undertaken with regard to the Transport Infrastructure Ireland (TII) (2022) *Air Quality Assessment of Proposed National Roads – Standard* (hereafter referred to as the 'TII guidelines') and Institute of Air Quality Management (IAQM) (2014) *Guidance on the assessment of dust from demolition and construction* (hereafter referred to as the 'IAQM guidance'). These guidelines provide a methodology for the assessment, management and mitigation of air quality that can be adapted accordingly, depending on the nature of the works.

Predicted concentrations due to the construction and operation of the Proposed Development are compared to the relevant limit values to determine likely significant effects.

### 11.2.1 Guidance and Legislation

#### *11.2.1.1 Overview*

This chapter has been prepared in accordance with the following legislation and guidance:

- Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022);
- Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive');
- Directive 2008/50/EC on ambient air quality and cleaner air for Europe (the 'CAFÉ Directive');
- Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (the 'amended EIA Directive');
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018;
- Planning and Development Act 2000 – 2022;
- Planning and Development Regulations 2001 – 2022;
- Department of Housing, Planning and Local Government (DHPLG) (2018). *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;*
- Environmental Protection Agency (EPA) (2022a). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (the 'EPA guidelines');
- Institute of Air Quality Management (IAQM) (2014). *Guidance on the assessment of dust from demolition and construction (Version 1.1)* (the 'IAQM guidance');
- UK Highways Agency (UKHA) (2019) Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (hereafter referred to as LA 105 Air Quality Guidance); and

- TII (2022) *Air Quality Assessment of Proposed National Roads – Standards* (the 'TII guidelines').

### 11.2.1.2 Air Quality Standards

In order to reduce the risk to human health and the environment due to poor air quality, national and European statutory bodies have set limit values for a range of air pollutants in ambient air. These limit values or Air Quality Standards (AQS) are defined for the protection of human health and ecosystems.

The Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) transpose EU Directive 2008/50/EC on ambient air quality and cleaner air for Europe (the 'CAFE Directive') into Irish law. The purpose of the regulations is to establish limit values and alert thresholds for concentrations of certain pollutants, to provide for the assessment of certain pollutants using methods and criteria common to other European Member States, to ensure that adequate information on certain pollutant concentrations is obtained and made publicly available and to provide for the maintenance and improvement of ambient air quality, where necessary. The limit values established under the Directive relevant to this assessment are included in **Table 11.1**.

**Table 11.1: Limit values in the CAFE Directive**

| Pollutant | Limit value for the protection of: | Averaging period | Limit value ($\mu g/m^3$) | Basis of application of limit value |
|---|---|---|---|---|
| Particulates ($PM_{10}$) | Human Health | 24-hours | 50 | ≤ 35 exceedances p.a. (90%ile) |
| | | Calendar year | 40 | Annual mean |
| Particulates ($PM_{2.5}$) | Human Health | Calendar year | 25 | Annual mean |
| Nitrogen Dioxide ($NO_2$) | Human Health | 1-hour | 200 | ≤ 18 exceedances p.a. (99.7%ile) |
| | | Calendar year | 40 | Annual mean |
| Nitrogen Oxides ($NO_x$) | Vegetation | Calendar year | 30 | Annual mean |
| Carbon Monoxide (CO) | Human Health | 8-hours | 10,000 | Annual mean |
| Sulphur Dioxide ($SO_2$) | Human Health | 1-hour | 350 | ≤ 24 exceedances p.a. (99.7%ile) |
| | Human Health | 24-hour | 125 | ≤ 3 exceedances p.a. (99.2%ile) |
| | Vegetation | Calendar year | 20 | Annual mean |

There are no statutory limits for dust at a European or national level. However, TA Luft (TA Luft, 2002) provides a guideline for the rate of dust deposition of 350 $mg/m^2$/day averaged over one year. The EPA concurs (EPA, 2006) that this guideline may be applied, although the EPA typically applies the guideline limit as a 30-day average.

## 11.2.2 Traffic

The TII guidelines state that increases in annual average daily traffic (AADT) flows of 1,000 vehicles or 200 heavy duty vehicles (HDV) (greater than 3.5 tonnes) during the Construction and Operational Phases are unlikely to result in significant air quality effects. Likely significant effects on air quality are, therefore, assessed when the AADT flows are projected to increase above these thresholds.

As traffic volumes are not projected to increase by 1,000 vehicles or 200 HDVs during the Construction Phase or Operational Phase of the Proposed Development, traffic related air quality impacts have been scoped out of the assessment. Refer to **Chapter 7**, *Traffic and Transportation* for further information on construction and operational traffic associated with the Proposed Development.

## 11.2.3 Construction Phase

For the Construction Phase assessment, the focus is on air quality sensitive receptors adjacent to the proposed works that are susceptible to dust impacts. The greatest potential impact on air quality during the Construction Phase will be related to construction dust.

The construction effects have been assessed using the qualitative approach described in the IAQM guidance, which applies to the assessment of dust from construction and demolition activities. The IAQM guidance provides guidelines to air quality consultants and environmental health officers on how to assess air quality impacts from construction activities. It provides a method for classifying the significance of effects from construction activities based on the 'dust magnitude' (high, medium or low) and proximity of the site to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, appropriate mitigation measures are implemented. The guidance notes that once the appropriate mitigation measures are applied, in most cases the resulting dust impacts can be reduced to negligible levels.

In the context of this assessment, an 'impact' refers to a change in pollutants concentrations or dust deposition, while an 'effect' refers to the consequence of same. The main impacts that may arise during construction of the Proposed Development are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes;
- Elevated $PM_{10}$ concentrations as a result of dust generating activities on site; and
- An increase in $NO_2$ and $PM_{10}$ concentrations due to exhaust emissions from non-road mobile machinery (NRMM) and vehicles accessing the site.

The IAQM guidance considers the potential for dust emissions from dust-generating activities, such as demolition of existing structures, earthworks, construction of new structures and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the road network.

For each of these dust-generating activities, the guidance considers three separate effects: annoyance due to dust soiling; harm to ecological receptors; and the risk of health effects due to a significant increase in $PM_{10}$ exposure. The receptors can be human or ecological and are chosen based on their sensitivity to dust soiling and $PM_{10}$ exposure.

The methodology takes into account the scale to which the above effects are likely to be generated (classed as small, medium or large), along with the levels of background $PM_{10}$ concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into consideration when deriving the overall risk for the site. Suitable mitigation measures are also proposed to reduce the risk of the site. **Image 11.1** outlines the steps to be undertaken.

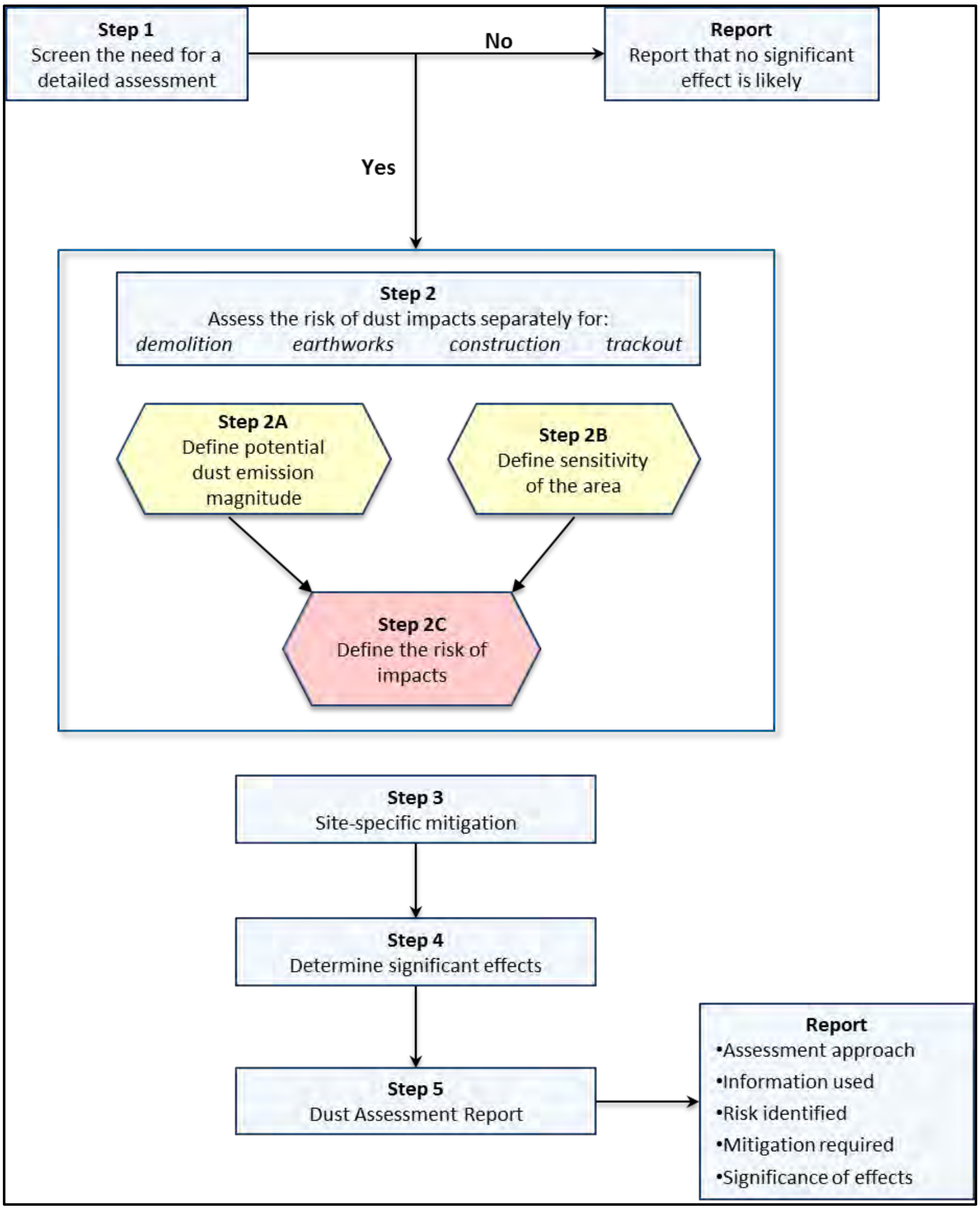


**Image 11.1: Steps to undertake a dust assessment**

### Step 1: Screen need for assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 350m of the site boundary, for ecological receptors within 50m of the site boundary and / or within 50m of the route(s) used by the construction vehicles on the public highway, and up to 500m from the site entrance(s). There are sensitive receptors within 350m of the site boundary and, therefore, an assessment of the air quality effects is required. There are no ecological sensitive areas in proximity to the Proposed Development (as per above thresholds). Therefore, the potential air quality effects on such receptors have been screened out of this assessment.

### Step 2: Assess the risk of dust impacts

This step is split into three sections as follows:

2A. Define the potential dust emission magnitude;

2B. Define the sensitivity of the area; and

2C. Define the risk of impacts.

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria shown in **Table 11.2**.

As no demolition work is associated with the Proposed Development, it has been excluded from the assessment.

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local $PM_{10}$ background concentrations and any other site-specific factors. **Table 11.3** and **Table 11.4** show the criteria for defining the sensitivity of the area to different dust effects.

The health effects of $PM_{10}$ on *high sensitivity receptors* includes residential areas, residential properties, schools and residential care homes in close proximity to the Proposed Development.

The overall risk of the impacts for each activity is then determined (step 2C) prior to the application of any mitigation measures and an overall risk for the site derived.

**Table 11.2: Categorisation of dust emission magnitude**

| Dust Emission Magnitude | | |
|---|---|---|
| **Small** | **Medium** | **Large** |
| **Earthworks** | | |
| • total site area <2,500m$^2$<br>• soil type with large grain size (e.g., sand)<br>• <5 heavy earth moving vehicles active at any one time<br>• formation of bunds <4m in height<br>• total material moved <10,000 tonnes<br>• earthworks during wetter months | • total site area 2,500m$^2$-10,000m$^2$<br>• moderately dusty soil type (e.g., silt)<br>• 5 – 10 heavy earth moving vehicles active at any one time<br>• formation of bunds 4-8m in height<br>• total material moved 20,000 - 100,000 tonnes | • total site area >10,000m$^2$<br>• potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size)<br>• >10 heavy earth moving vehicles active at any one time<br>• formation of bunds >8m in height<br>• total material moved >100,000 tonnes |
| **Construction** | | |
| • total building volume <25,000 m$^3$<br>• construction material with low potential for dust release (e.g., metal cladding or timber) | • total building volume 25,000 - 100,000m$^3$<br>• potentially dusty construction material (e.g., concrete)<br>• on-site concrete batching | • total building volume >100,000m$^3$<br>• on-site concrete batching<br>• sandblasting |
| **Trackout** | | |
| • <10 HDV (>3.5t) outward movements in any one day<br>• surface material with low potential for dust release<br>• unpaved road length <50m | • 10 – 50 HDV (>3.5t) outward movements in any one day<br>• moderately dusty surface material (e.g., high clay content)<br>• unpaved road length 50 – 100m; | • >50 HDV (>3.5t) outward movements in any one day<br>• potentially dusty surface material (e.g., high clay content)<br>• unpaved road length >100m |

**Table 11.3: Sensitivity of the area to human health impacts**

<table>
<tr><th rowspan="2">Background $PM_{10}$ concentrations (annual mean)</th><th rowspan="2">Number of receptors</th><th colspan="5">Distance from the source (m)</th></tr>
<tr><th><20</th><th><50</th><th><100</th><th><200</th><th><350</th></tr>
<tr><td colspan="7">High Receptor Sensitivity</td></tr>
<tr><td rowspan="3">> 32µg/m³</td><td>> 100</td><td rowspan="3">High</td><td rowspan="2">High</td><td>High</td><td>Medium</td><td rowspan="3">Low</td></tr>
<tr><td>10 – 100</td><td>Medium</td><td rowspan="2">Low</td></tr>
<tr><td>< 10</td><td>Medium</td><td>Low</td></tr>
<tr><td rowspan="3">28 – 32µg/m³</td><td>> 100</td><td rowspan="3">High</td><td>High</td><td>Medium</td><td rowspan="3">Low</td><td rowspan="3">Low</td></tr>
<tr><td>10 – 100</td><td rowspan="2">Medium</td><td rowspan="2">Low</td></tr>
<tr><td>< 10</td></tr>
<tr><td rowspan="3">24 – 28µg/m³</td><td>> 100</td><td rowspan="2">High</td><td rowspan="2">Medium</td><td rowspan="3">Low</td><td rowspan="3">Low</td><td rowspan="3">Low</td></tr>
<tr><td>10 – 100</td></tr>
<tr><td>< 10</td><td>Medium</td><td>Low</td></tr>
<tr><td rowspan="3">< 24µg/m³</td><td>> 100</td><td>Medium</td><td rowspan="3">Low</td><td rowspan="3">Low</td><td rowspan="3">Low</td><td rowspan="3">Low</td></tr>
<tr><td>10 – 100</td><td rowspan="2">Low</td></tr>
<tr><td>< 10</td></tr>
<tr><td colspan="7">Medium Receptor Sensitivity</td></tr>
<tr><td rowspan="2">–</td><td>> 10</td><td>High</td><td>Medium</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td></tr>
<tr><td>< 10</td><td>Medium</td><td>Low</td></tr>
<tr><td colspan="7">Low Receptor Sensitivity</td></tr>
<tr><td>–</td><td>> 1</td><td>Low</td><td>Low</td><td>Low</td><td>Low</td><td>Low</td></tr>
</table>

**Table 11.4: Sensitivity of the area to dust soiling effects on people and property**

<table>
<tr><th rowspan="2">Receptor Sensitivity</th><th rowspan="2">Number of receptors</th><th colspan="4">Distance from the source (m)</th></tr>
<tr><th><20</th><th><50</th><th><100</th><th><350</th></tr>
<tr><td rowspan="3">High</td><td>> 100</td><td>High</td><td>High</td><td>Medium</td><td>Low</td></tr>
<tr><td>10 – 100</td><td>High</td><td>Medium</td><td>Low</td><td>Low</td></tr>
<tr><td>< 10</td><td>Medium</td><td>Low</td><td>Low</td><td>Low</td></tr>
<tr><td>Medium</td><td>> 1</td><td>Medium</td><td>Low</td><td>Low</td><td>Low</td></tr>
<tr><td>Low</td><td>> 1</td><td>Low</td><td>Low</td><td>Low</td><td>Low</td></tr>
</table>

**Table 11.5: Risk of dust impacts**

| Sensitivity of Area | Dust Emissions magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| **Earthworks** | | | |
| High | High risk site | Medium risk site | Low risk site |
| Medium | Medium risk site | Medium risk site | Low risk site |
| Low | Low risk site | Low risk site | Negligible |
| **Construction** | | | |
| High | High risk site | Medium risk site | Low risk site |
| Medium | Medium risk site | Medium risk site | Low risk site |
| Low | Low risk site | Low risk site | Negligible |
| **Trackout** | | | |
| High | High risk site | Medium risk site | Low risk site |
| Medium | Medium risk site | Low risk site | Negligible |
| Low | Low risk site | Low risk site | Negligible |

### 11.2.4 Operational Phase

For the Operational Phase, an assessment of dust impacts from the maintenance of the Proposed Development has been scoped out on the basis that these activities have low potential for dust release and are likely to have a negligible impact on air quality sensitive receptors. As outlined in Section 11.2.2, in accordance with the TII guidelines, operational phase traffic related air quality impacts have also been scoped out of the assessment.

### 11.2.5 Decommissioning Phase

For the Decommissioning Phase, the decommissioning of the Proposed Development will have the potential to generate dust. However, impacts are not likely to be greater than Construction Phase impacts. As traffic volumes generated during the Decommissioning Phase are anticipated to be minimal, traffic related air quality impacts have been scoped out of the decommissioning assessment.

## 11.3 Baseline Environment

### 11.3.1 Overview

The Air Quality Standards (AQS) Regulations describe the air quality zoning adopted in Ireland as follows:

- Zone A (Dublin Conurbation);
- Zone B (Cork Conurbation);
- Zone C (16 Cities and Towns with population greater than 15,000); and
- Zone D (Rural Ireland: areas not in Zones A, B and C).

The Proposed Development is in Zone B.

The annual mean background levels of $NO_2$, $NO_x$, $PM_{10}$, $PM_{2.5}$ and Carbon Monoxide (CO) from EPA monitoring undertaken from 2019 to 2021, are presented in **Table 11.6**. Concentrations of each pollutant recorded in Zone B are averaged to represent typical background levels.

**Table 11.6: Annual mean background pollutant concentrations for Zone B**

| Years | Annual Average $NO_2$ (µg/m³) | Annual Average $NO_x$ (µg/m³ $NO_2$) | Annual Average $PM_{10}$ (µg/m³) | Annual Average $PM_{2.5}$ (µg/m³) | 8-hour average CO (µg/m³) |
|---|---|---|---|---|---|
| 2019 | 15.5 | - | 8.0 | 8.5 | 300 |
| 2020 | 11.0 | 22.6 | 13.3 | 7.0 | 600 |
| 2021 | 12.3 | 22.1 | 12.4 | 7.2 | 350 *Note 5* |
| **Average** | 12.5 | 18.8 | 12.8 | 8.2 | 433.3 |
| **Limit** | *40* | *30 Note 6* | *40* | *20 Note 7* | *10,000* |

*Note 5: Only one concentration was provided in the report tables which includes a 79% data capture. The average of Zone A sites (above the required 90% capture rate) was therefore used instead.*
*Note 6: Limit for the protection of human health.*
*Note 7: Limit for the protection of vegetation. As stated by the EPA this limit only applies to rural stations in Zone B*

Concentrations of each pollutant recorded in Zone B are averaged to represent typical background levels. Average concentrations were obtained from all Zone B stations where 90% data capture was achieved. This is in accordance with the air quality standards which specifies that any site used for assessment purposes must comply with 90% data capture. For pollutants where the 90% capture rule was not achieved at any Zone B sites, the average of Zone A was taken instead.

Air quality monitoring at Zone B has indicated that average background concentrations for $NO_2$, $NO_x$, $PM_{10}$, $PM_{2.5}$ and CO are all below the standard air quality limits outlined in **Table 11.6**.

### 11.3.2 National ambient air quality network

The EPA's National Ambient Air Quality Network[1] records air quality at several monitoring stations around the country, including at locations in the vicinity of the Proposed Development site. The closest station to the Proposed Development site is located in Cobh, Carrignafoy (Station 60). Air quality data from this monitoring station in 2023 has been summarised below.

This station is located approximately 7.5km to the southeast of the Proposed Development. This station measures $PM_{10}$ and $PM_{2.5}$. For the six-month period from January 2023 to July 2023, the average $PM_{10}$ and $PM_{2.5}$ levels were approximately 12.3µg/m³ and 7.4µg/m³, respectively. These are below the 40 µg/m³ $PM_{10}$ and $PM_{2.5}$ limit values.

### 11.3.3 Sensitive receptors

The guidance defines sensitive receptors as locations including residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e., locations where members of the public are likely to be regularly present. There are a number of sensitive receptors in proximity to the Proposed Development. The following are the properties present within 500m of the site boundary of the Proposed Development which are considered 'sensitive' in terms of air quality:

- Radisson Blu Hotel & Spa, approximately 50m south of the site boundary;
- Multiple residential properties to the north and northwest of the site boundary, with the closest located approximately 80m north of the site boundary;
- Little Island train station, approximately 100m southeast of the site boundary; and
- Shopping area with various commercial premises, approximately 250m southeast of the site boundary.

Most properties surrounding the Proposed Development site are industrial developments. There are currently no hospitals, schools or places of worship within 500m of the site boundary.

[1] www.airquality.ie

Sensitive receptors in the wider area include Cork Golf Club, approximately 570m south of the site boundary, the Little Island National School, approximately 580m southwest of the site boundary, the Time of Wonder Montessori School, approximately 600m southeast of the site boundary, St. Lappan's Church, approximately 640m southwest of the site boundary and the Little Island Dental Surgery, approximately 670m southeast of the site boundary.

As discussed above, potential impacts on ecological sensitive receptors have been screened out of this assessment, as there are no such sites situated on the site of the Proposed Development or in the immediate vicinity.

## 11.4 Potential Impacts

### 11.4.1 'Do-Nothing' Impact

The 'Do-Nothing' scenario considers the likely scenario that would arise, assuming the Proposed Development were not progressed, i.e., if nothing were done. In the 'Do-Nothing' scenario, the Proposed Development would not be constructed, and the air quality impacts described herein would not occur. The Do-Nothing' scenario would be consistent with the baseline conditions and trends in the receiving environment, as detailed above. The resultant air quality impact would be neutral.

### 11.4.2 Construction Phase

#### *11.4.2.1 Dust*

The primary air quality issues associated with the construction of the Proposed Development will be short-term dust. Dust emissions during the Construction Phase are likely to result from the following activities:

- Site clearance;
- Utility diversions;
- Bridge foundation construction;
- Site excavation;
- Piling;
- Stockpiling of materials;
- Handling of construction materials;
- Construction traffic movements; and
- Landscaping.

As per the IAQM guidance (IAQM, 2014), the following three types of overarching dust generating activities have been assessed to reflect the different potential impacts:

- Earthworks;
- Construction; and
- Trackout.

The fourth type, demolition, has been excluded as noted previously in Section 11.2.3 as no demolition work is associated with the Proposed Development.

***Dust Emission Magnitude***

Following the methodology outlined in Section 11.2.3 (refer to **Table 11.2**), each dust generating activity has been assigned a dust emission magnitude as shown in **Table 11.7**.

**Table 11.7: Dust emission magnitude for construction activities**

| Activity | Dust emission magnitude | Reasoning |
|---|---|---|
| Earthworks | Large | Total site area >10,000 $m^2$ |
| Construction | Small | Construction material with low potential for dust release |
| Trackout | Medium | Moderately dusty surface material (e.g., high clay content)<br>Unpaved road length 50 – 100 m |

### *Sensitivity of the Area*

The sensitivity of the area to human health has been assigned as 'low' as the background $PM_{10}$ concentration is less than the lower value of 24 $\mu g/m^3$ (refer to **Table 11.3**). The sensitivity of the area to dust soiling has been assigned as 'medium', due to the number of sensitive receptors within proximity of dust generating activities. The overall sensitivity has been summarised as shown in **Table 11.8**.

**Table 11.8: Sensitivity of the area**

| Potential Impact | Sensitivity |
|---|---|
| Human health | Low |
| Dust soiling | Medium |

### *Risk of Impacts*

Taking into consideration the dust emission magnitude and the sensitivity of the area, the risk of dust impacts in the absence of mitigation is presented in **Table 11.9**.

**Table 11.9: Risk of dust impacts**

| Potential Impact | Activity | | |
|---|---|---|---|
| | Earthworks | Construction | Trackout |
| Human health | Low | Negligible | Low |
| Dust soiling | Medium | Low | Low |

Overall, the site has been classified as low to medium risk for earthworks, a negligible to low risk for construction and a low risk for trackout (in the absence of mitigation).

There are a number of receptors located relatively close to the proposed works, as described in Section 11.3.3. Therefore, there is potential for air quality effects arising from dust during construction activities. The worst-case risk is assigned as Medium, as shown in **Table 11.9**, prior to the implementation of mitigation measures. In accordance with IAQM Guidance, the significance of effects is determined after the application of mitigation measures. Specific mitigation is described in Section 11.5.

### 11.4.3 Operational Phase

As discussed in Section 11.2.2, there will be no significant change in traffic volumes as a result of the Operational Phase and no significant operational air emissions sources. Therefore, no significant negative air quality effects are predicted during the Operational Phase. There is the potential for a positive impact on air quality during the operational phase due to the modal shift away from private car due to the provision of the proposed development.

### 11.4.4 Decommissioning Phase

As outlined in **Chapter 4**, *Description of the Proposed Development*, the design life of the proposed new pedestrian and cyclist bridge is 120 years. During the potential future decommissioning works, the main bridge span and approach spans will be decommissioned by cutting the concrete decking and steel spans into a number of large sections. This will be done either *in situ* or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry.

The decommissioning activities have the potential to generate dust, but the intensity and duration of the activities will be less than that associated with the Construction Phase. i.e., negligible temporary effects are predicted.

## 11.5 Mitigation and Monitoring

### 11.5.1 Mitigation

#### *11.5.1.1 Construction Phase*

The assessment of likely significant effects during construction (as noted in Section 11.4.2) includes for the implementation of 'standard mitigation', as stated in the TII guidance. The measures which are appropriate and practicable to the Proposed Development include:

- During very dry periods when dust generation is likely, construction areas will be sprayed with water;
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators and other plant equipment, will be controlled by the contractor through regular servicing of machinery;
- Vehicle speeds will be limited in the construction site;
- Wheel-wash facilities may be provided, if required. Wheel-wash facilities will have rumble grids to remove excess mud from wheels. These facilities will be located at the exit from the construction compounds and away from sensitive receptors, where possible; and
- Surrounding roads used by trucks to access to and egress from the site will be cleaned regularly using an approved mechanical road sweeper. Roads will be cleaned on a daily basis, or more regularly, as required.

In addition, the following measures will be implemented. These measures are based on best practice as outlined in the British Research Establishment (BRE) document *Controlling particles, vapour and noise pollution from construction sites* (BRE, 2003) and the Institute of Air Quality Management (IAQM) document *Guidance on the assessment of dust from demolition and construction* (IAQM, 2016):

- Areas where materials will be handled and stockpiled will be designed to minimise their exposure to wind – all temporary stockpiles shall be kept to the minimum practicable height with gentle slopes;
- Material drop heights from plant to plant or from plant to stockpile will be minimised; and
- Where practicable, truck loads will be covered when carrying material likely to generate dust.

A dust minimisation plan, forming part of the Construction Environmental Management Plan (CEMP) (refer to **Appendix 5.1** in **Volume 4** of this EIAR) will be prepared and implemented by the building contractor during the Construction Phase of the project.

The following measures shall also be implemented to minimise off-site dust impacts:

- Provision of hoarding around the site;
- Locating plant likely to generate emissions away from sensitive receptors; and
- Any stockpiled material will be covered / dampened during periods of dry weather to prevent the spreading of dust.

The above techniques will be adopted for all works will minimise the release of dust into the atmosphere.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected.

#### *11.5.1.2 Operational Phase*

As there are no significant negative effects on air quality predicted during the Operational Phase of the Proposed Development, no mitigation measures are proposed.

#### *11.5.1.3 Decommissioning Phase*

As there are no significant negative effects on air quality predicted during the Decommissioning Phase of the Proposed Development, no mitigation measures are proposed.

### 11.5.2 Monitoring

#### *11.5.2.1 Construction Phase*

The following monitoring measure will be implemented for the Construction Phase of the Proposed Development:

- The contractor will undertake on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to Cork County Council (CCC) on request. The frequency of the inspections will be increased during site activities which have a high potential to generate dust.

#### *11.5.2.2 Operational Phase*

As there are no significant air quality effects predicted during the Operational Phase, no monitoring measures are required.

#### *11.5.2.3 Decommissioning Phase*

As there are no significant air quality effects predicted during the Decommissioning Phase, no monitoring measures are required.

## 11.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

Taking the nearby projects together in combination with the Proposed Development, it is considered that there is a potential for short-term cumulative effects to air quality due to construction dust, should the Construction Phases overlap. However, given the implementation of the mitigation measures outlined in Section 11.5.1 and low volumes of construction traffic associated with the Proposed Development, no significant cumulative air quality effects are predicted during the Construction Phase.

Considering there are no significant operational emissions associated with the Proposed Development, there are no significant cumulative air quality effects predicted during the Operational Phase in combination with the projects listed in **Chapter 20,** *Cumulative and Interactive Impacts*.

Overall, there are no significant effects to air quality associated with the construction or operation of the Proposed Development in combination with the projects listed in **Chapter 20,** *Cumulative and Interactive Impacts.* Therefore, no significant cumulative construction or operation effects are predicted.

## 11.7 Residual Impacts

### 11.7.1 Construction Phase

With the implementation of the mitigation measures outlined in Section 11.5.1, no significant negative residual effects on air quality are envisaged during the Construction Phase.

### 11.7.2 Operational Phase

There are no significant negative residual air quality effects expected as a result of the operation of the Proposed Development.

### 11.7.3 Decommissioning Phase

There are no significant negative residual air quality effects expected as a result of the decommissioning of the Proposed Development.

## 11.8 References

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# Chapter 12

# Climate

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# 12. Climate

## 12.1 Introduction

This chapter assesses the potential significant effects on climate resulting from the construction, operation and decommissioning of the Proposed Development.

The chapter assesses the impact of potential emissions from the Proposed Development on air quality against Irish and EU standards. The potential effects of emissions of carbon due to the Proposed Development are assessed in the context of Ireland's national climate change obligations.

The potential effects on air quality due to the Proposed Development are considered separately in **Chapter 11**, *Air Quality*.

## 12.2 Assessment Methodology

This section presents details on relevant guidance and legislation, and the appraisal method for the assessment of impacts to climate from the Proposed Development.

### 12.2.1 Introduction

The assessment methodology has been derived with reference to the most appropriate guidance documents relating to climate which are set out in Section 12.2.2.

The potential effects of emissions of carbon due to the construction, operation and decommissioning of the Proposed Development have been considered in the context of Ireland's national climate change obligations. The climate assessment for the Construction Phase estimates the potential for GHG emissions, i.e., carbon dioxide equivalence ($CO_2e$), for the Proposed Development.

EU greenhouse gas emission reduction targets and reduction obligations for Ireland are split into two broad categories. The first category covers the large energy and power (i.e., energy intensive) industry which have their emissions controlled under the EU Emissions Trading Scheme (ETS). The second category deals with the non-Emissions Trading Scheme (non-ETS) sectors such as agriculture, transport, residential, commercial, waste and non-energy intensive industry.

As construction materials (primarily concrete and steel) are manufactured using energy intensive practices, the carbon impact has been assessed against the ETS category.

### 12.2.2 Relevant guidelines, policy and legislation

The assessment has been undertaken with reference to the most appropriate guidance documents relating to climate which are set out in the following sections.

The following climate guidance and standards have been consulted for the assessment from Transport Infrastructure Ireland (TII):

- Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document (TII, 2022a); and
- Climate Assessment of Proposed National Roads – Standard (TII, 2022b).

In addition to specific climate guidance documents, the following guidelines were considered and consulted in the preparation of this assessment:

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA, 2022a).

The assessment has made reference to national guidelines, where available, in addition to international standards and guidelines relating to the assessment of GHG emissions and associated climatic impacts from road schemes. These are summarised below:

- National Adaptation Framework (hereafter referred to as the NAF) (DCCAE, 2018a);
- Project 2040 National Planning Framework (DCCAE, 2018b)
- National Development Plan 2021-2030 (DCCAE, 2021a);
- Climate Action Plan 2019 (DCCAE, 2019);
- Climate Action Plan 2021 (DCCAE, 2021b);
- Climate Action Plan 2023 (DCCAE, 2023);
- Department of Transport, Tourism and Sport (DTTAS) Transport – Climate Change Sectoral Adaptation Plan (DTTAS, 2019);
- 2030 EU Climate Target Plan (European Commission, 2021);
- Institute of Environmental Management and Assessment (IEMA) Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition (IEMA, 2022a);
- IEMA EIA Guide to: Climate Change Resilience and Adaptation (IEMA 2020b);
- IEMA Greenhouse Gas Management Hierarchy (IEMA, 2020); and
- Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021);
- Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document (TII 2022); and
- Climate Assessment of Proposed National Roads – Standard (TII, 2022b).

#### *12.2.2.1 International policy*

The Paris Agreement (UNFCCC 2015), which came into force in 2016, aims to limit global temperature increases to no more than 2°C above pre-industrial levels, with efforts to limit this rise to 1.5°C. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs comprise the efforts and actions by each country to reduce national emissions and adapt to the impacts of climate change. Each of the EU Member States submit their own NDCs, which contribute to the overall EU NDC.

The European Green Deal, published by the European Commission in December 2019, provides an action plan which aims for the EU to be climate neutral by 2050. On 14 July 2021, the European Commission adopted a series of legislative proposals setting out how it intends to achieve climate neutrality in the EU by 2050, including the intermediate target of at least a 55% net reduction in greenhouse gas emissions by 2030. The package includes revisions to the legislation put forward as part of the Climate and Energy Framework 2021-2030, including the EU Emissions Trading System (ETS), Effort Sharing Regulation, transport and land use legislation.

The EU ETS was launched in 2005 as the world's first international company-level 'cap-and trade' system for reducing emissions of greenhouse gases cost-effectively. The EU ETS regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry.

The sectors of the economy covered by the current ETS must reduce emissions by 61% by 2030 compared to 2005 levels by increasing annual emissions reduction to 4.2% per annum. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture.

Under this new package of proposals, the Commission is now proposing to reduce emissions under the non-ETS sectors by at least 40%, compared to 2005 levels. The European Climate Law aims to write into law the goal set out in the European Green Deal – for Europe's economy and society to become climate-neutral by 2050.

The 2021 EU Strategy on Adaptation to Climate Change (European Commission, 2021a) sets out the pathway to prepare for the unavoidable impacts of climate change. The aim is that *"by 2050, when we aim to have reached climate neutrality, we will have reinforced adaptive capacity and minimised vulnerability to climate impacts…"* Adaptation refers to measures that can reduce the negative impact of climate change by, e.g., ensuring a project is resilient to future increases in storm frequency and rainfall levels.

#### *12.2.2.2 National policy*

Ireland's first statutory National Adaptation Framework (NAF) which was published in 2018 (DCCAE, 2018a), sets out the national strategy, for government and society, to reduce the vulnerability of the country to the negative effects of climate change.

The National Development Plan (NDP) 2021-2030 was adopted in 2021 (DCCAE, 2021a) and sets out funding to underpin key Government priorities and will enable a step-change in investment to ameliorate the effects of climate change. The NDP is to work in parallel with the National Planning Framework (Project 2040) (DCCAE, 2018b), which sets out the overarching long-term planning and investment strategy by the Government, to ensure that the investment strategy supports spatial planning.

In May 2019, the Government of Ireland declared a climate and biodiversity emergency. Following on from this, the Government of Ireland's first national Climate Action Plan (CAP) was published in 2019 (DCCAE, 2019). It commits to achieving a net zero carbon energy systems objective for Ireland. In October 2019, the Transport Climate Change Sectoral Adaption Plan was published. The Plan identifies the key vulnerabilities in the transport network and looks to promote greater resilience to safeguard its continued operation. The new Programme for Government Our Shared Future, agreed in June 2020, accelerated the decarbonisation agenda, committing to a 7% average yearly reduction in overall greenhouse gases over the next decade, and to achieving net zero emissions by 2050.

The CAP 2021 (DCCAE, 2021b) sets out a detailed sectoral roadmap to deliver a cumulative reduction in emissions, building on the commitments of the first Climate Action Plan (2019). The core measures for transport focus on accelerating the electrification of road transport, increasing the use of biofuels and a shift to low energy transport modes such as walking, cycling, active travel and public transport. There are measures focused on increasing the 'modal shift' to reduce the fossil fuelled distances taken by car by 10%.

The CAP 2023 (DCCAE, 2023) notes that industry must reduce its carbon emissions from a 2018 baseline of 7 $MtCO_2e$ to 4 $MtCO_2e$ er annum by 2030. Measures set out to achieve this are "decrease in demand for construction materials" and "specify low carbon construction methods and low carbon cement material as far as practicable" for directly procured or supported construction projects from 2023. To meet the level of emissions reduction required by 2025, CAP 23 also notes that government will:

- Actively deliver a series of measures to reduce embodied carbon in construction materials; promote the swapping to lower embodied carbon construction materials wherever possible; and reduce emissions from cement production aligned with the above KPIs;
- Promote alternative construction materials through robust carbon lifecycle assessment of construction projects. Switching from high global warming potential (GWP) materials to low GWP materials, as well as reducing the GWP of individual materials.

The Climate Action and Low Carbon Development (Amendment) Act, 2021 was enacted into national law in July 2021. The Act commits Ireland, in law, to move to a climate resilient and climate neutral economy by 2050 in alignment with the European Green Deal, and includes the following elements:

- Establishes 2050 emissions target;
- Introduces a system of successive 5-year, economy-wide carbon budgets. The first two carbon budgets covering the periods 2021-2025 and 2026-2030 were announced by the Climate Change Advisory Council in 2021 (with a provisional budget from 2031). Following the approval of the Carbon Budgets, Ireland's Sectoral Emissions Ceilings were agreed by Government on 28th July 2022.
- Strengthens the role of the Climate Change Advisory Council in proposing carbon budgets;

- Introduces a requirement to annually revise the Climate Action Plan and prepare a National Long Term Climate Action Strategy at least every decade;
- Introduces a requirement for all Local Authorities to prepare individual Climate Action Plans which will include both mitigation and adaptation measures.

The EU ETS is implemented in Ireland under the European Communities (Greenhouse Gas Emissions Trading) Regulations, SI 490 of 2012, and amendments and European Communities (Greenhouse Gas Emissions Trading) (Aviation) Regulations SI 261 of 2010 and amendments.

#### *12.2.2.3 Local policy*

Under the National Adaptation Frameworks (NAF), which was published in response to the provisions of the Climate Action and Low Carbon Development Act, 2015, all local authorities were tasked with producing a Climate Adaptation Strategy for their functional areas. In response, the Cork County Council (CCC) Climate Adaptation Strategy 2019-2024 was adopted in 2019 (CCC, 2019).

In order to prepare for the challenges of climate change and adapting to its effects, seven high level goals were identified:

- Local adaptation governance and business operations;
- Infrastructure and built environment;
- Land use and development;
- Drainage and flood management;
- Natural environment, built and cultural heritage;
- Community, health and wellbeing; and
- Other sectors and agencies.

The development of these high-level goals is supported by a number of objectives and actions that form that basis of the strategy. The strategy ensures that climate adaptation considerations are mainstreamed into all plans and policies and integrated into all operations and functions of CCC.

### 12.2.3 Categorisation of the baseline environment

A desk-based study of the baseline environment of the Proposed Development area was undertaken in order to inform this assessment and included the following sources:

- Government of Ireland carbon budgets and sectoral emission targets.
- Ireland's Greenhouse Gas Emissions Projections 2021-2040 (EPA, 2022b);
- CCC;
- Department of the Environment, Climate and Communications;
- Met Eireann;
- Environmental Protection Agency (EPA); and
- Sustainable Energy Authority Ireland (SEAI).

### 12.2.4 Impact assessment methodology

#### *12.2.4.1 Construction Phase*

The Proposed Development is anticipated to be constructed in one Construction Phase which will include a number of stages. The likely stages of construction are as follows:

- Stage 1 – Site clearance, access and construction compounds;

- Stage 2 – Utility diversion;
- Stage 3 – Bridge fabrication;
- Stage 4 – Foundation construction;
- Stage 5 – Bridge transportation;
- Stage 6 – Bridge assembly;
- Stage 7 – Bridge erection; and
- Stage 8 – Completion of works.

Refer to **Chapter 5**, *Construction Strategy* for further details on the above stages.

The specifics of the durations and sequence of works will be further informed by the appointed contractor during the tender period in due course. Construction is expected to commence in early 2025, with a duration of approximately 18 months. The development is expected to become operational in 2026.

The assessment of carbon emissions was carried out to determine the likely greenhouse gas emissions ($CO_2e$) predicted due to the Construction Phase of the Proposed Development, relative to Ireland's decarbonisation targets and projections. The construction materials are manufactured using carbon intensive practices, which results in embodied carbon associated with the materials. The assessment considers the material manufacture, the transport of construction materials to site, the construction processes and the construction compound.

The TII Carbon Assessment Tool (hereafter referred to as the TII Carbon Tool) (TII, 2022c) has been used to calculate the embodied carbon of materials in terms of carbon dioxide equivalency ($CO_2e$). The TII Carbon Tool uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (SEAI, 2019), Guidelines for the calculation of land carbon stocks (European Commission, 2010), and Greenhouse Gas Reporting Conversion Factors (UK Government, 2021). The tool has a wide range of applications covering the embodied carbon of infrastructure projects, such as raw material extraction and construction activities.

The University of Bath's (via Circular Ecology) carbon calculator (Version 1.1 November 2019) has been used to calculate the embodied carbon of cement and concrete mixtures in terms of carbon dioxide equivalency ($CO_2e$). The calculator uses data from the Inventory of Carbon and Energy (ICE) Database – Embodied Carbon Model of Cement, Mortar and Concrete (Hammond and Jones, 2011).

For a small number of materials not covered by the TII Carbon Tool and the University of Bath's (via Circular Ecology) carbon calculator, the National Highways England tool version 2.5 is used.

The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the Construction Phase. The varying, relevant transport distances have been included in the calculations for the transportation of materials to site.

The assessment includes the pre-construction (site clearance) stage, the assessment of the embodied carbon associated with all materials used in the construction of the Proposed Development, the emissions during the Construction Phase and additionally, emissions related to waste generated during the Construction Phase.

The Construction Phase of the Proposed Development will result in GHG emissions from various sources. The Construction Phase embodied GHG emissions are considered at all construction stages including the following:

- Land clearance activities (including the removal of trees / vegetation);
- Manufacture of materials and transport to site;
- Construction works (including excavations, construction, water usage, personnel travel and project size); and
- Construction waste products (including transport off site).

Detailed information for the Proposed Development including volumes of materials were obtained from the design team for the Proposed Development.

In accordance with TII Climate guidance, the Climate Practitioner must assess:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

To assess its impact on meeting decarbonisation targets, the results of this assessment have been compared with the Ireland's EPA projected GHG emissions for the 'worst case' construction year (with additional measures), with particular relevance to the ETS sector. The Irish carbon budget for the period 2026-2030 is used to assess the extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050.

It should be noted that Ireland's carbon budgets are based on the emissions directly produced in Ireland. It does not include emissions produced outside of Ireland but arising as a result of activities undertaken within Ireland. At early project stages, the origin of materials may not be known. It is therefore assumed the emissions arising from materials assessed may all potentially contribute to Ireland's carbon budget, as a worst case.

The significance matrix as stated in the TII Climate guidance (TII, 2022a) is shown in **Table 12.1.**

**Table 12.1: Significance criteria – Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) (TII, 2022a)**

| Effects | Significance level | Description |
|---|---|---|
| Significant adverse | Major adverse | • The project's GHG impacts are not mitigated.<br>• The project has not complied with do-minimum standards set through regulation, nor provide reductions required by local or national policies; and<br>• No meaningful absolute contribution to Ireland's trajectory towards net zero. |
| | Moderate adverse | • The project's GHG impacts are partially mitigated;<br>• The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and<br>• Falls short of full contribution to Ireland's trajectory towards net-zero. |
| Not significant | Minor adverse | • The project's GHG impacts are mitigated through 'good practice' measures;<br>• The project has complied with existing and emerging policy requirements; and<br>• Fully in line to achieve Ireland's trajectory towards net zero. |
| | Negligible | • The project's GHG impacts are mitigated beyond design standards;<br>• The project has gone well beyond existing and emerging policy requirements; and<br>• Well 'ahead of the curve' for Ireland's trajectory towards net zero. |
| Beneficial | Beneficial | • The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration;<br>• The project has gone well beyond existing and emerging policy requirements; and<br>• Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact. |

### *12.2.4.2 Operational Phase*

There will be occasional maintenance works required during the Operational Phase of the Proposed Development. However, the intensity and duration of the maintenance works will be significantly less than the construction works, generating significantly lower carbon. Therefore, this aspect of the Operational Phase has been scoped out of further assessment.

The Operational Phase has the potential to have a beneficial impact on climate and carbon due to a modal shift away from private car to more sustainable modes of transport. The significance criteria outlined in **Table 12.1** have also been applied to the Operational Phase.

#### *12.2.4.3 Decommissioning Phase*

As outlined in **Chapter 4**, *Description of the Proposed Development*, the design life of the proposed new pedestrian and cyclist bridge is 120 years. During the potential future decommissioning works, the main bridge span and approach spans will be decommissioned by cutting the concrete decking and steel spans into a number of large sections. This will be done either *in situ* or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry.

The intensity and duration of decommissioning activities will be less than that associated with the Construction Phase and will generate significantly lower carbon than the construction activities. Therefore, the Decommissioning Phase has been scoped out for further assessment.

#### *12.2.4.4 Vulnerability to climate change*

The vulnerability assessment identifies the impact of a changing climate on a project and receiving environment. The assessment considers a project's vulnerability to climate change and identifies adaptation measures to accommodate climate change impacts. The vulnerability assessment combines the outcomes of the analysis of sensitivity and exposure and aims to identify potential significant climate hazards to the project.

The aim of the sensitivity analysis is to identify which climate hazards are relevant to the specific type of project, irrespective of its location (European Commission, 2021a). The analysis considers the project in a comprehensive manner, looking at the sensitivity of individual components making up the asset (e.g., bridge structure, pavement, drainage etc.,) to relevant climate hazards (flooding, extreme weather events etc.). A sensitivity score is given to each asset category against each climate hazard. **Table 12.2** shows the following definitions and scoring used when assessing sensitivity.

**Table 12.2: Sensitivity criteria - Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) (TII, 2022a)**

| Sensitivity level | Definition | Score |
|---|---|---|
| High sensitivity | The climate hazard will or is likely to have a major impact on the asset category. | 3 |
| Medium sensitivity | It is possible or likely the climate hazard will have a moderate impact on the asset category. | 2 |
| Low sensitivity | It is possible the climate hazard will have a low or negligible impact on the asset category | 1 |

Different geographical locations are exposed to different climate hazards. The aim of the exposure analysis is to identify which climate hazards are relevant to the planned project location, e.g., flooding could represent a significant hazard for a project located next to a river in a floodplain. Therefore, while sensitivity analysis focuses on the type of project, exposure focuses on location.

**Table 12.3** shows the following definitions and scoring used when assessing exposure.

**Table 12.3: Exposure criteria - Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) (TII, 2022a)**

| Sensitivity level | Definition | Score |
|---|---|---|
| High exposure | It is almost certain or likely this climate hazard will occur at the project location i.e., might arise once to several times per year | 3 |
| Medium exposure | It is possible this climate hazard will occur at the project location i.e., might arise a number of times in a decade. | 2 |
| Low exposure | It is unlikely or rare this climate hazard will occur at the project location i.e., might arise a number of times in a generation or in a lifetime. | 1 |

The vulnerability assessment combines the outcomes of the sensitivity and exposure analysis with the aim to identify the key vulnerabilities and the potentially significant climate hazards associated with the project to reveal the most relevant hazards. This is intended to form the basis of the detailed climate change risk assessment if deemed necessary.

Vulnerability is simply calculated as the product of sensitivity and exposure (i.e., vulnerability = sensitivity x exposure). **Table 12.4** shows the vulnerability matrix.

**Table 12.4: Vulnerability matrix - Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) (TII, 2022a)**

| | | Exposure | | |
|---|---|---|---|---|
| | | **Low (1)** | **Medium (2)** | **High (3)** |
| **Sensitivity** | **Low (1)** | 1 | 2 | 3 |
| | **Medium (2)** | 2 | 4 | 6 |
| | **High (3)** | 3 | 6 | 9 |

With regards to the next stage of the climate assessment, TII Climate Guidance (TII 2022) notes that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed.

## 12.3 Baseline Environment

### 12.3.1 Local Climate

CCC's Climate Adaptation Strategy 2019-2024 was adopted in 2019 (CCC, 2019) and includes a risk register of potential climate events for Cork County, which includes increased risks of:

- Fluvial flooding;
- Heat waves;
- Coastal flooding;
- Pluvial flooding;
- Windstorms;
- Groundwater flooding;
- Coastal erosion; and
- Freezing conditions.

The EPA Irish Climate Futures: Data for Decision Making report (EPA, 2019) states that it is expected that weather extremes will become more likely and more frequent with future climate change.

The EPA The Status of Ireland's Climate 2020 report (EPA, 2021) includes a number of recent climate observations for Ireland. The report states that the annual average surface air temperature in Ireland has increased by approximately 0.9°C over the last 120 years, with a rise in temperatures being observed in all seasons. This compares with a global average temperature estimated to be 1.1°C above pre-industrial levels. The report indicates that the sea level around Ireland has risen by approximately 2–3 mm per year since the early 1990s. In addition, annual precipitation was 6% higher in the period 1989 to 2018, compared to the 30-year period 1961 to 1990.

The EPA's Climate Change Research Programme carries out relevant and up to date studies on climate change in Ireland (available at www.epa.ie). Analysis of the meteorological records shows that Ireland's climate is changing in line with global patterns.

According to the EPA (www.epa.ie) climate change is expected to lead to the following adverse effects:

- Sea level rise;

- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality;
- Changes in distribution of plant and animal species; and
- Effects on fisheries sensitive to changes in temperature.

Little Island, County Cork has a temperate maritime climate with mild winters and cool summers. The region experiences a relatively high amount of precipitation, particularly during the winter months. The recent weather patterns and extreme weather events recorded by Met Éireann have been reviewed. Recent weather patterns recorded in the area indicate an increase in the frequency and severity of storms, heavy rainfall, and flooding events.

### 12.3.2 Climate pollutants

Climate is defined as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in recent years human activities, through the release of GHGs, have impacted on the climate (IPCC, 2021).

The release of anthropogenic GHGs is altering the Earth's atmosphere resulting in a 'Greenhouse Effect'. This effect is causing an increase in the atmosphere's heat trapping abilities resulting in increased average global temperatures over the past number of decades. The release of $CO_2$ as a result of burning fossil fuels, has been one of the leading factors in the creation of this 'Greenhouse Effect'. The most significant GHGs are $CO_2$, methane ($CH_4$) and nitrous oxide ($N_2O$).

GHGs have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The IPCC AR6 Synthesis Report: Climate Change 2021 sets out the global warming potential for a 100-year time period (GWP100) for $CO_2$ as the basic unit (GWP = 1) whereas $CH_4$ has a global warming potential equivalent to 29.8 units of $CO_2$ (for fossil sources) and $N_2O$ has a GWP100 of 273. These values have been refined since the AR5 report.

Carbon dioxide is considered the primary greenhouse gas due to its abundance in the atmosphere and its long atmospheric lifetime. $CO_2e$, or carbon dioxide equivalency, is a metric used in carbon assessments to express the total GWPs of the different greenhouse gases in terms of the amount of $CO_2$ that would have the same impact over a given period. This allows for easier comparison and quantification of the total greenhouse gas impact of different sources.

### 12.3.3 Baseline emissions

Given the circumstances of Ireland's declaration of a climate and biodiversity emergency in May 2019, and the November 2019 European Parliament approval of a resolution declaring a climate and environment emergency in Europe, in conjunction with Ireland's current failure to meet its EU binding targets under the EU Effort Sharing Regulation, changes in GHG emissions either beneficially or adversely are of more significance than previously viewed prior to these declarations. Thus, the baseline climatic environment should be considered a highly sensitive environment for the assessment of impacts.

In June 2022, the EPA released the report Ireland's Greenhouse Gas Emissions Projections 2021-2040 (EPA, 2022b), which includes total projected emissions and a breakdown of projected emissions per sector under the "With Existing Measures" and "With Additional Measures" scenarios.

Implementation of "Additional Measures" (including those in the 2021 Climate Action Plan) is projected to deliver 28% emission reduction by 2030 compared to the 2018 level, while the implementation of "With Existing Measures" can deliver 9% emission reduction over the same period. This represents a reduction of 3% per annum in emissions over the period with the implementation of the "Additional Measures". The latest greenhouse gas emissions projections show total emissions decreasing from the latest inventory (2020) levels by 10.5% by 2030 under the “With Existing Measures” scenario and by 28% under the “With Additional Measures” scenario.

**Table 12.5** presents the EPA With Existing Measures and Additional Measures scenarios for 2025 and 2030 for the emissions for the ETS sector.

**Table 12.5: Projected emissions for the ETS sector and total emissions (EPA, 2022b)**

| Projections | Year | ETS Sector ($Mt\ CO_2e$.) | National Total ($Mt\ CO_2e$) |
|---|---|---|---|
| **With existing measures** | 2025 | 13.25 | 59.46 |
| | 2030 | 9.61 | 52.55 |
| **With additional measures** | 2025 | 13.06 | 55.31 |
| | 2030 | 8.71 | 42.26 |

Following the approval of the Ireland’s carbon budgets from CAP 21, Ireland’s sectoral emissions ceilings were agreed by Government on 28th July 2022. The total emissions allowed under each budget is set out below, as well as the average annual reduction for each 5-year period, which sets out Ireland’s trajectory towards net zero emissions by 2050:

- 2021-2025: 295 Mt CO2 eq1. This represents an average reduction in emissions of 4.8% per annum for the first budget period;
- 2026-2030: 200 Mt CO2 eq. The represents an average reduction in emissions of 8.3% per annum for the second budget period; and
- 2031-2035: 151 Mt CO2 eq. The represents an average reduction in emissions of 3.5% per annum for the third provisional budget.

There is likely to be a beneficial impact on climate during the Operational Phase due to the potential shift away from private car. Therefore, only the impact of the Construction Phase of the Proposed Development is considered. Potential impacts are compared with reference to the ETS sector.

## 12.4 Potential Impacts

### 12.4.1 Construction Phase

The carbon footprint of the Proposed Development during the Construction Phase is estimated based on an assessment of worst-case carbon equivalents, as outlined in **Table 12.6**. The material volumes comprise estimates provided by the design team for the Proposed Development. The carbon assessment assumes no improvement in the carbon intensity of the production of cement and steel over time. The assessment excludes maintenance, repairs, decommissioning, electrical and mechanical equipment and water use.

The estimated carbon footprint of the Proposed Development during the Construction Phase is **1,390 tonnes $CO_2e$**, as outlined in **Table 12.6**.

The embodied carbon is calculated on the basis that all emissions occur over approximately one year, as a worst-case scenario. The predicted results are compared to the EPA’s projected ETS Sector $CO_2e$ emissions in 2030 assuming additional measures (assumed as a worst-case construction year). Refer to **Table 12.7**.

**Table 12.6: Estimated carbon footprint of the Proposed Development**

| Element | Embodied carbon contribution tonnes $CO_2e$ / tonne | Quantity of material (tonnes) | Comment / assumptions | Tonnes $CO_2e$ | Sources (Circular Ecology (CE) / National Highways / TII) |
|---|---|---|---|---|---|
| Concrete | 0.11 | 3,000 | Assumed Density 2.4t/m3. Concrete- Average - 0.11t$CO_2e$/tonne. | 342.5 | TII |

| Element | Embodied carbon contribution tonnes $CO_2e$ / tonne | Quantity of material (tonnes) | Comment / assumptions | Tonnes $CO_2e$ | Sources (Circular Ecology (CE) / National Highways / TII) |
|---|---|---|---|---|---|
| | | | Assumed 50km additional transport (TII assumption). HGV - Rigid Average - 0.998 kg$CO_2$e/km (TII). **12.5 t$CO_2$e** for transport. | | |
| Clause 804 hardcore | 0.00438 | 32,400 | Assumed carbon factor of 0.00438t$CO_2$e/tonne - Virgin Land Won resources (CE). Assumed 50km transport (TII assumption). HGV - Rigid Average - 0.998 kg$CO_2$e/km (TII). **124.5 t$CO_2$e** for transport. | 266.4 | TII/CE |
| Reinforcing steel | 0.604 | 187 | Assumed Plain round steel bar reinforcement- Average carbon factor 0.604t$CO_2$/tonne (TII). Assumed 50km additional transport (TII assumption). HGV - Articulated Average - 1.13 kg$CO_2$e/km (TII). **0.8 t$CO_2$e** for transport. | 113.8 | TII |
| Structural steelwork | 1.55 | 88 | Steel Section (CE) - 1.55t$CO_2$e/tonne. 8t/m3 density steel (National highways). Assumed 50km additional transport (TII assumption). HGV - Articulated Average - 1.13 kg$CO_2$e/km (TII). **0.4 t$CO_2$e** for transport. | 136.8 | TII/National Highways |
| Precast concrete elements | 0.148 | 930 | Pre-Cast Concrete - Ordinary Portland Cement (OPC) concrete - CEM I based - with total cementitious content of 300 kg per $m^3$ of concrete - 0.148t$CO_2$e/tonne. Assumed 50km additional transport (TII assumption). HGV - Articulated Average - 1.13 kg$CO_2$e/km (TII). **3.1 t$CO_2$e** for transport. | 140.7 | TII/CE |
| Embankment fill material | 0.00438 | 5,560 | Assumed carbon factor of 4.38kg$CO_2$e/tonne - Virgin Land Won resources (CE). Assumed 50km transport (TII assumption). HGV - Rigid Average - 0.998 kg$CO_2$e/km (TII). **21.4 t$CO_2$e** for transport. | 45.71 | TII/CE |
| Link footway / cycleway surfacing (75% 804 Subbase) | 0.00438 | 1,448 | Assumed carbon factor of 0.00438t$CO_2$e/tonne - Virgin Land Won | 71.6 | TII/CE |

| Element | Embodied carbon contribution tonnes $CO_2e$ / tonne | Quantity of material (tonnes) | Comment / assumptions | Tonnes $CO_2e$ | Sources (Circular Ecology (CE) / National Highways / TII) |
|---|---|---|---|---|---|
| | | | resources (CE). Assumed 50km transport (TII assumption). HGV - Rigid Average - 0.998 kg$CO_2e$/km (TII). Assume Maintenance every 15-25 years (Approximately 6 replacements in lifetime). **5.6 t$CO_2e$** for transport. | | |
| Link footway / cycleway surfacing (25% Asphalt Surface Course) | 0.055 | 483 | Asphalt Average - 0.055t$CO_2$/tonne (National Highways). Assumed 50km additional transport (TII assumption). HGV - Rigid Average - 0.998 kg$CO_2e$/km (TII). Assume Maintenance every 15-25 years (Approximately 6 replacements in lifetime). **1.9 t$CO_2e$** for transport. | 170.6 | TII/National Highways |
| Excavation Activity | 0.00052 | 4000 | Assumed density 2t/m3. General Excavation - 0.00052t$CO_2e$/tonne (TII). **0 t$CO_2e$** for transport. | 2.1 | TII |
| Excavated Waste | 0.001239 | 4000 | Assumed carbon factor of 1.239kg$CO_2e$/tonne - Aggregate and Soil Off-Site to landfill (TII). Assumed dispose to landfill (reuse offsite not yet assessed), with 50km additional transport (TII assumption). HGV - Rigid Average - 0.998 kg$CO_2e$/km (TII). **15.4 t$CO_2e$** for transport. | 20.3 | TII |
| Site Clearance | 0.439 | 1.06 hectares | 10,600$m^2$ Minor vegetation clearance (0.78ha). General Site Clearance (Transitional Woodland Scrub) - 0.439t$CO_2e$/ha. **0 t$CO_2e$** for transport. | 0.5 | TII |
| Construction Site | 1.05 | Approximately 74 Weeks | Captures Estimated Employee Commuting, plant use and other site operations such as compound activities. Medium Size Construction site (construction cost €1.5m to €5m, between 9 and 15 people permanently on site) - 1.05t$CO_2e$/week (TII). Assumed duration c.74 weeks (approx. 17 months). **0 t$CO_2e$** for transport. | 77.7 | TII |
| | | | **Total** | **1390** | t$CO_2e$ |

**Table 12.7: Estimated carbon output during the Construction Phase**

| | |
|---|---|
| **Estimated $CO_2$ e. Construction Phase (Mt)** | 0.0139 |
| **Projected ETS sector $CO_2$ e. 2030 with additional measures (Mt)** | 8.71 |
| **As % 2030 ETS sector $CO_2$ e. emissions with additional measures** | 0.16 % |
| **Projected total Irish $CO_2$ e. emissions 2030 with additional measures (Mt)** | 42.26 |
| **As % of 2030 total $CO_2$ e. emissions with additional measures** | 0.03% |

The annual carbon emissions from the construction of the Proposed Development are estimated to be 0.16% of the projected ETS Sector $CO_2$e. emissions (with additional measures) in 2030. The carbon emissions from the construction of the Proposed Development are estimated to be 0.03% of Ireland's projected total $CO_2$e. emissions (with additional measures) in 2030. The carbon emissions from the construction of the Proposed Development are estimated to be 0.007% of Ireland's total carbon budget for the 2026-2030 budget period.

In line with the significance criteria set out in **Table 12.1**, the Proposed Development is expected to have a minor, adverse, long-term impact in terms of climate change during the Construction Phase.

### 12.4.2 Operational Phase

As discussed, there will be no significant carbon impacts as a result of the maintenance works required during the Operational Phase.

The Proposed Development will provide an attractive alternative to the private car and promote a modal shift to walking, cycling and public transport. The Proposed Development will also support the delivery of government strategies outlined in the 2023 CAP and the 2021 Climate Act by enabling sustainable mobility and supporting a sustainable transport system. Its aim is to provide enhanced walking and cycling infrastructure in the Cork Region. The Proposed Development will provide connectivity and integration with other public transport services leading to more people availing of public transport, helping to further reduce $CO_2$e emissions.

### 12.4.3 Decommissioning Phase

As discussed, there will be no adverse significant carbon impacts as a result of the Decommissioning Phase of the Proposed Development.

### 12.4.4 Vulnerability to climate change

#### *12.4.4.1 Flood risk*

A Flood Risk Assessment (FRA) has been conducted for the Proposed Development (refer to **Appendix 16.1** in **Volume 4** of this EIAR), which revealed that the primary source of flood risk to the development is coastal. The proposed bridge location falls within Flood Zone A and the 0.5% AEP coastal floodplain on the northern access ramp. A cautious approach was taken, and it was determined that the maximum flood level on the site would be 3.66m OD, with a small section of the northern access ramp expected to be flooded due to its low elevation of 3.40m OD. This was deemed acceptable because the bridge structure is considered "less vulnerable" due to the flood-resistant vegetation on the embankment of the access ramp.

Despite being partially located in Flood Zone A, a Justification Test was performed to ensure that the development complies with the Guidelines. The results of the test indicated that the proposal is suitable for the proposed location, promotes sustainable urban growth, and will not interfere with the floodplain area.

Therefore, the coastal flood risk's impact on the Proposed Development is assessed to be of high exposure and low sensitivity, resulting in low vulnerability.

#### *12.4.4.2 Temperature and extreme weather*

Met Éireann's climate predictions for the future have been published in 'Ireland's Climate: the road ahead' (Met Éireann, 2013), based on four scenarios (RCP2.6, RCP4.5, RCP6.0, and RCP8.5) named after the radiative forcing values for the year 2100 (2.6, 4.5, 6.0, and 8.5 W/m2), with a focus on the medium-low (RCP4.5) and high (RCP8.5) scenarios. The mean temperature is expected to increase by 1°C to 3°C under RCP4.5, rising to 2°C to 4°C under RCP8.5. Warm extremes are expected to increase by 2°C to 3°C under RCP4.5 and up to 5°C under RCP8.5. These increased temperatures may cause construction materials like asphalt / bitumen to heat up. However, since the temperature is projected to increase by only 1°C to 3°C under RCP4.5, it is unlikely to have a significant impact on construction materials.

Therefore, the likelihood of increased temperatures affecting the Proposed Development is assessed to have high exposure with negligible or low sensitivity, resulting in low vulnerability.

## 12.5 Mitigation and Monitoring

### 12.5.1 Mitigation

#### *12.5.1.1 Construction Phase*

There will be mitigation embedded through the design of the Proposed Development including the use of low carbon construction materials, such as the use of recycled aggregate, where practicable.

As ETS carbon allowances for energy intensive industries are regulated by the EPA under the GHG permitting regime, the $CO_2e$. calculated, and shown in **Table 12.7,** are assumed to be incorporated within the projected ETS allowances. ETS allowances are reduced annually, forcing industry to minimise emissions. As improvements in sustainability and recycling measures are progressed throughout the construction industry, it is expected that the embodied carbon calculated as part of this assessment can be taken as a worst case, as with time this figure will improve.

A series of mitigation measures have been incorporated into the construction design with the goal of reducing the embodied carbon associated with the Construction Phase of the Proposed Development. These mitigation measures include:

- The Proposed Development will use low carbon construction materials, such as recycled aggregate, where practicable;
- Where practicable, opportunities for materials reuse will be incorporated within the extent of the Proposed Development;
- Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport; and
- The Proposed Development will minimise wastage of materials due to poor timing or over ordering on site thus helping to minimise the embodied carbon footprint of the Proposed Development.

#### *12.5.1.2 Operational Phase*

As there are no significant adverse effects on carbon predicted during the Operational Phase, no mitigation measures are proposed.

#### *12.5.1.3 Decommissioning Phase*

As there are no significant adverse effects on carbon predicted during the Decommissioning Phase, no mitigation measures are proposed.

#### *12.5.1.4 Vulnerability to Climate Change*

Other than the employment of good construction management practices, and standard measures to be employed during construction as outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), as there are no significant adverse effects associated with climate change vulnerability predicted for the Proposed Development, no additional mitigation measures are proposed.

### 12.5.2 Monitoring

As there are no significant adverse effects on climate predicted during the Construction Phase, Operational Phase or Decommissioning Phase, no monitoring measures are proposed.

## 12.6 Cumulative Impacts

A review of CCC, An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

The Proposed Development does not give rise to significant adverse effects on climate. Climate is affected by macro-scale carbon contribution rather than by local effects. Therefore, projects need not necessarily be considered at a local level for the cumulative assessment. As such, no significant cumulative effects to climate are predicted as a result of the Proposed Development in combination with the projects listed in **Chapter 20,** *Cumulative and Interactive Impacts*.

## 12.7 Residual Impacts

Any potential adverse impacts generated during the Construction Phase of the development will be offset by the potential carbon reductions during the Operational Phase. Over the lifespan of the Proposed Development, a beneficial and long-term impact on climate is expected as the Proposed Development will result in a modal shift to walking, cycling and public transport.

There are no significant adverse residual effects associated with climate change vulnerability predicted for the Proposed Development.

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# Chapter 13

# Archaeological, Architectural and Cultural Heritage

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# 13. Archaeological, Architectural and Cultural Heritage

## 13.1 Introduction

This chapter comprises an assessment of the likely effects that the Proposed Development, the N25 Little Island Pedestrian and Cyclist Bridge, as detailed in **Chapter 4**, *Description of the Proposed Development*, will have on the archaeological, architectural and cultural heritage environment.

### 13.1.1 Terms used

Some terms used in this Chapter are explained hereunder:

The phrase '*Cultural Heritage*' is a generic term covering a multitude of cultural, archaeological and architectural sites and monuments within the landscape. For the purpose of this report, Cultural Heritage is divided into three sub-groups, namely Archaeology, Cultural Heritage and Architecture.

*Archaeological Heritage*

Archaeological heritage can be described as the study of past human societies through their material remains and artifactual assemblages. The Valletta Treaty (or the European Convention on the Protection of the Archaeological Heritage, 1992) defines archaeological heritage as "all remains and objects and any other traces of humankind from past times" and this includes "structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or underwater".

*Cultural heritage*

Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation. This includes customs, practices, places, objects, artistic expressions and values. Cultural Heritage is often expressed as either Tangible or Intangible Cultural Heritage (ICOMOS, 2002). Environmental Protection Agency Guidelines (EPA, 2015) define Tangible Cultural Heritage as movable cultural heritage (artefacts), immovable cultural heritage (monuments, archaeological sites and so on) and underwater cultural heritage (shipwrecks, underwater ruins and cities). Intangible cultural heritage encompasses oral traditions, folklore, history and language. The cultural heritage aspects of this assessment include an overall history of Little Island, The Cork to Midleton / Cobh railway line and a study of the placenames in and around the Proposed Development site.

*Architectural Heritage*

Architectural heritage is defined in the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999, as structures and buildings together with their settings and attendant grounds, fixtures and fittings, groups of such structures and buildings, and sites, which are of architectural, historic, archaeological, artistic, cultural, scientific, social or technical interest.

## 13.2 Methodology

### 13.2.1 Study area

The Proposed Development site is situated in the townlands of Kilcoolishal and Castleview in the parishes of Caherlag and Little Island, respectively, and the barony of Barrymore. To obtain a comprehensive assessment of the Cultural Heritage environment, a study area within a 1.5km radius of the Proposed Development site was chosen. All known registered archaeological monuments listed in the Record of Monuments and Places (RMP) and on the Sites and Monuments Register (SMR) and all registered architectural sites listed as Protected Structures (PS) or listed in the National Inventory of Architectural Heritage (NIAH) within the study area were assessed.

For the purpose of this assessment the Proposed Development site is divided into two sections as follows:

- **Area A** to the north of the Cork to Midleton railway line, comprising an irregular area stretching west from the western side of Little Island train station. Most of the site is greenfield with some hard standing towards its eastern end; and
- **Area B** to the south of the N25 in Little Island comprising an irregular area stepping south from the N25 into the grounds of the Radisson Blu Hotel (formerly Ditchley House) and Eastgate Business Park. It is divided roughly half and half into woodland / dense vegetation and car parking.

### 13.2.2 Relevant guidelines, policy and legislation

In Ireland, the principal legislative measures protecting cultural heritage assets are the National Monument (Amendments) Acts 1930 to 2014, the Heritage Act 1995, the relevant provisions of the National Cultural Institutions Act 1997, the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 and the Planning and Development Acts 2000, as amended.

This Chapter has been undertaken with regard to the following guidelines:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency (EPA), 2022);
- Framework & Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands, 1999a);
- Policy & Guidelines on Archaeological Excavation (Department of Arts, Heritage, Gaeltacht and the Islands, 1999b); and
- Architectural Heritage Protection, Guidelines for Planning Authorities (Department of Arts, Heritage and the Gaeltacht, 2004).

### 13.2.3 Data collection and collation

The methodology for this assessment comprised the following steps;

- A desktop study of the Proposed Development site and study area (1.5km radius of Proposed Development site);
- A walkover survey of the Proposed Development site in October 2022 and February 2023;
- An evaluation of the likely impacts of the Proposed Development on the archaeological, architectural and cultural heritage environment; and
- Proposed mitigation measures to be undertaken to prevent or reduce any potential impacts on the archaeological, architectural and cultural heritage environment.

#### *13.2.3.1 Desktop study*

A comprehensive review and analysis of the archaeological, architectural, and cultural heritage environment of the Proposed Development site and study area was undertaken using the following sources:

*Record of Monuments and Places (RMP)*

This record was established under Section 12 (1) of the National Monuments (Amendment) Act, 1994. It lists all monuments and places believed to be of archaeological importance in the County. The numbering system consists of two parts: the first part is the county code (CO for Cork) followed by the Ordnance Survey map number (six inches to the mile scale); the second part is the number of a circle surrounding the site on the RMP map, e.g. (CO075-010) refers to circle 010 on OS sheet 075 for County Cork. The area within the circle is referred to as the Zone of Archaeological Potential (ZAP*)* or zone of notification for that site. Its diameter can vary depending on the size and shape of the site, but it averages out at approximately 180m. The RMP for County Cork was published in 1998. All RMP sites within 1.5km of the Proposed Development site are listed in **Table 13.1**.

*Sites and Monuments Record (SMR) Database of the Archaeological Survey of Ireland (ASI)*

The purpose of the ASI is to compile a baseline inventory of the known archaeological monuments in the State. It contains details of all monuments and places or sites known to the ASI which pre-date AD 1700, and a selection of monuments which post-date 1700. The large record archive and databases resulting from the survey are continually updated. Archaeological sites which are added to the database are proposed to be included in the next published edition of the RMP and will then be afforded its protection. This database, complete with maps, is available for consultation via the National Monuments Service (NMS) website at www.archaeology.ie.

Some sites listed in the SMR Database will not be included in the next revision of the RMP but will remain on the database for record purposes. There are four such sites within the study area; a fulacht fia (CO075-082) and three corn drying kilns (CO075-084, CO075-085 and CO075-086). All four sites were fully excavated and preserved by record in 1999 in advance of construction of Eastgate Business Park. All SMR sites within 1.5km of the Proposed Development site are listed in **Table 13.1**.

*Archaeological Inventory*

The inventories for each county are follow-ons by the ASI to the RMPs. They give a written description of each archaeological site in the county. The archaeological inventory for East and South Cork, Volume 2 (Power, Byrne, Egan, Lane & Sleeman, 1994) was published in 1994 and a follow up volume, Volume 5 (Ronan, Egan & Byrne, 2009), was published in 2009.

*Files of the NMS, DAU*

These files were consulted in order to retrieve information on lists of RMP sites that have been afforded added protection such as:

- National Monuments in the ownership or guardianship of the state – none in the study area;
- National Monuments in the ownership or guardianship of the local authority – none in the study area;
- Monuments subject to Preservation Orders and Temporary Preservation Orders – none in the study area; and
- Monuments listed in the Register of Historic Monuments – none in the study area.

*Database of Irish Excavation Reports (www.excavations.ie)*

This website provides a database of summary accounts of archaeological excavations and investigations in Ireland undertaken between 1970 and 2023. The database was queried for any investigations undertaken in any of the townlands within proximity of the Proposed Development site and are listed in **Table 13.2**.

*Cork County Development Plan (CCDP) (2022-2028)*

The CCDP (2022-2028) outlines Cork County Council's (CCC's) objectives with regard to the preservation of the archaeological, architectural and cultural heritage of the county. The CCDP sets out CCC's commitment to identifying and safeguarding sites and settings, structures and objects of archaeological and architectural interest within the county. Volume 2 of the CCDP lists Protected Structures (PS) and Architectural Conservation Areas (ACA) in county Cork. All PS's within 1.5km of the Proposed Development site are listed in **Table 13.3**.

*National Inventory of Architectural Heritage (NIAH)*

The NIAH was set up under the Convention for the Protection of the Architectural Heritage of Europe or the Granada Convention of 1985. It was established on a statutory basis under Section 2 of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from 1700 to the present day, in a systematic and consistent manner. It is divided into two parts; The Building Survey and Historic Garden Survey (www.buildingsofireland.ie). The main function of both is to identify and evaluate the State's architectural heritage in a uniform and consistent manner, so as to aid its protection and conservation. The NIAH carried out a survey of the buildings of County Cork between 2006 and 2011. Under Section 53 of the Planning and Development Act, 2000, all structures considered of regional, national or international importance within the survey are recommended for inclusion in the Record of Protected Structures (RPS) by the Minister for Arts Heritage and the Gaeltacht. If this is not adopted by the local authority, the reasons must be communicated to the Department. The Building and Historic Garden Survey for County Cork is available online. The NIAH for County Cork includes approximately 6,500 items of architectural importance in the County. All NIAH structures listed within 1.5km of the Proposed Development site are listed in **Table 13.3**.

*Aerial photographs*

The Ordnance Survey of Ireland (OSI) and Google maps have posted a number of online aerial photographs dating from 1995 (OSI; 1995, 1999-2003, 2004-2006, 2005-2012, 2011-2013 and 2013-2018). These were examined to identify any previously unrecorded features of archaeological/cultural heritage significance that may only be visible from the air. No potential archaeological features are apparent in the photographs.

*LiDAR*

LiDAR (light detection and ranging) is a survey method that can provide detailed landscape data and information on the earth's topography which enable a better understanding of historical landscapes and their past uses. Much of the Proposed Development site is covered by LiDAR survey and no potential archaeological features were apparent on the images.

*Cartographic Sources*

A small number of later medieval and post medieval maps of Cork Harbour were consulted and these are reproduced in **Image 13.1** to **Image 13.10** in Section 13.3.3 and Section 13.3.4, as follows:

- The 1811 Grand Jury map of Cork compiled by Neville Bath in the 1790s and published in 1811 at a scale of three quarters of an inch to one mile;
- Candell's Map of Cork Harbour (1587);
- John Speed's Map of Munster (1610);
- Down Survey Parish map of Little Island (1654-1659);
- Smith's Map of County Cork 1750;
- Taylor and Skinner Road maps (1777);
- Ordnance Survey (OS) 6-inch maps; the three editions of the 6-inch to one mile scale maps were consulted, the first edition published in 1841-1842, the second edition published in 1902 and the third edition published in 1935. The 25-inches to one mile OS map (1902), from which the second edition 6-inch map was derived.

#### 13.2.3.2 Walkover survey

The primary purpose of a walkover survey is to assess the physical environment in which the Proposed Development will take place to identify any potential archaeological sites or Areas of Archaeological Potential (AAP) and any features of cultural heritage interest. The Proposed Development site was inspected by the author in October 2022 and February 2023 in overcast dry weather conditions and no features or finds of archaeological or cultural heritage interest were evident in either Area A or B. Details of the walkover survey with photographs are given in Section 13.3.5.

### 13.2.4 Appraisal method for the assessment of impacts

The assessment of impacts (both direct and indirect) during Construction, Operation and Decommissioning of the Proposed Development has been carried out in accordance with Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022). The likely significant effect of the Proposed Development on the archaeological, architectural and cultural heritage environment are assessed with reference to the EPA Description of Effects (EPA, 2022) as provided in Table 1.1 of **Chapter 1**, *Introduction*.

### 13.2.5 Consultation

During the compilation of the EIAR, discussions were held with Mary Sleeman, Cork County Archaeologist via email and phone. Her recommendations are reflected in the mitigation measures in Section 13.5.

## 13.3 Baseline Environment

### 13.3.1 Archaeology

The Proposed Development will involve the construction of a bridge to span the Cork to Midleton railway line and the N25. The bridge will provide a link from Little Island train station and the Glounthaune region (Area A) to Eastgate Business Park and Little Island (Area B).

One of the earliest maps of Cork Harbour (Candell, 1587) depicts Little Island as an island in Lough Mahon, completely separate from the mainland and only accessible by boat (refer to **Image 13.2** in Section 13.3.4). On the Grand Jury map of 1811 (refer to **Image 13.1** in Section 13.3.3), a bridge can be seen linking the mainland to Little Island in the same area as the present bridge. By the time of the 1841 OS map (refer to **Image 13.7** in Section 13.3.4), the island is connected to the mainland by three bridges and by the time of the 1902 OS map, the channel on the north side of the island has been infilled and reclaimed with the Great Southern and Western railway line (now the Cork to Midleton and Cobh railway line) running roughly along its course (refer to **Image 13.9** in Section 13.3.4). With the construction of the railway line in 1859, the landscape was transformed, and this change continued with the construction of the N25 in the 2000s. Waterways and their drainage areas have always been attractive as places to both live and forage and have been used as a means of travel, trading and a major food resource over the Millenia. The Proposed Development site is located at the northern end of Little Island which lies in Lough Mahon in the inner reaches of Cork Harbour, an area with a rich and varied tradition.

There are no recorded archaeological sites listed in the RMP or the SMR within the Proposed Development site. The closest known recorded archaeological sites to the proposed works are a fulacht fia (CO075-082) and three corn drying kilns (CO075-084, CO075-085 and CO075-086) in the townland of Castleview, c. 220m to the southwest (refer to **Figure 13.1** in **Volume 3** of this EIAR). All four sites were fully excavated and preserved by record in 1999 in advance of construction of Eastgate Business Park. In total, there are 16 recorded archaeological monuments within a 1.5km radius of the Proposed Development site (refer to **Table 13.1** and **Figure 13.2** in **Volume 3** of this EIAR) providing evidence for human settlement and activity within the study area dating back to the Bronze Age and giving an indication of the archaeological potential of the Proposed Development site.

The pace of landscape change in Ireland accelerated in the second half of the 20$^{th}$ century and many archaeological sites have been levelled by activities associated with modern development such as agriculture, industry and infrastructural improvements. This has ensured that the present-day archaeological landscape is not fully representative of the human occupation of this island, which has spanned at least ten thousand years. Much of the physical evidence for the existence of past societies has been altered by each successive community, all of which leave their mark on the landscape they have occupied. While many archaeological sites survive today as partially upstanding structures, such as earthworks and stone monuments, many more survive only as subsurface remains, often forgotten and concealed from view.

**Table 13.1: RMP Sites within 1.5km of the Proposed Development Site**

| RMP / SMR<br>PS, NIAH | Site Type | Townland | ITM Co-Ordinates | Distance |
|---|---|---|---|---|
| CO075-020001<br>PS495 | Graveyard | Wallingstown | 574402, 572026 | 1km to south-west |
| CO075-020002<br>PS495 | Church | Wallingstown | 574417, 572023 | 1km to south-west |
| CO075-004 | Ringfort | Rowgarrane | 574712, 574215 | 1.4km to north-west |
| CO075-005001 | Graveyard | Kilcoolishal | 574904, 573852 | 1km to north-west |
| CO075-005002 | Church | Kilcoolishal | 574904, 573852 | 1km to north-west |
| CO075-007 | Ringfort | Rowgarrane | 575740, 574182 | 1.3km to north-east |
| CO075-008 | Enclosure | Rowgarrane | 576354, 574206 | 1.5km to north-east |

| RMP / SMR PS, NIAH | Site Type | Townland | ITM Co-Ordinates | Distance |
|---|---|---|---|---|
| CO075-009 | Ringfort | Ballynaroon | 576351, 574039 | 1.4km to north-east |
| CO075-010 | Ringfort | Ballynaroon | 576281, 573882 | 1.2km to north-east |
| CO075-021 PS491 | Castle | Wallingstown | 574506, 572015 | 950m to south-west |
| CO075-049 PS492, 20907523 | Father Mathew Tower | Kilcoolishal | 574261, 573080 | 1km to north-west |
| CO075-052 | Water mill | Wallingstown | 574635, 571670 | 1.2km to south-west |
| CO075-082 | Fulacht fia | Castleview | 574962, 572470 | 320m to south-west |
| CO075-084 | Corn drying kiln | Castleview | 575133, 572455 | 230m to south-west |
| CO075-085 | Corn drying kiln | Castleview | 575060, 572437 | 280m to south-west |
| CO075-086 | Corn drying kiln | Castleview | 575001, 572460 | 300m to south-west |

The archaeological timescale can be divided into two major periods, each with a number of sub-sections:

- **The prehistoric period:** Mesolithic (c. 8000 to 4000 BC); Neolithic (c. 4000 to 2400 BC); Chalcolithic (c. 2450-2200 BC); Bronze Age (c. 2200 to 700 BC); Iron Age (c. 700 BC to AD 400); and
- **The medieval period:** Early medieval 5$^{th}$ – 12$^{th}$ century; high medieval 12$^{th}$ century – c. 1400; late medieval c. 1400 – 16$^{th}$ century.

**Mesolithic, Neolithic and Chalcolithic**

The earliest evidence for human colonisation and settlement in Cork can be dated to 8000 BC, the Mesolithic Period. The people of this era were hunter-gatherers, entirely dependent on what food could be obtained through hunting and gathering, amongst other things, edible plants and shellfish. The transition of these early settlers from hunter / gatherers to a farming way of life in the Neolithic Period brought about more permanent settlements and a more complex and structured social hierarchy. The Chalcolithic, meaning the ‘Copper and Stone Age’ is a transitional phase in Ireland between the Neolithic and Bronze Age that is characterised by the adoption of copper metallurgy as an established technology prior to the use of bronze. This period is also frequently represented on excavated sites ‘*by the widespread cultural adoption of a new form of pottery, collectively referred to as Beaker Ware*’ (Hanley, 2013).

There are no known archaeological sites dating to the Mesolithic, Neolithic or Chalcolithic periods within the study area. The general lack of sites does not, however, mean that there was no early settlement and occupation in the broader region. A Neolithic polished stone axe (almost 0.12m long) was identified during monitoring of topsoil removal prior to the construction of the waste-water treatment plant at Carrigrenan, *c.* 2.3km to the south-east of the Proposed Development site (Lane 2001). A number of Neolithic polished stone axes have been recovered from the Cork Harbour area while the Files of the NMI give details of a dugout canoe washed ashore in the townland of Pembroke, Passage West, 4km across Lough Mahon to the south-east. Although this boat wasn’t dated, it is typical of the earliest boats known to have been made by humans. These finds provide valuable evidence of human activity in the study area in the early prehistoric period.

**Bronze Age and Iron Age**

The Irish Bronze Age is characterised by the adoption of bronze, distinctive pottery styles, changes in burial traditions and an increase in population. The burial traditions of the Bronze Age were generally much simpler than the elaborate megalithic tombs of the earlier Neolithic and Chalcolithic periods, although these were frequently reused for later burials. Most Bronze Age burials, either cremated or inhumed, were placed in stone-lined cists or simple earth-cut pits often accompanied by grave goods. Some graves were marked with a cairn or a mound of stones, while others were marked by a mound of earth known as a barrow.

The earliest recorded archaeological site in the study area is a fulacht fia (CO075-082) in the townland of Castleview, 320m to the south-west of the Proposed Development site. Fulachtaí fia are the most common type of prehistoric site in the country and although some Neolithic examples occur, most excavated fulachtai fia have been dated to the Bronze Age. They comprised a trough or pit usually lined with stone, wattle or planks in which quantities of water could be boiled using fire-heated stones. A mound (often horseshoe-shaped) was formed when the heat-shattered stones were removed from the trough. Fulachtai fia are generally interpreted as ancient cooking sites but could have been used for any purpose that required large quantities of hot or boiling water such as bathing, processing textiles, tanning, brewing, extraction of fats from meat, and soap making, or even a combination of these functions (Ó Drisceoil, 1988; Monk, 2007; Quinn & Moore, 2007).

The example in Castleview was excavated in 1999 in advance of development of an industrial and retail complex (Eastgate). Excavation revealed a D-shaped spread (10.46m E-W; L 9.6m; D 0.1-0.45m) of heat-shattered stone and charcoal-enriched soil which covered a trough of two conjoined unlined pits (Ronan *et. al.* 2009). Radiocarbon dates retrieved from the site place the use of this fulacht fia in the Late Bronze Age (*ibid*).

**Early Medieval Period**

This period in Ireland is characterised by the influx and influence of Christianity, which had become widely established by the 6th century. Monasteries became a focal point for the lay communities of this period who were spread throughout the countryside in settlements such as ringforts / raths, crannogs and simple huts. The majority of recorded archaeological monuments within a 1km radius of the Proposed Development site date from the medieval and post medieval period and later.

There are four ringforts in the study area, two in Ballynaroon (CO075-009 and CO075-010) and two in Rowgarrane (CO075-004 and CO075-007). Ringforts (also known by the names rath, lios, cathair or caiseal / cashel) are defended farmsteads and are the most characteristic monument of this period. Their main phase of construction and occupation dates from the beginning of the 7th century AD to the end of the 9th century. They are generally circular or oval in plan, defined by an earthen bank with an external ditch or fosse. Larger ringforts with double defences (bi-vallate) and triple defences (tri-vallate) are generally interpreted as higher status sites and these can be particularly associate with specialised craft working.

One of the ringforts in Ballynaroon CO075-010) is described by Power *et al.* (1994) as a slightly raised circular area (34.5m E-W; 34m N-S) enclosed by an earthen bank (int. H. 0.3m; ext. H 1.8m). The nearby ringfort (CO075-009) 75m to the north, is described as a roughly circular area (46.5m E-W; 40.5m N-S) enclosed by an earthen bank (int. H 1.3m) and external fosse (*ibid.*). There is no visible surface trace of the two ringforts in Rowgarrane. Both monuments are shown on the OS 6-inch map of 1841 as hachured circular enclosures approximately 35m in diameter.

Two tidal mills (CO075-052) were identified during construction of an extension to the Mitsui Denman factory in Wallingstown, 1.2km to the south-west of the Proposed Development site. Upon excavation, the timber remains of one horizontal-wheeled mill and one vertical-wheeled mill were uncovered in reclaimed land and dated to c. 630AD (Power *et al*. 1994). The site of the mill is incorrectly marked on the ASI database. Its correct location, as given on the published RMP map is depicted on **Figure 13.2** in **Volume 3** of this EIAR.

**High Medieval and Late Medieval Periods**

The majority of castles in Ireland can be broadly classified into two groups; the early castles of the late twelfth and thirteenth centuries and the tower houses of the fifteenth to seventeenth centuries. Tower houses consist of fortified residences in the form of a tower that was usually four to six storeys high and often partially enclosed by a bawn. Most tower houses date to the fifteenth / sixteenth centuries.

Wallingstown Castle (CO075-021; PS00491) lies 950m to the south-west of the Proposed Development site. It consists of a small rectangular tower (6.1m N-S; 7.6m E-W) which stands to 4 storeys. It is known as Wallingstown Castle although there is no apparent link with the Wallyns or Waleys (later Walsh) family. The castle was held by the Fitzgeralds for a time in the 16th century and stood in the demesne lands of Little Island House which no longer survives. The following excerpt is taken from an archaeological assessment carried out as part of a proposed programme of conservation works for the castle; '*The remains of Wallingstown Castle stand in an area of rough grass within a modern industrial estate and so it is difficult to establish the original landscape context of the site, though a ruined medieval church and graveyard are located a short distance away to the west. The structure is a Later Medieval tower house and as such belongs to a late form of castle architecture that was common in Ireland, and particularly in Munster, in the* *fifteenth and sixteenth centuries. Wallingstown is a relatively simple tower house and is comprised of a rectangular stone-built structure which appears to have had a single room at each level within it. The structure is built with limestone rubble and lime mortar, though there have been many alterations to the original building over time. The building is now in a ruinous state and the timber floors, the roof, the doors and the window fittings are no longer in situ.* (Sherlock, January 2003) The conservation works were archaeologically monitored and no finds or features of archaeological interest were identified. It was noted at the time that the works '*should considerably improve the stability of the structure and ensure its preservation for future year*s' (*ibid.*).

A church and graveyard (CO075-020002 and CO075-020001; PS00495) lie a short distance to the west of the castle also in the townland of Wallingstown. The ruins of the rectangular church (13.35m E-W; 8.5m N-S) consist of the west gable wall and north wall standing to full height but most of the east and south walls reduced to 1.1m in height (Power *et al*., 1994). The church stands in the north-western corner of the graveyard which is enclosed within a stone wall with the earliest grave slab dating to 1715 (*ibid.*). Brady (1863) described it as the parish church of Little Island in repair in 1615 and 1639 and in 1700 as built with stones and lime and in good repair (Power *et al*., *ibid.*). There is another church and graveyard in Kilcoolishal, 1km to the north-west of the Proposed Development area. There is no visible surface trace of the church which is depicted as 'in ruins' on the OS 6-inch map of 1841. The former parish church of Caherlag is described by Brady in 1918 as 'almost completely disappeared' (Power *et al. ibid.*). The roughly rectangular graveyard contains many late 18th and 19th century headstones.

**Post Medieval Period**

The eighteenth century was an era of relative peace and political stability in Ireland. This encouraged a growing sense of prosperity and order, which in turn created an environment favourable to industrial and agricultural innovation as well as intellectual and aesthetic pursuits. Perhaps the most notable cultural heritage site-type of this period and the ensuing century is the country house and its demesne. The term 'demesne' or 'demaine' is Norman French in origin and denotes that portion of the manorial estate not leased out to tenants but retained by the Lord for his own use and occupation' (Reeves-Smyth, 1997, 549). The estate system was finally dismantled in Ireland in the early twentieth century.

Little Island is described by Lewis (1837) as being '*...embellished with several handsome seats'* which were attracted to the island by the '*pure atmosphere, fertile soil and sylvan scenery'*. The OS map of 1841 (refer to **Image 13.7** and **Image 13.8**) depicts several named country houses and their attendant demesnes in great detail. Amongst the houses mentioned by Lewis is Castle View (PS502) (latterly called Ditchley) which lies within the study area. This is discussed in greater detail in Section 13.3.3.

Ten archaeological investigations have taken place (www.excavations.ie) within the study area and archaeological remains were revealed in five. These are listed and summarised in **Table 13.2.**

**Table 13.2: Archaeological investigations undertaken in the vicinity of the Proposed Development site**

| Excavation Reference | Townland | Details |
|---|---|---|
| None | Wallingstown | Timber remains of two tidal mills, one horizontal-wheelied mill and one vertical mill found during extension to the Mitsu Denman (Ireland) Ltd factory in 1978. The mills were excavated and dated to c. 630AD (Power *et al.* 1994). |
| 1998:088 | Wallingstown | Archaeological monitoring of an expansion to the existing Irotec Laboratories Ltd plant. Apart from the recovery of a single sherd of post medieval ware and two struck lithics, nothing of archaeological significance was noted (McCarthy, 1998). |
| 1999:085 | Castleview | Monitoring of topsoil removal identified four archaeological sites consisting of a fulacht fia and three linear stone-lined features. Archaeological excavation of the fulacht fia exposed a D-Shaped spread (10.46m E-W; straight W side; L 9.6m N-S; D 0.1-0.45m) of heat shattered stones and charcoal-enriched soil covering a trough of two conjoined unlined pits. The three linear stone-lined features (between 2.2m and 4.1m in length with an average width and depth of 0.65m and 0/52m respectively) contained fills of charcoal-enriched deposits and red, oxidised soil caused by intense burning. A large quantity of charred cereal grain and charcoal was recovered (McCarthy, 1999). |
| 2001:135 | Carrigrenan | Monitoring of a 15ha greenfield site was undertaken prior to construction of wastewater prior to construction of wastewater treatment plant. Two shell spreads along the western seashore perimeter were noted and were tested under licence (see below 2001:136). A polished stone axe was recovered during monitoring and has been dated to the late Mesolithic (Lane, 2001). |

| Excavation Reference | Townland | Details |
|---|---|---|
| 2001:136 | Carrigrenan | Three test trenches excavated across two shell spreads identified during archaeological monitoring (see above 2001:135). A beach head of stratified shell and beach material tapering inland was identified. No evidence of human activity and the position and nature of the stratified material suggests the layers were laid down naturally (Lane, 2001). |
| 2004:0299 | Wallingstown, Flaxfort, Courtstown | Monitoring of Cork Main Drainage Scheme (Phase 2) was undertaken around the southern portion of little Island. Monitoring of groundworks associated with the site compound, access road, three pump stations and their associated rising mains and gravity sewers undertaken in the townlands of Wallingstown, Flaxfort and Courtstown. A section of the rising main was laid along the northern shore of Lough Mahon and no archaeological features or artefacts were identified (Dunne, 2004). |
| 2004:0300 | Castleview – Ditchley House | Archaeological monitoring of groundworks was carried out in the grounds of Ditchley House (PS 005202) in advance of its development as a hotel. No archaeological finds or features were noted (Lane, 2004). |
| 2006:320 | Courtstown | This greenfield site was in the zone of archaeological potential for the site of Courtstown Castle (CO075-025). There were no visible remains of the castle thought to be of 17th century date. Trenches were opened on the site in areas of potential identified in a geophysical survey. Several sherds of post-medieval glazed red earthenware were recovered particularly in the trench closest to the extant 19-century Courtstown House (Sutton, 2006). |
| 2016:184 | Wallingstown | Archaeological testing on the site of a proposed data centre within the grounds of the former Mitsui Denman Factory which was constructed in 1973. Testing confirmed ground levels had been reduced down to the natural subsoil when the 1970s industrial complex was constructed. No archaeological finds, features or deposits were noted (Cummins, 2016). |
| 2018:082 | Inchera and Dunkettle | Archaeological monitoring of the N25 Dunkettle Interchange Improvement Motorway Scheme. Monitoring of tree grubbing was carried out and archaeological features were identified which correlated to features present on historic mapping. These consisted of a revetted field drain and two linears which were interpreted as walls, a curved wall relating to the original causeway leading into Little Island, a tank/pump structure, townland boundaries and a drain and cobbled feature. All features were recorded and left *in situ* (Long, 2018). |

### 13.3.2 Cultural Heritage

Cultural Heritage can be site specific, when an archaeological or architectural site has cultural heritage associations, or non-site specific, where less tangible aspects of cultural heritage cannot be pinpointed to a particular place but can be tied to a specific region. Our cultural heritage provides a link with our past, is part of our identity and who we are as a people and as a region.

Little Island was once home to a number of country houses surrounded by extensive demesnes and owned by wealthy landowners and aristocrats. It is described by Lewis (1837) as follows; '*Little Island, a parish and island, in the barony of Barrymore… containing 1103 inhabitants. It comprises 1627 statute acres, chiefly under tillage and in high state of cultivation; there is no waste land or bog. Limestone abounds, and it is worked to a considerable extent for agricultural and building purposes, and as a ballast for vessels sailing without cargoes from the port of Cork. The island is embellished with several handsome seats, the principal of which is Wallingstown house, the residence of Phineas Bury, Esq., the principal proprietor, containing within the demesne the ruins of a church or chapel and of the castle of Wallingstown'.* Other country houses referred to by Lewis include, Castleview, the property of W.H. Jackson, latterly called Ditchley and now the Radisson Blu Hotel (PS502).

As mentioned by Lewis (*ibid.*), quarrying was an important industry in the Little Island area in the 19th century where the quality of the limestone was considered excellent. Thus, the demand for Little Island limestone was high and it was used extensively in the construction of public buildings in Cork City such as the Court House (built 1835), and St. Fin Barre's Cathedral (1865-79) (Rynne, 2006). Extensive quarrying appears to have taken place in Ballytrasna (Rock Farm Quarry), at the southern end of Little Island while additional smaller unnamed quarries are also depicted on all three OS map editions. The quarries were conveniently located on the shoreline allowing the quarried stone to be moved by boat upriver to the city. A number of quays along the southern coastline of Little Island still remain, if in somewhat poor condition. Limestones which could be polished were commonly referred as 'marbles' and one such marble, known as the Cork 'reds' from Little Island, was used in the Liverpool and Manchester exchanges and in St John's College, Cambridge (*ibid.*).

The industrialisation of Little Island commenced in the 1970s and 1980s when a number of multinational companies established factories and manufacturing facilities in the area. With the opening of three industrial estates by 1980, 1,000 jobs had been created on the island, in small and medium sized engineering and pharmaceutical companies (Brunt, 2005). Eastgate Business Park is a major commercial and industrial park and, as one of the largest in the country, is home to a range of businesses, which include multinational corporations and indigenous Irish companies. Little Island has been transformed from a seaside retreat for the wealthy in the 19th century to an industrial hub, where according to the Little Island Business Association, over 1,000 businesses operate (www.liba.ie).

The Proposed Development site is situated in the townlands Castleview and Kilcoolishal. The Irish landscape is divided into over 62,000 townlands and this system of landholding is unique in Western Europe for its scale and antiquity. Many townlands are pre-Anglo / Norman in origin and Irish historical documents consistently use townland names throughout the historic period to describe areas and locate events accurately in their geographical context. The townland names and boundaries were standardised across the country in the nineteenth century when the Ordnance Survey began to produce large-scale maps of the country. Townlands existed long before the parishes and counties. The original Irish names were eventually systematically recorded in anglicised form in the mid-19th century during compilation of the OS 6-inch maps. Many townlands throughout Ireland took their names from early habitation sites, both ecclesiastical and secular.

Townland names are an important aspect of cultural landscapes in Ireland, providing valuable insights into the history, culture and language of the area. The social customs or history of the people who have lived in a particular place can be reflected in the name of the townland. Some townland names are derived from the names of prominent individuals who owned or occupied the land, while some are named after early Christian monasteries or religious sites such as churches or holy wells. Many other townland names are descriptive of the natural features of the landscape of that area and region, such as hills, rivers or forests. The townland of Castleview is an English name which in Irish is '*Radharc an Chaisleáin*'. It is most likely referring to either Wallingstown Castle (CO075-021; PS491) situated to the south-west or Courtstown Castle (CO075-025) to the south-east. Courtstown Castle is no longer extant but was located on top of a natural knoll in a commanding position, making it very visible on the landscape at one point in time. Killcoolishal, in Irish, '*Cill Chúil Íseal*' means the low corner or angle of a church (www.loganim.ie). Other townland names in the surrounding region include Rowgarrane, in Irish '*Ruagharrán*' meaning Red Grove, Ballynaroon, in Irish '*Bhaile na Rún*' meaning town of the spades and Wallingstown in Irish '*Baile an Bhailisigh*', meaning the town or homestead of the Walshes. The Proposed Development site lies in the parishes of Caherlag and Little Island. Caherlag in Irish' '*Chathair Laga*' meaning fort of the hollow. Little Island is in Irish '*An tOileán Beag'*. Little Island is depicted on early maps of the harbour area (Candell, 1587; Down Survey, 1655-66; Taylor and Skinner, 1777) as an island only accessible by boat. By the time of the OS 6-inch map of 1841, three bridges are depicted linking the island to the mainland.

### 13.3.3 Architecture

There are no Protected Structures (PS) listed in the CCDP 2022-2028 within the Proposed Development site. The closest PS is the Radisson Blu Hotel (PS502), approximately 50m to the south of Area B, while the closest structures listed in the NIAH are in Area A and include those associated with the Cork to Midleton / Cobh railway line, formerly the Great Southern and Western railway line (GS & W). They comprise a cast iron foot bridge (20907530), Station Master's House (20907529) and Railway Station (20907528), located between 13m to 20m to the east of the Proposed Development site. The closest Architectural Conservation Area (ACA) is that at Passage West, c. 4km across Lough Mahon to the south-east. There are a total of 25 structures within 1.5km of the Proposed Development site which date from the 16th century (Wallingstown Castle; PS491) to the early 20th century (Dunsland House; PS494). These are listed in **Table 13.3** and displayed on **Figure 13.3** in **Volume 3** of this EIAR.

**Table 13.3: PS and NIAH Sites within c. 1.5km of the Proposed Development site**

| NIAH, PS, RMP | Site Type | Townland | ITM Co-Ordinates | Distance |
|---|---|---|---|---|
| 20907518<br>PS494 | Dunsland House Gate Lodge – c. 1890 | Kilcoolishal | 573739 572861 | 1.5km to west |
| 20907519<br>PS 494 | Dunsland House – c. 1930 | Kilcoolishal | 573928 572970 | 1.3km to west |
| 20907521 | Glenburne Country house – c. 1840 | Kilcoohishal | 574287 573491 | 1.2km to north-west |
| 20907523<br>PS492<br>CO075-049 | Father Mathew Tower - 1843 | Kilcoolishal | 574250 573082 | 1km to north-west |
| 20907524 | Dunsland Cottage – c. 1890 | Kilcoolishal | 574189 572925 | 1km to west |
| 20907525 | Mount Patrick House – c. 1810 | Kilcoolishal | 574432 573023 | 870m to north-west |
| 20907526 | House – c. 1900 | | 575279572150 | 600m to south-west |
| 20907527<br>PS502 | Ditchley House (now Raddison Hotel) – c. 1820 | Castleview | 575342 572683 | 50m to south |
| 20907527<br>PS502 | Gate lodge to Ditchley House (now Radisson Blu Hotel) | Castleview | 575546 572780 | 120m to south |
| 20907528 | Railway station – 1859 | Ballyhennick | 575555 572888 | 20m to south-east |
| 20907529 | Station Master's House - 1859 | Ballyhennick | 575541 572928 | 19m to north-east |
| 20907530 | Foot Bridge - 1859 | Ballyhennick | 575530 572890 | 13m to south-east |
| 20907531<br>PS490 | Rockgrove House (now Biocel Ltd) – c. 1760 | Ballyhennick | 575727 573151 | 340m to north-east |
| 20907531<br>PS490 | Gate Lodge Rock Grove House - c. 1760 | Ballyhennick | 575468 573006 | 70m to north-east |
| 20907532 | Saint Lappan's Church of Ireland – 1865 | Ballytrasna | 575712 572195 | 660m to south-east |
| 20907533 | House – c. 1930 | Ballytrasna | 576380 572198 | 1.2km to south-east |
| 20907534 | Bridge – single arch, built c. 1811 | Ballynaroon | 576790 573530 | 1.4km to north-east |
| 20907535 | House dated 1819 | Lackenroe | 576876 573205 | 1.3km to north-east |
| 20907536 | Water pump | Lackenroe | 576940 573205 | 1.4km to north-east |
| 20907537 | Sacred Heart roman catholic church – c. 1880 | Lackenroe | 576936 573342 | 1.4km to north-east |
| PS495<br>CO075-020001 | Graveyard | Wallingstown | 574402 572026 | 1km to south-west |
| PS495<br>CO075-020002 | Church | Wallingstown | 574417 572023 | 1km to south-west |
| PS491<br>CO075-021 | Tower house | Wallingstown | 574506 572015 | 950m to south-west |
| PS500 | North Esk Lodge | Dunkettle | 573761 572571 | 1.5km to west |
| PS501 | Lodge | Inchera | 574019 571607 | 1.6km to south-west |

The structures within 1.5km of the Proposed Development site reflect the residential, spiritual and infrastructural history of the area from the 16th to the early 20th centuries. The closest structure to the Proposed Development site is the Radisson Blu Hotel, formerly Ditchley House (PS502; NIAH 20907527). The southern half of the Proposed Development site (Area B) lies within the former demesne associated with this house. Ditchley House is described in the NIAH as a six-bay, two-storey over half-basement which despite more modern extensions and alterations, retains much of its early character. Remnant demesne structures comprise the gate lodge and limestone gate piers which lie c. 200m to the east of the house at the entrance to the Radisson Blu Hotel. On the OS 6-inch map of 1841, the house is named Castle View and the associated farm buildings are depicted to the east (refer to **Image 13.8**). On the later OS maps dating to 1902 (refer to **Image 13.9**) and 1935 (refer to **Image 13.10**), the house is named Ditchley while the farm buildings to the east are called Castle View.

An architectural survey of Ditchley House and Farm buildings was carried out in advance of development of the house as a hotel in 2002 (Sutton, 2002). Archaeological monitoring of ground works associated with this development was carried out in 2004 and no archaeological finds or features were identified (Lane, 2004). Ditchley House was built by S. Jackson in 1760-1780 as the Dower House to Little Island House (no longer extant) which stood at the north-western side of the island in the townland of Wallingstown. Jackson was from an English family and reputedly owned a large amount of land on Little Island, including quarries (Sutton, 2002). Little Island is described by Lewis (1837) as being '…*embellished with several handsome seats'* which are attracted to the island by the '*pure atmosphere, fertile soil and sylvan scenery'*. Amongst those houses mentioned is Castleview which he describes as the property of W. H. Jackson. In Griffiths Valuation of 1852, the occupier of Ditchley House is Robert de la Cour Beamish when the property, consisting of 13 acres was valued at £34 (Griffith, 1852). Castleview farm is listed in the same valuation as being owned by Edmond Murphy with 208 acres, valued at £13.10s (Sutton, 2002). It is probable that the Jackson family may still have been landlords of both Castleview and Ditchley at this time with separate tenants paying them a ground rent (*ibid.*).

In 1900, Ditchley House was purchased by Arthur Julian, a solicitor and his wife Mary Louisa Grey who moved from Carrigrennan House at the southern end of Little Island. One of their daughters, Dorothy, married Judge D.B. Sullivan and lived in Carrigrenan House while their second daughter known as Miss Julian, inherited Ditchley house and lived there until it was sold to the Ellis family in the 1960's who were the last to occupy the house until it was again sold in the late 1990's (Sutton, 2002). The Murphy's were involved with Castleview Farm from at least from the mid-19th century until the Ellis family bought both Ditchley House and Castleview Farm in the 1960's. The farm buildings were demolished as part of the redevelopment of the site into a hotel in 2004.

The Grand Jury Map of 1811 depicts the house and several other mansions (none of which are named) on 'The Little Island' when at this time, the Island Bridge is the only bridge connecting Little Island to the mainland (refer to **Image 13.1**).


**Image 13.1: Grand Jury Map of 1811 with Ditchley House (PS501) arrowed**

Another country house in the study area is Rockgrove House (PS490; 20907531), located 340m to the north-east of the Proposed Development site. The house is described in the NIAH as '*Detached five-bay three-storey over half-basement former country house, built c. 1760, with breakfront to central bay, bowed bays and two-bay two-storey wings to east and west elevations and two-storey extensions to the rear (north)*'. A gate lodge and limestone gate piers remain at the entrance to the house which was the seat of the Dring family in the 18th and 19th centuries and valued in the early 1850s at £51 (www.landedestatesdatabase.ie). The house was subsequently sold in 1906 when it was valued at £80 and was restored in the 1970s (Bence Jones, 1988).

Saint Lappan's Church of Ireland, situated in the townland of Ballytrasna c. 660m to the south-east of the Proposed Development site, is a Gothic Revival style church. The church was built in 1865 by the Ecclesiastical Commissioners of Ireland and aided by a bequest from Miss Hester Bury (NIAH). According to the NIAH, '*The attention to detailing and skilled workmanship evident on the exterior continues throughout the interior, most notably in the carpentry of the roof bracing and carved timber reredos*'. The foundation stone was laid by Mrs Elizabeth Bury of Little Island House on the 29th of September 1864 (www.historicgraves.com).

Father Mathew Tower (PS00492/CO075-049), c. 1km to the north-west in the townland of Kilcoolishal, was built in 1843 by William O'Connell to honour Theobald Matthew (1790-1856), known as Father Mathew, the temperance reformer (NIAH). It consists of a detached circular-plan, single-bay, three-stage former folly which is now in use as part of a house.

The railway line, formerly the Great Southern and Western railway line (GS & W), divides the Proposed Development site east to west.  During the 19th century, with the industrial revolution, there was an increase in production and a change in population shift with more people moving to towns and cities to work. The introduction of railway lines improved communication shortened travel times and allowed for better trade and commerce. The section of railway line between Dunkettle and Midleton opened for traffic on the 10th of November 1859 and was extended eastwards to Killeagh and then on to Youghal which opened in 1860 (Johnson 2005, 25). The railway line was an important transport link for the region, and it played a significant role in the economic development of the area, facilitating the transportation of good such as coal, timber and agricultural produce. It also provided an important passenger service connecting Cork city with towns like Midleton, Youghal and Dungarvan. The railway line was closed to all traffic in 1963 as part of a wider programme of railway closures across Ireland. It reopened under the Irish Government's Transport 21 investment programme in 2009, a section of which now stops at Little Island. The NIAH lists the red brick Railway Station (20907528), Tudor Revival style Station Masters (20907529) and cast-iron foot bridge (20907529), all constructed in 1859 and still extant.

### 13.3.4 Cartographic information

A small number of later medieval and post medieval maps of the harbour were consulted. The earliest of these is Candell's map of Cork harbour, dated to 1587, that depicts *Little Island* on which a house is shown, while Belvelly Castle (CO075-030) is depicted on *Great Island* and named '*Belville'* (refer to **Image 13.2**). John Speed's Map of Munster dated to 1610 depicts Little Island as Lord Barry Island (refer to **Image 13.3**), while the Down Survey Map of 1654-1659 depicts three houses on the island, none of which appear to be Ditchley (refer to **Image 13.4**). Smith's map of County Cork dated to 1750 and Taylor and Skinner map dated to 1777, similarly depict Little Island as an island in Lough Mahon, completely separate from the mainland and only accessible by boat (refer to **Image 13.5** and **Image 13.6**). The Grand Jury Map of Cork Harbour dated to 1811 (refer to **Image 13.1**) depicts but does note name Ditchley House and several other mansions on the island which is now accessible via one bridge to the north. On the OS 6-inch map of 1841 there are three bridges linking the north side of the island to the mainland (refer to **Image 13.7**).

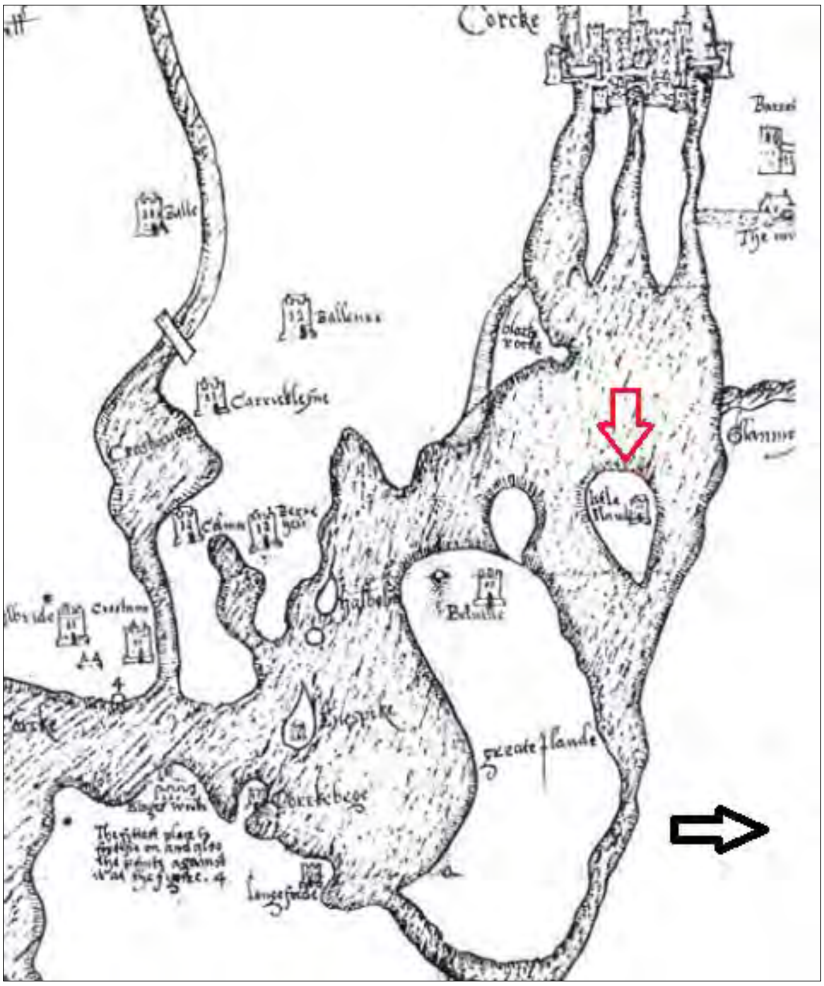


**Image 13.2: Francis Candell's map of Cork Harbour (1587) (https://catalogue.nli.ie/Record/vtls000536698)**


**Image 13.3: John Speed's map of Munster (1610) (www.lbrowncollection.com)**


Image 13.4: Down Survey Parish Map of Little Island (1655-66) (www.downsurvey.tcd.ie)

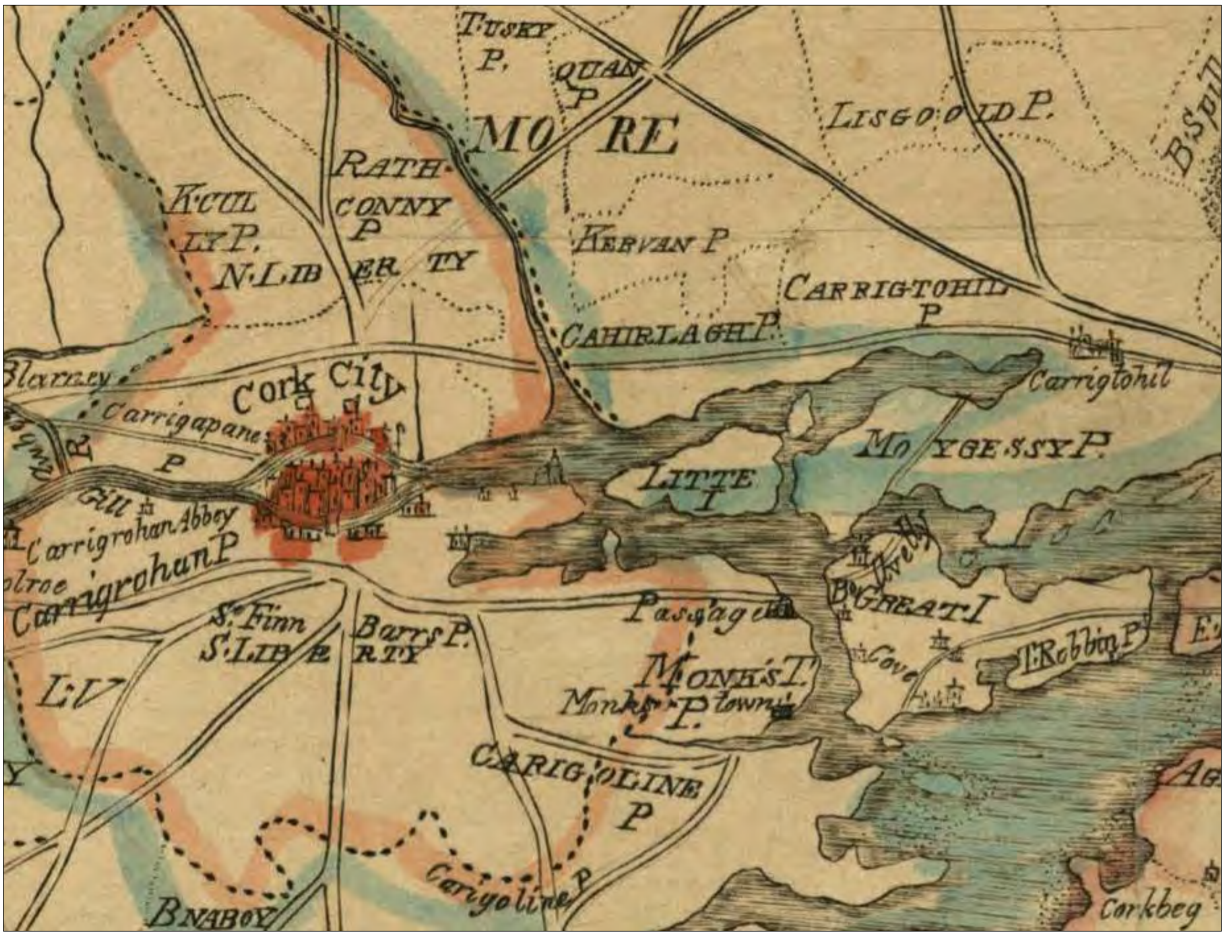


Image 13.5: Smiths map of county cork (1750) depicting Little Island completely separate from the mainland (www.corkpastandpresent.ie)


**Image 13.6: Taylor and Skinner (1777) depicting Little Island completely separate from the mainland (www.lbrowncollection.com/road-maps-of-ireland-taylor-skinner-1777-)**

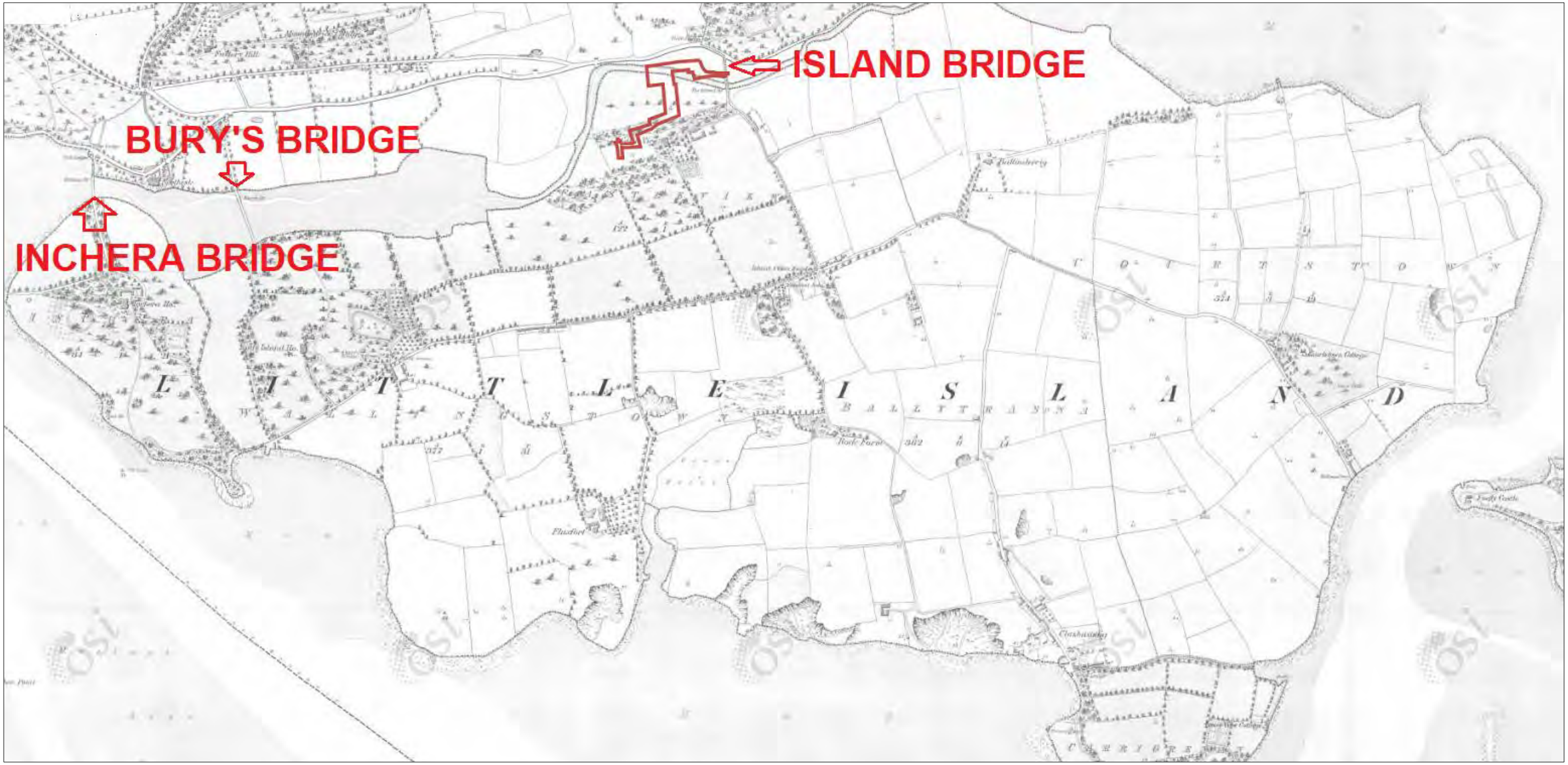


Image 13.7: OS 6-inch map 1841 (1841) depicting Little Island with its county houses and demesnes and the three bridges which connected it to the mainland in the mid-19th century (www.osi.ie)

On the 1841 OS 6 inch map (refer to **Image 13.7** and **Image 13.8**), Little Island can be seen as the most northerly of the islands in Cork harbour with its northern shore separated from the mainland by a narrow tidal channel which is crossed by three bridges. One of the bridges, The Island Bridge, lies just to the east of the Proposed Development site. Area A (on the mainland side) is depicted as part of a field on the northern bank of the tidal channel with the Cork to Youghal Road forming the northern boundary of the field. The Island Bridge was a swing bridge, built in 1880 linking Little Island to the mainland. Area B across the channel to the south is situated on Little Island. It lies within the demesne lands of Castle View (now the Radisson Blu Hotel; PS502). On the OS map of 1902 (refer **to Image 13.9**) almost all of the channel has been infilled and reclaimed and the GS & W railway line (now the Cork to Midleton and Cobh railway line) runs roughly along this railway line. Area A lies in a field now sandwiched between the Cork to Youghal Road to the north and the railway line to the south. Little Island train station lies to the east. Area B, to the south of the railway line, lies within the grounds of Ditchley and covers an area of open ground with some trees at the southern end. The two areas of the Proposed Development site are depicted in much the same way on the OS 6-inch map of 1935 (refer to **Image 13.10**).

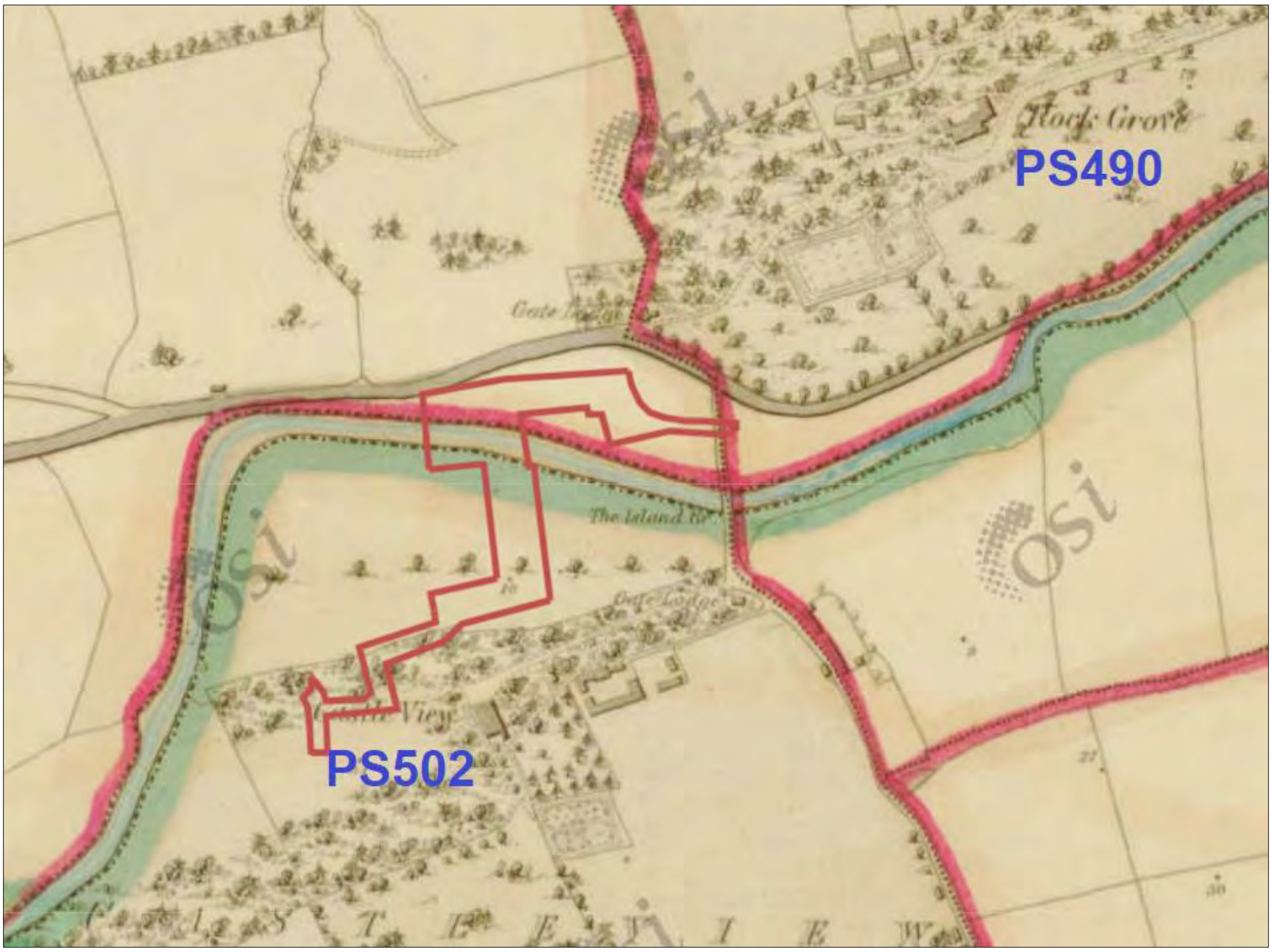


**Image 13.8: Indicative outline of Proposed Development site on OS 6-inch map 1841 (www.archaeology.ie)**

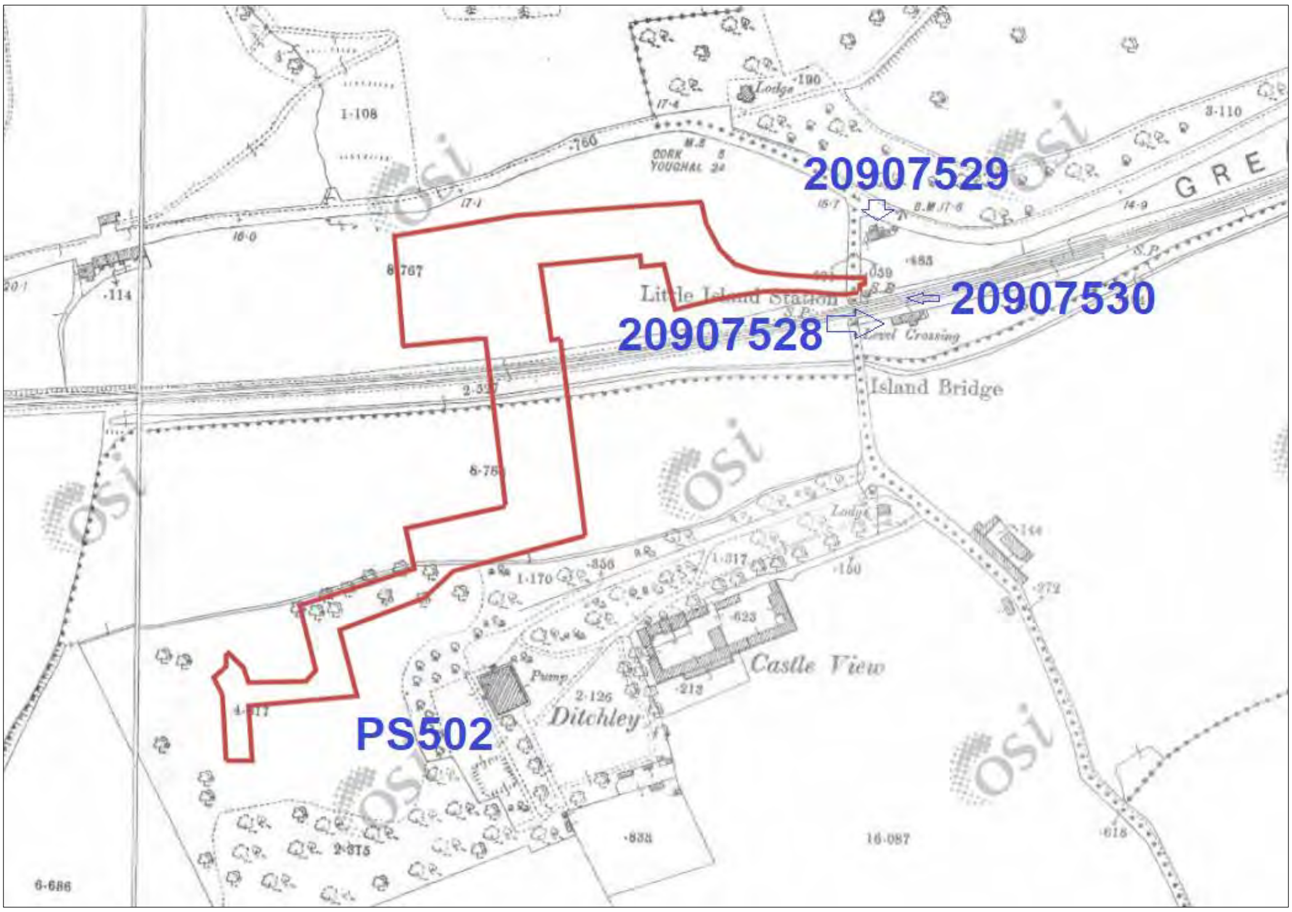


Image 13.9: Indicative outline of Proposed Development site on OS 25-inch map 1902 (www.archaeology.ie)

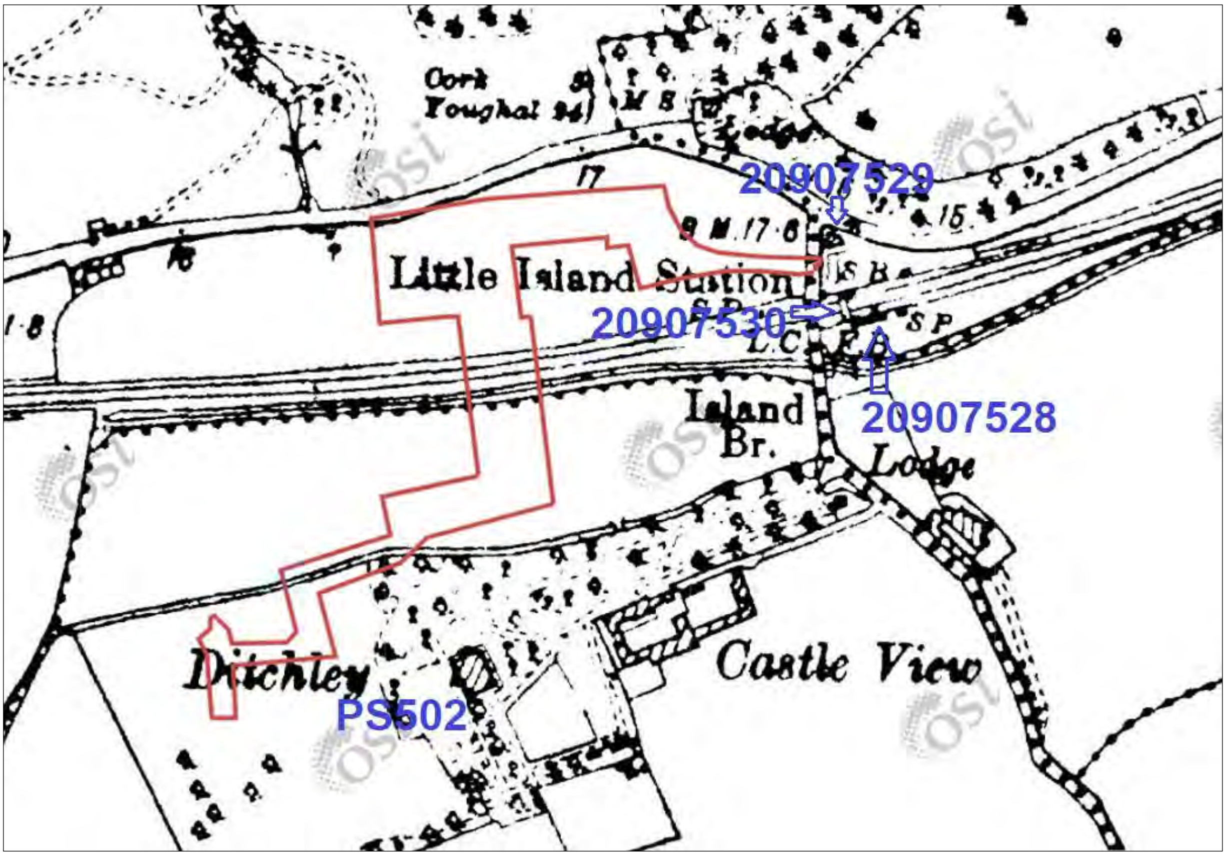


Image 13.10: Indicative outline of Proposed Development site outlined on OS 6-inch map 1935 (www.archaeology.ie)

### 13.3.5 Walkover survey

The Proposed Development site (refer to **Image 13.11**) was inspected by the author in October 2022 and February 2023 in overcast dry weather conditions (refer to **Plates 1** to **5)** and the following observations were made:

- Area A comprises a section of a public park on the south side of the old Youghal Road and to the north of the Cork to Midleton and Cobh railway line. It comprises a level green area with a gravel pathway running east-west along the northern boundary and a row of mature trees along the southern boundary within waterlogged ground. An aerial photograph dated 1999-2003 depicts it as an amenity space with meandering pathways running through it. Subsequent aerial photographs (2004-2013) show changes and variations to these pathways. Just outside the Proposed Development site to the west, an open drain feeds into a roughly circular overgrown pond with banked up excavated material around its edges;
- The eastern section of Area B comprises an overgrown area of mature woodland and dense vegetation, a section of which lies within the grounds of the Radisson Blu Hotel. To the west of this overgrown area are car park areas associated with the Radisson Blu Hotel and Eastgate Business Park; and
- No features or finds of archaeological / cultural heritage interest were evident in either Area A or B.

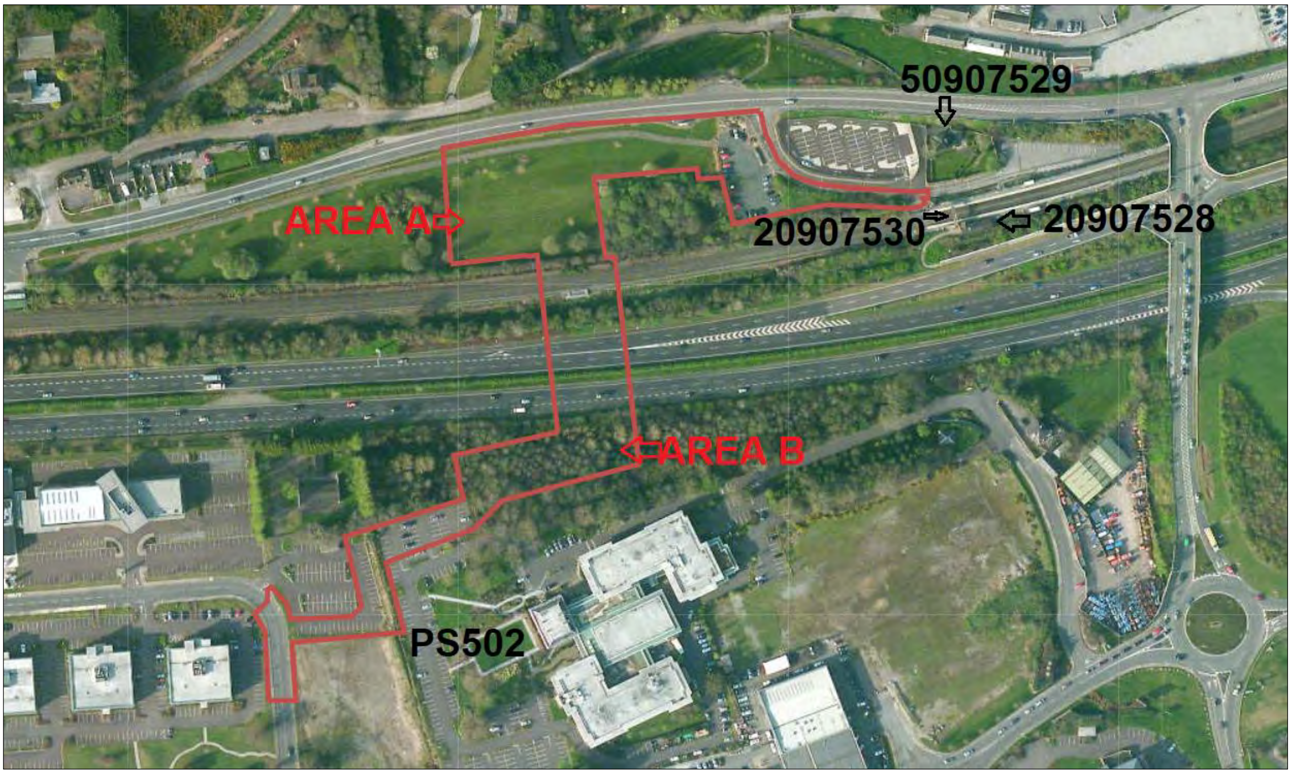


**Image 13.11: Indicative outline of the Proposed Development outlined on OS aerial 2014-2018 (www.osi.ie)**

Plate 1: Area A, looking west

Plate 2: Area A, looking west

Plate 3: Area A, looking east

Plate 4: Area B, looking south towards the Radisson Blu Hotel

Plate 5: Area B, looking east

## 13.4 Potential Impacts

The assessment of impacts (both direct and indirect) during Construction, Operation and Decommissioning of the Proposed Development has been carried out in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022). The likely significant effect of the Proposed Development on the archaeological, architectural and cultural heritage environment are assessed with reference to the EPA Description of Effects (EPA, 2022) as detailed in Table 1.1 of **Chapter 1,** *Introduction*.

### 13.4.1 Characteristics of the Proposed Development

The Proposed Development involves the construction of a pedestrian and cyclist bridge between Areas A and B and will involve large scale ground disturbance and ground reduction. The location of the Proposed Development site, albeit in a radically transformed landscape, would have encouraged human settlement and use from the earliest of times and evidence of such may still exist beneath the surface.

### 13.4.2 Do-Nothing Scenario

If the Proposed Development does not proceed, the existing landscape will remain in its current condition with the potential for subsurface archaeological remains to exist in situ, resulting in a neutral impact.

### 13.4.3 Construction Phase

There are no registered archaeological sites listed in the RMP for Cork or on the SMR database of the ASI within the Proposed Development site.

The predicted impact of the Construction Phase on registered archaeological sites will be neutral.

There are no Protected Structures listed in the CCDP and no structures listed in the NIAH within the Proposed Development site. One PS, the Radisson Blu Hotel, is located approximately 50m to the south of the Proposed Development site.

The predicted impact of the Construction Phase on the Radisson Blu Hotel will be neutral.

The Proposed Development will involve large scale ground reduction. This would have a direct effect on any potential archaeological sites which may survive below the ground surface. Where extensive earthmoving is involved, there is always the possibility that archaeological material will be uncovered.

If previously unknown archaeological features are identified during ground reduction, they will either be preserved by record or preserved in situ. If such features are preserved by record, they will be removed from the cultural landscape following full archaeological excavation. This effect would be significant and permanent.

### 13.4.4 Operational Phase

#### 13.4.4.1 Visual impact on Ditchley House

The Proposed Development site is situated within a well-established industrial and commercial landscape which has experienced monumental change since the construction of the railway line in 1859. This change continued with the construction of the N25 and the growth of Little Island into an industrial and commercial hub in the 1970s and 80s. Ditchley House (PS502) once stood within a highly ornate demesne landscape and both the demesne and house have now been permanently altered. The house was converted to a hotel in 2004 and while the house itself was restored and retained, a large modern extension was added to its east and south. As part of that development, the associated farm buildings and courtyard were demolished. The development of Eastgate Business Park and the N25 have removed all trace of the demesne. These developments have had a significant effect on Ditchley House and its setting, irreversibly altering it and its setting.

The construction of a bridge here will be in keeping with the type of development which has taken place in the past 200 years. Several bridges have linked Little Island with the mainland since the first bridge shown on the Grand Jury map of 1811. The Proposed Development will not detract from the setting of the house, rather it will open up views to and from it, making it a more prominent feature which will ultimately have a positive visual effect on the local landscape. Ditchley House and its remaining demesne features, gate lodge and entrance piers, will remain intact within this ever-changing landscape.

The predicted visual impact of the bridge on the Radisson Blu Hotel will be positive and long term.

### 13.4.5 Decommissioning Phase

In the event of decommissioning of the site, no archaeological, architectural or cultural heritage effects are predicted.

## 13.5 Mitigation and Monitoring Measures

### 13.5.1 Construction Phase

The Proposed Development was assessed as being wholly unsuitable to conduct a geophysical survey due to prevailing ground conditions (previous ground disturbance such as hardstanding, underground services and overhead medium voltage powerlines in Area A and dense tree cover and hardstanding in Area B). Similarly, it was determined that existing ground conditions meant that archaeological monitoring during construction was more suitable mitigation than pre-development archaeological testing.

Licenced archaeological monitoring of all ground works will be undertaken during construction. If features of archaeological significance are identified, further mitigation will be required following consultation with the County Archaeologist and the NMS. Such features will be fully resolved to professional standards of archaeological practice either by preservation in situ or preservation by record, as outlined in Policy and Guidelines on Archaeological Excavation (Department of Arts, Heritage, Gaeltacht and the Islands, 1999b).

### 13.5.2 Operational Phase

No archaeological, architectural or cultural heritage effects are predicted during the Operational Phase of the Proposed Development. Therefore, no mitigation or monitoring measures are required during the Operational Phase.

### 13.5.3 Decommissioning Phase

No archaeological, architectural or cultural heritage effects are predicted during the Decommissioning Phase of the Proposed Development. Therefore, no mitigation or monitoring measures are required during the Decommissioning Phase.

## 13.6 Cumulative Impacts

A review of CCC, An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

There is predicted to be no cumulative effects on archaeology, architectural and cultural heritage associated with the Construction, Operation or Decommissioning of the Proposed Development in combination with the projects listed in **Chapter 20,** *Cumulative and Interactive Impacts*.

## 13.7 Residual Impacts

Following the implementation of mitigation measures, no significant negative residual archaeological, architectural or cultural heritage effects are predicted.

## 13.8 Difficulties Encountered

No archaeological, architectural or cultural heritage features were identified within the Proposed Development site via a desktop assessment and walkover survey. Many archaeological sites, however, survive only as subsurface remains, often forgotten and concealed from view.

Prevailing ground conditions throughout the Proposed Development site prevented a geophysical survey (which can identify subsurface archaeological remains) being undertaken. Hitherto unknown subsurface archaeological remains may be present in areas of undisturbed ground within the Proposed Development site. The eastern half of Area B is heavily wooded and overgrown with vegetation, making a full assessment of this area on the ground difficult.

Although difficulties were encountered, an informed conclusion on the effects that the Proposed Development will have on the receiving archaeological, architectural and cultural heritage environment was nevertheless feasible.

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# Chapter 14

# Population and Human Health

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# 14. Population and Human Health

## 14.1 Introduction

This chapter describes the potential impacts of the Proposed Development on population and human health (i.e., socio-economic and public health aspects, respectively) during Construction, Operation and Decommissioning. It should be noted that **Chapter 19**, *Major Accidents and Disasters* separately addresses the potential impacts of possible unplanned events (i.e., major accidents or disasters) on humans.

**Chapter 4**, *Description of the Proposed Development* provides a description of the Proposed Development and **Chapter 5**, *Construction Strategy* describes the construction strategy.

The purpose of this assessment is to identify and assess the potential health and wellbeing impacts of the Proposed Development on the surrounding population, and to deliver evidence-based recommendations that maximise health benefits and reduce or remove potentially negative impacts.

Population aspects of relevance to this assessment primarily include economic and employment opportunities, and traffic distribution. Other aspects relevant to human beings such as natural amenity, built and natural heritage, ecosystem services, material assets and nuisance are dealt with in the following chapters:

- **Chapter 7**, *Traffic and Transportation*;
- **Chapter 8**, *Landscape and Visual*;
- **Chapter 9**, *Biodiversity*;
- **Chapter 10**, *Noise and Vibration*;
- **Chapter 11**, *Air Quality*;
- **Chapter 12**, *Climate*;
- **Chapter 13**, *Archaeological, Architectural and Cultural Heritage*;
- **Chapter 16**, *Water*;
- **Chapter 17**, *Land, Soils, Geology and Hydrogeology*;
- **Chapter 18**, *Material Assets*; and
- **Chapter 19**, *Risk of Major Accidents and / or Disasters*.

## 14.2 Assessment Methodology

### 14.2.1 General

Population aspects of relevance to this assessment primarily include economic and employment opportunities, and traffic distribution. Human health impacts are primarily considered through an assessment of the environmental pathways by which health can be affected such as air, noise, water or soil.

The assessment on human health therefore draws on the findings of other sections of the EIAR as appropriate to assess the potential significant impacts on human health.

This chapter initially sets out the assessment methodology (Section 14.2) and describes the baseline environment of the Proposed Development (Section 14.3). The potential impacts of the Proposed Development which are of relevance for population and human health are described (Section 14.4). Measures are then proposed to mitigate and monitor likely significant impacts (Section 14.5). Cumulative impacts are addressed in Section 14.6 and residual impacts are detailed in Section 14.7. The chapter concludes with a reference section (Section 14.8).

### 14.2.2 Guidance and legislation

This assessment has been undertaken with due regard to the following guidance:

- US EPA (2016). Health Impact Assessment Resource and Tool Compilation;
- IEMA (2022). Determining Significance for Human Health in Environmental Impact Assessment;
- IEMA (2017). Health in Environmental Impact Assessment - A Primer for a Proportionate Approach;
- Institute of Public Health Ireland (2009) Health Impact Assessment Guidance;
- British Standards Institution (2014). 5228-1 and 2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites. Noise and Vibration;
- EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- Air Quality Standards Regulations 2011; and
- European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No 272 of 2009) as amended by the European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012 (S.I. No. 327 of 2012); and the European Communities Environmental Objectives (Surface Water) (Amendment) Regulations 2015 (SI No. 386 of 2015).

### 14.2.3 Study area

For the purposes of this assessment, the Caherlag electoral division, within which the Proposed Development is located, was examined in the context of the receiving environment, and with the potential for significant impacts on population and human health.

### 14.2.4 Categorisation of the baseline environment

The categorisation of the baseline environment has required the assimilation and examination of baseline data through desktop research, site visits and analysis to establish the existing conditions in the study area. Specifically, the following data has been examined in order to categorise the baseline environment:

- Demographic data from the 2016 Census that has been published by the Central Statistics Office;
- Design drawings of the Proposed Development;
- Relevant environmental baseline data gathered and considered as part of this EIAR, especially traffic and air quality, noise, landscape and visual assessments;
- Relevant planning documentation as described in detail in **Chapter 6**, *Planning and Policy***;**
- The Proposed Development as described in **Chapter 4**, *Description of the Proposed Development***.**

### 14.2.5 Impact assessment methodology

The approach to assessing potential impacts on population and human health is set out in the current EIA Directive (2014/52/EU). The recitals to the 1985 and 2011 Directives refer to '*Human Health*' and include '*Human Beings*' as the corresponding environmental factor. The 2014 Directive changes the title of this factor to '*Population and Human Health*'.

According to the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) *"in an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc."*

The Guidelines also note that:

*"The transposing legislation does not require assessment of land-use planning, demographic issues or detailed socio-economic analysis. Coverage of these can be provided in a separate Planning Application Report to accompany an application for planning permission."*

Potential impacts of the Proposed Development on population and human health arise from traffic and transportation, air quality and climate, noise and vibration, landscape and visual, material assets and the risk of major accidents and/or disasters. These aspects are dealt with in the specific chapters in this EIAR dedicated to those topics, and this chapter refers to the findings of those assessments included elsewhere in this EIAR for which human health impacts might occur.

The initial assessment as outlined in Section 14.3 examines the existing population statistics and the status of human health in the proposed study area.

Section 14.4 outlines the potential impacts associated with the Proposed Development.

Assessment criteria are based on those outlined in the EPA guidelines.

Following the assessment of impacts, specific mitigation and monitoring measures have been developed to avoid, reduce and, if possible, remedy any negative impacts on population and human health. These are described in Section 14.5.

Cumulative and residual impacts are described in Section 14.6 and Section 14.7, respectively.

## 14.3 Baseline Environment

The description of the baseline conditions has been made in the context of the site and land use, as well as demographics in relation to population, age and economic activity.

### 14.3.1 Population and employment

#### *14.3.1.1 National context*

The Labour Force Survey[1] released by the CSO for Q3 of 2022 indicated that in Ireland there was an annual increase in employment of 3.4% or 83,100 from Q3 of 2021, bringing the total employment to 2,554,300. However, there was a slight decrease in employment numbers between Q2 2022 and Q3 2023 of 300.

Data regarding the number of persons at work and the related industries for Ireland from the 2016 Census for the State are represented in **Table 14.1** and **Table 14.2**.

**Table 14.1: Persons at work by occupation (state)**

| Occupation | Male | Female | Total |
|---|---|---|---|
| Managers, Directors and Senior Officials | 105,704 | 63,328 | 169,032 |
| Professional Occupations | 172,799 | 220,809 | 393,608 |
| Associate Professional and Technical Occupations | 145,431 | 102,982 | 248,413 |
| Administrate and Secretarial Occupations | 50,294 | 177,738 | 228,032 |
| Skilled Trades Occupations | 287,177 | 29,136 | 316,313 |
| Sales and Customer Service Occupations | 54,592 | 100,438 | 155,030 |
| Caring, Leisure and Other Service Occupations | 29,517 | 136,646 | 166,163 |
| Process, Plant and Machine Operatives | 134,949 | 27,692 | 162,641 |
| Elementary Occupations | 120,395 | 79,892 | 200,287 |

[1] https://www.cso.ie/en/releasesandpublications/ep/p-lfs/labourforcesurveyquarter22022/

| Occupation | Male | Female | Total |
|---|---|---|---|
| Not Stated | 129,269 | 103,815 | 233,085 |
| **Total** | **1,230,127** | **1,042,476** | **2,272,603** |

**Table 14.2: Persons at work by industry (state)**

| Industry | Male | Female | Total |
|---|---|---|---|
| Agriculture, forestry and fishing | 78,631 | 10,485 | 89,776 |
| Building and construction | 94,638 | 7,211 | 101,849 |
| Manufacturing industries | 162,979 | 66,569 | 229,548 |
| Commerce and trade | 248,323 | 231,794 | 480,117 |
| Transport and communications | 124,866 | 46,328 | 171,194 |
| Public administration | 55,951 | 50,846 | 106,797 |
| Professional services | 129,677 | 341,979 | 471,656 |
| Other | 181,609 | 174,766 | 356,364 |
| **Total** | **1,076,674** | **926,967** | **2,006,641** |

#### *14.3.1.2 Local context*

Cork is one of the most populated counties in the State and has the third highest population, 581,231 (CSO: 2022). Over a 25- year period, Cork has experienced a major and consistent expansion of its population. From 1991 to 2016, Cork County experienced a 32.3% increase in its population base. Between 2016 and 2022, this growth rate continued with a 7.1% increase across the county. This growth can be attributed to numerous employment locations within the county, which include the electoral division of Caherlag, within which the Proposed Development is located.

**Table 14.3** compares the population change in the State, Cork County and the Electoral Division of Caherlag between 2011 and 2016.

**Table 14.3: Population change 2011-2016**

| Population Change 2011-2016 | | | |
|---|---|---|---|
| | **2011** | **2016** | **% Change 2011-2016** |
| **State** | 4,588,252 | 4,761,865 | +3.8% |
| **Cork County** | 399,802 | 417,211 | +4.4% |
| **Caherlag** | 6,958 | 7,480 | +7.5% |

According to CSO data, the population of Caherlag in 2011 was 6,958. In 2016, the population increased by 522 or 7.5% to a total of 7,480.

Analysis of the Census 2016 data for Caherlag provides information relating to the jobs that are located within the area and the place of employment for the people who live within this electoral division.

**Table 14.4** outlines the occupations of all those usually resident members of the population within the study area who are 'at work'. Within the study area, there are 3,623 people who are stated to be 'at work' in the 2016 census.

**Table 14.4: Persons at work by occupation (Caherlag)**

| Occupation | Caherlag | | |
|---|---|---|---|
| | Male | Female | Total |
| Managers, Directors and Senior Officials | 267 | 112 | **379** |
| Professional Occupations | 357 | 437 | **794** |
| Associate Professional and Technical Occupations | 290 | 170 | **460** |
| Administrative and Secretarial Occupations | 72 | 297 | **369** |
| Skilled Trades Occupations | 314 | 33 | **347** |
| Caring, Leisure and Other Service Occupations | 32 | 209 | **241** |
| Sales and Customer Service Occupations | 95 | 169 | **264** |
| Process, Plant and Machine Operatives | 241 | 45 | **286** |
| Elementary Occupations | 149 | 113 | **262** |
| Not Stated | 129 | 92 | **221** |
| **Total** | **1,946** | **1,677** | **3,623** |

Information is also provided in relation to the industries in the area in **Table 14.5,** which outlines the industry type of all those usually resident members of the population within the study area who are 'at work'. In Caherlag, approximately 13% of those 'at work' are in the 'Building and Construction' and 'Transport and Communications' sectors.

**Table 14.5: Persons at work by industry (Caherlag)**

| Occupation | Caherlag | | |
|---|---|---|---|
| | Male | Female | Total |
| Agriculture, forestry and fishing | 31 | 2 | **33** |
| Building and construction | 121 | 9 | **130** |
| Manufacturing industries | 460 | 199 | **659** |
| Commerce and trade | 507 | 404 | **911** |
| Transport and communications | 223 | 97 | **320** |
| Public administration | 84 | 68 | **152** |

| Occupation | Caherlag | | |
|---|---|---|---|
| | Male | Female | Total |
| Professional services | 183 | 581 | **764** |
| Other | 224 | 212 | **436** |
| **Total** | **1,833** | **1,572** | **3,405** |

According to 2016 Census data, the journey time to work, school or college of some 34% of the population of Caherlag is under 15 minutes. Refer to **Table 14.6**.

**Table 14.6: Population aged 5 years and over - journey time to work, school or college (Caherlag)**

| Journey Time | Caherlag (persons) |
|---|---|
| Under 15 mins | 1,787 |
| 1/4 hour – under 1/2 hour | 1,809 |
| 1/2 hour – under 3/4 hour | 1,080 |
| 3/4 hour – under 1 hour | 167 |
| 1 hour – under 1 1/2 hours | 120 |
| 1 1/2 hours and over | 61 |
| Not stated | 215 |
| **Total** | **5,239** |

For those who identified as being ‘at work’ in the 2016 Census, approximately 51% of people in Caherlag drive themselves to work. Commuting trends for Caherlag are displayed in **Table 14.7**.

**Table 14.7: Means of travel to work (Caherlag)**

| Means of Travel | Caherlag (persons) |
|---|---|
| On foot | 418 |
| Bicycle | 32 |
| Bus, minibus or coach | 311 |
| Train, DART or LUAS | 118 |
| Motorcycle or scooter | 13 |
| Car driver | 2,715 |
| Car passenger | 1,314 |
| Van | 161 |

| Means of Travel | Caherlag (persons) |
|---|---|
| Other (incl. lorry) | 13 |
| Work mainly at or from home | 100 |
| Not stated | 144 |
| **Total** | **5,339** |

The Cork County Development Plan (CCDP) (CCC, 2022) notes that Little Island is one of the key employment locations in Metropolitan Cork and is designated as a strategic employment location. Little Island is identified as a location that is suitable for large scale employment development, i.e., large stand-alone uses which require significant amounts of land, in the CCDP.

The Cork Metropolitan Area Strategic Plan (MASP) (SRA, 2020) also identifies the potential for foreign direct investment and development by indigenous enterprises in the Little Island area.

### 14.3.2 Human health

#### *14.3.2.1 National context*

The 2022 edition of the Health in Ireland: Key Trends report (Department of Health, 2022) provides summary statistics of the overall health status of the country.

Population health at the national level presents a picture of decreasing mortality rates and high self-perceived health over the past 10 years. Ireland has the highest self-perceived health status in the EU, with 82.1% of people rating their health as good or very good. The number of people reporting a chronic illness or health problem is also better than the EU average, at around 29% of the population. However, health status reflects income inequality, with fewer low-income earners reporting good health both in Ireland and across the EU.

Age-standardised mortality rates have declined for all causes over the past decade by 15.8%. This decrease is particularly strong for mortality rates from suicide (-32.6%), pneumonia (-59.1%) and stroke (-47.8%). Infant mortality, measured as deaths per 1,000 live births, has also decreased by 14.3% since 2011 and remains below the EU average. Ireland is currently below the EU average for suicide rates for both men and women. Ireland performs better than the European average for treatable deaths.

**Table 14.8: Self-perceived health status**

| General Health | Total (%) |
|---|---|
| Very Good | 45% |
| Good | 36.1% |
| Fair, Bad, Very Bad | 18.9% |

#### *14.3.2.2 Local context*

Cork County Council is a member of the National Healthy Cities and Counties of Ireland Network which is accredited to the World Health Organisation (WHO). The purpose of the network is to develop a structure to support Local Authorities in implementing a Health Ireland Framework. The network aims to:

- Promote lifelong health and wellbeing;
- Provide a means where local issues can influence national policy; and
- Provide a voice for Ireland in the WHO Network of European National Healthy Cities Networks.

The CCDP (CCC, 2022) has identified a number of planning objectives to provide for the future wellbeing of the residents of the county with the aim to "*promoting and improving quality of life and public health.*"

Results from the 2016 Census indicated that 90% of the population in Cork County identified themselves as being of 'very good' or 'good' health. Refer to **Table 14.9.**

**Table 14.9: Self-perceived health status in Cork County**

| General Health | Cork County Total |
|---|---|
| Very Good | 263,057 |
| Good | 110,351 |
| Fair | 28,786 |
| Bad | 4,276 |
| Very Bad | 967 |
| Not Stated | 9,774 |
| **Total** | **417,211** |

According to the 2016 results, approximately 91% of the population in Caherlag identified themselves as being of 'very good' or 'good' health, with only 0.87% of the population in this area identifying themselves as being of 'bad' or 'very bad' health. **Table 14.10** outlines the self-perceived health status of the population living within this electoral division. These results are consisted with State and County results.

**Table 14.10: Self-perceived health status for Caherlag**

| General Health | Caherlag | | |
|---|---|---|---|
| | Male | Female | Total |
| Very Good | 2,570 | 2,607 | 5,177 |
| Good | 786 | 872 | 1,658 |
| Fair | 192 | 210 | 402 |
| Bad | 24 | 33 | 57 |
| Very Bad | 5 | 3 | 8 |
| Not Stated | 109 | 70 | 179 |
| **Total** | **3,686** | **3,795** | **7,481** |

The 2016 Census data showed that there were some 294 carers and 792 persons with a disability in Caherlag.

Information on the receiving environment with regards air and water quality is provided in **Chapter 11**, *Air Quality*, **Chapter 12**, *Climate* and **Chapter 16**, *Water*.

Radon accounts for more than half of the total radiation dose received by the Irish population. As a known carcinogen, in the same category as tobacco smoke and asbestos, it is a cause of lung cancer. Approximately 300 cases of lung cancer in Ireland every year can be linked to radon. These lung cancer cases are principally associated with exposure to radon in the home, but exposure in the workplace is also a contributor. In the workplace, the employer must protect the health of workers from this identifiable risk.

Certain areas of the country are more likely to have a high number of homes with excessive levels of radon and these areas are known as High Radon Areas. The online EPA maps were reviewed in order to determine the risk of the Proposed Development to exposure to Radon. According to the EPA Radon Risk Map of Ireland, the Proposed Development is located in an area in which '*about 1 in 10 homes in this area is likely to have high radon levels'*.

### 14.3.3 Tourism and recreation

#### *14.3.3.1 National Context*

In 2019, tourism generated approximately €1.8 billion worth of revenue for the Irish economy and represents one of the most important economic sectors for Ireland. In response to the effects of the COVID-19 pandemic, the CCDP 2022-2028 introduced a new tourism agenda. It aims to develop, enhance and protect new and existing tourism assets, maximises tourism diversity throughout the County and to develop strong year-round tourist products that promote the potential of underdeveloped areas for tourism.

#### *14.3.3.2 Local context*

As noted in the Cork County Development Plan 2022-2028, Cork represents a significant draw for overseas tourists. In 2017, Fáilte Ireland estimated that 1,605,000 overseas tourists visited County Cork which represents a dramatic increase from the 2011 figures of 1,081,000 visitors (CCC, 2022). In 2019, Cork had five attractions within Ireland's top 50 Fee Charging visiting attractions: Fota Wildlife Park (462,047 visitors), Blarney Castle (460,000 visitors), Jameson Distillery Midleton (135,000 visitors), Charles Fort (97,900 visitors), and Youghal Heritage Centre (39,671 visitors) (CCC, 2022).

## 14.4 Potential Impacts

### 14.4.1 'Do-Nothing' Impact

The 'Do-Nothing' scenario considers the likely scenario that would arise, assuming the Proposed Development were not progressed, i.e., if nothing were done. In the 'Do-Nothing' scenario, the Proposed Development would not be constructed, and the population and human health impacts described herein would not occur.

Under the 'Do-Nothing' scenario, no additional employment opportunities would be generated, and no subsequent economic benefits would be gained locally, regionally or nationally.

Should the Proposed Development not proceed, there would be no change in existing traffic movements or journey patterns, no new atmospheric emissions, and no risk of major accidents or disasters occurring on site.

The Do-Nothing' scenario would be consistent with the baseline conditions and trends in the receiving environment, as detailed above. The resultant population and human health impact would be neutral.

### 14.4.2 Construction Phase

There may be some temporary disruption to nearby residents and road users during the Construction Phase of the Proposed Development, and some associated noise and dust emissions.

As outlined in **Chapter 7**, *Traffic and Transportation*, a total of 70 no. car parking spaces will be lost to accommodate the southern construction compound and the construction works. These will include 38 no. car parking spaces from the Radisson Blu car park and 32 no. car parking spaces from the Eastgate Business Park car park. This will result in a short-term, negative and imperceptible impact on population.

The traffic levels generated during the Construction Phase of the Proposed Development will not be significant. The impact on the surrounding public road network will be short-term, negative and imperceptible. A weekend closure of the railway line will take place to allow for the construction of the span crossing the railway line. This is anticipated to be a weekend closure during the Christmas or Easter downtime periods. Access to all local residences in the immediate vicinity of the site will not be prevented during the Construction Phase. Further detail on the potential impacts on traffic and transportation during the Construction Phase of the Proposed Development is provided in **Chapter 7**, *Traffic and Transportation*.

There is the potential for minor dust emissions to occur during the Construction Phase of the Proposed Development that have the potential to affect population and human health. **Chapter 11**, *Air Quality* and **Chapter 12**, *Climate* provide further detail on the potential significant impacts of the Construction Phase of the Proposed Development on air quality and climate.

Construction activities also have the potential to generate noise and vibration during the Construction Phase of the Proposed Development which have the potential to impact population and human health. However, in considering the nature and scale of the proposed construction works, and following the implementation of mitigation measures, noise and vibration levels during the Construction Phase are not predicted to be significant and are expected to be consistent with the levels of noise and vibration currently experienced in the surrounding area. As such, no significant negative impact on population or human health is predicted. **Chapter 10,** *Noise and Vibration* provides further detail on the potential significant impacts of the Construction Phase of the Proposed Development on noise and vibration.

The Construction Phase will result in hoarding / fencing, temporary excavations, piling rigs and cranes on site, soil disturbance, deliveries to site and lighting. This will result in a temporary, negative visual impact that is localised in nature.

The Proposed Development is not expected to give rise to any increased risk of major accidents or disasters. As outlined in **Chapter 19**, *Risk of Major Accidents and / or Disasters,* considering the environmental controls and monitoring measures which the contractor will implement, as set out in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), no significant negative impacts are predicted.

The Proposed Development will have a slight, positive, short-term impact on the population of County Cork, particularly those in the Caherlag electoral division, through employment generation during the Construction Phase. Approximately 50 temporary construction jobs are expected to be required during the 18-month Construction Phase of the Proposed Development.

In conclusion, no likely significant negative impacts on population and human health are predicted during the Construction Phase.

### 14.4.3 Operational Phase

As outlined in **Chapter 7**, *Traffic and Transportation*, the Operational Phase of the Proposed Development is likely to have no significant impact on traffic volume in the vicinity of the Proposed Development. However, a total of 44 no. car parking spaces will be permanently lost during the Operational Phase to accommodate the Proposed Development. This will include 32 no. car parking spaces from the Radisson Blu Hotel car park and 12 no. car parking spaces from the Eastgate Business Park car park. This will result in a permanent, negative and imperceptible impact on population.

**Chapter 11**, *Air Quality* and **Chapter 12**, *Climate* provide further detail on the potential significant impacts of the Operational Phase of the Proposed Development on air quality and climate. No potential significant impacts on population and human health are predicted.

Given the nature of the Proposed Development as a pedestrian and cyclist bridge, noise levels during the Operational Phase are not predicted to be significant and are expected to be consistent with the levels of noise currently experienced in the surrounding area. As such, no significant negative impact on population or human health is predicted. Refer to **Chapter 10,** *Noise and Vibration* for further details.

It is anticipated that the provision of the Proposed Development, a dedicated pedestrian and cycle bridge, will attract a significant number of pedestrians and cyclists. It will provide an attractive alternative to the private car and promote a modal shift to walking and cycling, while it will also provide connectivity and integration with other public transport services (i.e., rail), leading to more people availing of public transport. Furthermore, it will provide direct connections to both the Little Island Sustainable Transport Interventions (LISTI) active travel infrastructure, which is being implemented to achieve an immediate improvement in the transport issues in Little Island, and the Dunkettle to Carrigtwohill pedestrian and cycle route to the north of the Proposed Development site. The Proposed Development will therefore have a moderate, positive, long-term impact on the population of County Cork, particularly those in Caherlag electoral division.

As outlined in **Chapter 19**, *Risk of Major Accidents and / or Disasters*, the Proposed Development is not expected to give rise to any increased risk of major accidents or disasters during the Operational Phase.

As outlined in **Chapter 8**, *Landscape & Visual*, no likely significant negative impacts on landscape and visual amenity are predicted. Once complete and operational, the Proposed Development will have a moderate, positive and permanent impact on the site and its context. Direct benefits will arise from the improved accessibility and connectivity for people to active travel and public transport and the local enhancement of public green space. There will also be wider indirect benefits to people arising from the Proposed Development through its support of modal shift to sustainable forms of travel, thereby reducing vehicle movements to / from Little Island and the improvement in the local environment for people that flows from this.

In conclusion, no likely significant negative impacts on population and human health are predicted during the Operational Phase.

### 14.4.4 Decommissioning Phase

As mentioned in **Chapter 4**, *Description of the Proposed Development*, the design life of the proposed new pedestrian and cycle bridge is 120 years. During the potential future decommissioning works, the main bridge span and approach spans will be decommissioned by cutting the concrete decking and steel spans into a number of large sections. This will be done either *in situ* or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry.

The decommissioning activities have the potential to generate some environmental impacts, including some increases in traffic levels, and some noise and dust emissions. However, the intensity and duration of the activities will be less than that associated with the Construction Phase. Therefore, no likely significant impacts on population and human health are predicted during the Decommissioning Phase.

## 14.5 Mitigation and Monitoring

### 14.5.1 Mitigation

#### *14.5.1.1 Construction Phase*

It should be noted that Construction Phase mitigation measures relating to those factors under which population and human health impacts may occur have been addressed elsewhere in this EIAR, under the environmental factors for traffic and transportation, landscape and visual, noise and vibration, air quality, climate and water. Other than the mitigation measures outlined separately in **Chapters 7, 8, 10, 11, 12** and **16**, no further mitigation measures are proposed with respect to population and human health.

#### *14.5.1.2 Operational Phase*

It should be noted that Operational Phase mitigation measures relating to those factors under which population and human health impacts might occur have been addressed elsewhere in this EIAR, under the environmental factors for traffic and transportation, landscape and visual, noise and vibration, air quality, climate and water. Other than the mitigation measures outlined separately in **Chapters 7, 8, 10, 11, 12** and **16**, no further mitigation measures are proposed with respect to population and human health.

### 14.5.2 Monitoring

Monitoring of dust will be undertaken during the Construction Phase. Refer to **Chapter 11**, *Air Quality* for further details.

Monitoring of noise and vibration will also be undertaken during the Construction Phase. Refer to **Chapter 10**, *Noise and Vibration* for further details.

No monitoring measures related to population and human health are required during either the Operational Phase or the Decommissioning Phase.

## 14.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

For the specific environmental topics which have the potential to affect population and human health, the potential for cumulative impacts has been considered and described in relevant topic chapters. In each case, no potential for significant negative cumulative impacts were identified.

## 14.7 Residual Impacts

### 14.7.1 Construction Phase

There are no significant negative residual impacts on population and human health expected as a result of the construction of the Proposed Development.

A slight, positive, short-term impact on the population of County Cork, particularly those in the Caherlag electoral division, will arise through employment generation during the Construction Phase.

### 14.7.2 Operational Phase

There are no significant negative residual impacts on population and human health expected as a result of the operation of the Proposed Development.

A moderate, positive, long-term impact on the population of County Cork, particularly those in Caherlag electoral division, will arise as a result of the Proposed Development promoting a modal shift to walking, cycling and public transport.

### 14.7.3 Decommissioning Phase

There are no significant negative residual impacts on population and human health expected as a result of the decommissioning of the Proposed Development.

## 14.8 References

Air Quality Standards Regulations 2011.

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# Chapter 15

# Resources and Waste

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# 15. Resources and Waste

## 15.1 Introduction

This Chapter describes the potential significant effects of the Proposed Development in relation to resource and waste management. **Chapter 4**, *Description of the Proposed Development* provides a description of the Proposed Development whilst **Chapter 5**, *Construction Strategy* describes the construction strategy. The following aspects of the Proposed Development are particularly relevant to the resource and waste assessment:

- **Design:** Throughout the design for the Proposed Development, consideration has been given to the minimisation of resource usage and to the generation of waste through retention of material on site and material use and reuse;
- **Construction:** During the construction of the Proposed Development, material usage will be minimised and material will be reused, where possible. Waste will be generated from site clearance, excavation and construction works;
- **Operation:** During operation, waste will be generated from the operation of the Proposed Development. Maintenance activities will also generate minor quantities of waste; and
- **Decommissioning:** Waste will also be generated at the end of the Proposed Development's lifespan during any decommissioning works.

The use of resources and the potential for waste and surplus materials to be generated during the Construction, Operation and Decommissioning of the Proposed Development are assessed herein. The potential environmental effects of the use of resources and the generation and management of solid waste arisings are examined in the context of the existing local and national resource and waste management environment. Mitigation measures are identified, where necessary, to reduce the impact of the use of resources and generation of waste by the Proposed Development during Construction, Operation and Decommissioning.

### 15.1.1 Sustainable resource and waste management principles

#### *15.1.1.1 Circular economy*

The principal objective of sustainable resource and waste management is to use material resources more efficiently, where the value of products, material and resources is maintained in the economy for as long as possible such that the generation of waste is minimised. To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy (refer to **Image 15.1**).

The Department of Environment, Climate and Communication's (DECC) A Waste Action Plan for a Circular Economy – Ireland's National Waste Policy 2020 – 2025 (DECC, 2020) notes that:

> *"In a circular economy the value of products and materials is maintained for as long as possible; waste and resource use are minimised, and resources are kept within the economy when a product has reached the end of its life, to be used again and again to create further value."*

The European Union (EU) Circular Economy Action Plan (European Commission, 2020) notes that:

> *"… the EU needs to accelerate the transition towards a regenerative growth model that gives back to the planet more than it takes, advance towards keeping its resource consumption within planetary boundaries, and therefore strive to reduce its consumption footprint and double its circular material use rate in the coming decade."*


**Image 15.1: Simplified model of the circular economy for materials and energy (European Environment Agency (EEA, 2016)**

Where residual waste generation is unavoidable, it will be dealt with in a way that follows the waste hierarchy (as illustrated in **Image 15.1**) and set out in Directive 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (hereafter referred to as the 'Waste Framework Directive').

The European Commission has adopted a new Circular Economy Action Plan (European Commission, 2020); one of the main blocks of the European Green Deal, Europe's new agenda for sustainable growth.

The Circular Economy Action Plan identifies buildings and construction as a key area where there are opportunities for resource efficiency and circularity.

The Department of Environment, Climate and Communications (DECC) published the Whole of Government Circular Economy Strategy 2022 – 2023 in December 2021 (DECC, 2021). The Strategy aims to support and implement measures that significantly reduce Ireland's circularity gap, so that Ireland's rate is above the EU average by 2030.

In July 2022, the Government issued into law the Circular Economy and Miscellaneous Provisions Act, 2022 (DECC, 2022). This Act places the Strategy and the commitment to a circular economy on a clear statutory footing. It underpins Ireland's shift from a 'take-make-waste' linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act is a key step in the successful transition of Ireland's economy to a circular economy and is evidence of Government's commitment to the achievement of that goal.

#### *15.1.1.2 The Waste Hierarchy*

The waste hierarchy supports the need to achieve efficient use of material resources, minimise the amount of waste produced (or otherwise increase its value as a resource) and reduce, as far as possible, the amount of waste that is disposed to landfill.


**Image 15.2: Waste hierarchy (European Commission)**

## 15.2 Methodology

### 15.2.1 Study area

The study area for waste and resources generation assessment from the Proposed Development comprises the areas and activities within the Proposed Development boundary (refer to **Chapter 4**, *Description of the Proposed Development*) and the wider Cork Region and the Southern Region (SR).

Waste from the Proposed Development may be accepted at sites nationally and internationally (which are suitably licensed or permitted for the waste volume and type) for treatment, recovery and / or disposal. However, as waste management planning in Ireland takes place on a regional basis, the study area generally for waste treatment, recovery and disposal comprises Cork and the SR, which takes in the following 10 Local Authority administrative areas:

- Limerick City and County Council;
- Tipperary County Council;
- Wexford County Council;
- Carlow County Council;
- Kilkenny County Council;
- Waterford City & County Council;
- Cork City Council;
- Cork County Council;
- Kerry County Council; and
- Clare County Council.

Where data is available at a local authority or regional level, this has been used. National data has been used where this is the only available level at which the data in question is published.

### 15.2.2 Relevant guidelines, policy and legislation

The following guidelines and policy documents were considered when undertaking the waste and resources assessment:

- Cork County Council (2022). Cork County Development Plan 2022 – 2028;
- DECC (2019). Consultation on the Transposition of the Circular Economy Waste Package;
- DECC (2020). A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020 – 2025;
- DECC (2021). Whole of Government Circular Economy Strategy 2022 – 2023;
- DECC (2022). Climate Action Plan 2023;
- EPA (2018). Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-hazardous;
- EPA (2019) Guidance on Soil and Stone By-products in the context of Article 27 of the European Communities (Waste Directive) Regulations 2011;
- EPA (2020a). By-Product - Guidance Note. A guide to by-products and submitting a by-product notification under Article 27 of the European Communities (Waste Directive) Regulations, 2011;
- EPA (2020b). Guidance to Planners, Planning Authorities and An Bord Pleanála on the Management of Excess Soil and Stone from Developments;
- EPA (2021a). The Circular Economy Programme 2021 – 2027;
- EPA (2021b). Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects;
- EPA (2021c) National Hazardous Waste Management Plan 2021 – 2027;
- EPA (2022a). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (the 'EPA guidelines');
- EPA (2022b). Municipal Waste Statistics for Ireland;
- EPA (2023a). Construction and Demolition Waste Statistics for Ireland;
- EPA (2023b). Hazardous Waste Statistics for Ireland;
- EPA (2023c). Biodegradable municipal waste to landfill;
- European Commission (2015). Closing the Loop: An EU Action Plan for the Circular Economy;
- European Commission (2018). EU Construction and Demolition Waste Management Protocol;
- European Commission (2020). Circular Economy Action Plan for a Cleaner and More Competitive Europe;
- Regional Waste Management Offices (2020). Construction & Demolition Waste, Soil and Stone Recovery / Disposal Capacity; and
- Southern Waste Regional Authority (2015). Southern Region Waste Management Plan 2015-2021.

#### *15.2.2.1 Directives and legislation*

- Waste Framework Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste;
- S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020 (hereafter referred to as the Waste Directive Regulations);

- S.I. No. 86/2008 - Waste Management (Facility Permit and Registration) Regulations 2008, as amended;
- S.I. No. 821/2007 - Waste Management (Facility Permit and Registration) Regulations 2007;
- S.I. No. 820/2007 - Waste Management (Collection Permit) Regulations 2007, as amended;
- S.I. No. 419/2007 - Waste Management (Shipments of Waste) Regulations 2007;
- Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (hereafter referred to as the Landfill Directive);
- Number 10 of 1996 - Waste Management Act 1996 Revised (hereafter referred to as the Waste Management Act 1996); and
- S.I. No. 26 of 2022 – Circular Economy and Miscellaneous Provisions Act 2022.

A summary of key policy and legislation is included as **Appendix 15.1** in **Volume 4** of this EIAR.

### 15.2.3 Appraisal method for assessment of impacts

The potential environmental impacts of solid waste and resource use and management associated with the Proposed Development were assessed with respect to the Construction, Operational and Decommissioning phases. These impacts may be neutral, positive or negative, and are dependent on the measures employed to prevent and / or manage the resources used and waste generated.

#### *15.2.3.1 Assessment methodology*

The likely impacts are assessed by describing waste and by-products generation and management from the Proposed Development and comparing this to the current waste and by-product management baseline in Ireland. The impact assessment and waste management options have been considered with regard to the waste hierarchy and the Waste Framework Directive.

The following factors were considered when determining the significance of the impacts of the Proposed Development on the various aspects of the receiving environment:

- Desk study of current practices for waste and by-product management in Ireland;
- Data gathered on the types and quantities of waste and by-product generation and management from the Proposed Development;
- An assessment of the likely environmental impacts that may arise from the quantity of waste requiring disposal to landfill, in line with the significance criteria from the EPA guidelines, as set out in **Chapter 1**, *Introduction*;
- The surplus materials arising and waste infrastructure capacity in the SR, in which the Proposed Development is located; and
- A review of the Proposed Development in the context of the waste hierarchy and circular economy principles to determine the mitigation measures required.

### 15.2.4 Data collection and collation

A desk study was undertaken, comprising reviews of:

- Relevant policy and legislation, which creates the legal framework for waste and resource management in Ireland;
- Estimated surplus materials and by-product generation for the Construction Phase of the Proposed Development;
- Operational Phase waste;
- Proposed Development design to identify appropriate mitigation and move waste management up the waste hierarchy through implementation of best practice, where possible;

- Types, quantities and management of construction and demolition (C&D) waste arisings generated in Ireland and the relevant Local Authority and SR jurisdictions;
- Types, quantities and management of commercial and industrial waste generated in Ireland and SR jurisdictions (Regional Waste Management Offices, 2020); and
- Availability (type and capacity) of waste infrastructure within the Local Authority jurisdiction and SR.

### 15.2.5 Waste management principles

During the Construction Phase of the Proposed Development, the appointed contractor will have regard to the following principles of the waste hierarchy, in line with the Waste Framework Directive (see **Image 15.2**).

#### *15.2.5.1 Prevention and minimisation*

Waste prevention and minimisation are the most environmentally sustainable means of managing surplus material from demolition, excavation and construction materials. The principles of prevention and minimisation of waste are inherent in the design of the Proposed Development.

#### *15.2.5.2 Reuse*

Article 27 of the European Union (Waste Directive) Regulations 2020 (Article 27) allows a material producer to determine, under certain circumstances, that a material is a by-product and not a waste. Substances or objects, such as soil and stones produced during construction projects, can be determined as a by-product if they satisfy all of the following criteria:

1. Further use of the material is certain;
2. The material can be used directly without any further processing other than normal industrial practice;
3. The material is produced as an integral part of the production process; and
4. Further use is lawful, in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

Substances or objects will be a by-product if they meet each of the conditions detailed in Article 27. The baseline area for reuse of by-products in accordance with Article 27 comprises the whole country, as no regional distinction is made in the Article 27 register.

Where it is proposed to use an Article 27 EPA notification in relation to excavation material from the Proposed Development, the appointed contractor will be responsible for ensuring compliance with Regulation 27 of the European Union (Waste Directive) Regulations 2011-2020 including notification to the EPA, seeking a determination from the EPA on the matter and compliance with all relevant Agency guidance on the matter.

Where it is proposed to use soil from off-site which is a by-product and subject to Regulation 27 of the European Union (Waste Directive) Regulations 2011-2020, the appointed contractor is responsible for carrying out any necessary due diligence regarding the material and ensuring that all EPA guidelines relating to that Article 27 notification have been complied with before the soil is imported into the site. Where feasible, appropriate and available construction by-products arising from other sites will be used in the development of this site in place of virgin materials.

#### *15.2.5.3 Recycling, recovery and disposal*

Where surplus materials are generated that cannot be reused, these will be regarded as waste and will be delivered to recycling or recovery facilities authorised in accordance with the Waste Management Act, 1996, as amended, which hold a Certificate of Registration, Waste Facility Permit or EPA Licence.

All wastes removed from site will be transported by the holder of the appropriate waste collection permit, granted in accordance with the S.I. No. 820/2007 - Waste Management (Collection Permit) Regulations 2007, as amended.

The option of disposal is the least desirable outcome for surplus material generated by the Proposed Development and will only be considered where it is not possible to deliver wastes for recycling or recovery to appropriately licensed / permitted facilities for reuse / recycling purposes.

In addition, where waste facility capacity does not exist within Ireland for management of specific waste streams, such as hazardous soils, these will be exported for treatment, recovery or disposal in accordance with the provisions of S.I. No. 419/2007 - Waste Management (Shipments of Waste) Regulations 2007, and in accordance with current practice in Ireland.

It will be the responsibility of the appointed contractor, under the Waste Management Act 1996, as amended, to ensure that all material delivered to authorised waste facilities is correctly classified and will meet the waste acceptance criteria of the receiving site.

It will be the responsibility of the appointed contractor to secure agreements for reuse, recycling or disposal of surplus materials from the Proposed Development in construction projects or authorised facilities, where appropriate, in accordance with the Waste Management Act, 1996 as amended, and associated regulations.

Where feasible recycled components or materials will be used in the development of this site in place of virgin materials, subject to the provisions of the Waste Management Act, 1996 as amended and Regulation 28 of the European Union (Waste Directive) Regulations 2011-2020.

## 15.3 Baseline Environment

### 15.3.1 Construction waste

#### *15.3.1.1 National*

List of Waste (LoW) codes for typical C&D wastes are included as **Appendix 15.2** in **Volume 4** of this EIAR.

In 2021, the latest year for which there are published statistics available, 9 million tonnes of C&D waste were generated in Ireland, representing an increase of 0.8 million tonnes from 2020 (EPA, 2023a). Of this waste, approximately 7.7 million tonnes comprised soil and stones, making up approximately 85% of the material waste stream.

A breakdown of the composition of C&D waste in Ireland in 2021 is set out in **Table 15.1**. These figures should be considered as a guide only, as C&D waste can vary significantly from one project to another, depending on the nature of the development and the waste management practices employed on-site.

**Table 15.1: Composition of C&D waste material collected in Ireland in 2021 (EPA, 2023a)**

| C&D waste type | Quantity (tonnes) | Proportion of material stream (%) |
|---|---|---|
| Soils, stones & dredging spoil | 7,696,287 | 85.1% |
| Concrete, brick, tile & gypsum | 608,235 | 6.7% |
| Mixed C&D waste | 362,380 | 4.0% |
| Metal | 257,558 | 2.8% |
| Bituminous mixtures | 87,343 | 1.0% |
| Segregated wood, glass & plastic | 31,946 | 0.4% |
| **Total** | **9,043,749** | **100%** |

Data issued by the EPA demonstrates that final treatment operations (backfilling, recycling, energy recovery, disposal) of C&D waste materials varied greatly between material streams. By far the largest quantity of C&D waste was used for backfilling (a recovery operation), which mainly reflects the dominance of soil and stones in the overall composition mix.

The EPA reports that Ireland achieved 85% material recovery of construction and demolition waste in 2021 (EPA, 2023a). Under the Waste Framework Directive (2008/98/EC) Member States must achieve 70% of material recovery of non-hazardous, non-soil-and-stone C&D waste by 2020.

As discussed above, Article 27 of the European Union (Waste Directive) Regulations 2020 allows a material producer to determine, under prescribed circumstances, that a material is a by-product and not a waste and so can be reused onsite or offsite within the industry.

On receipt of Article 27 notifications at the EPA, materials can be determined as a waste or a by-product. In some cases, no determination is issued by the EPA, meaning the material has not been determined as a waste. In 2021, the EPA assessed 123 by-product notifications. The EPA determined that 459,836 tonnes of the soil and stone notified were by-product, and 600 tonnes were waste. Notifications for 152,400 tonnes were withdrawn (EPA, 2023a).

The EPA reports that a total of 466,941 tonnes of hazardous waste was generated in Ireland in 2021, representing a decrease of 16 per cent (over 90,000 tonnes) from 2020 (EPA, 2023b). Hazardous waste types include wastes from dredging spoil, contaminated soils, waste treatment, solvents and hazardous elements of waste electrical and electronic equipment. In 2021, 52% of hazardous waste was treated in Ireland and 48% of hazardous waste was exported. Hazardous waste treatment in Ireland takes place on site of generation (95,130 tonnes) or at Irish hazardous waste management facilities (148,575 tonnes).

#### *15.3.1.2 Regional*

The Regional Waste Management Offices (RWMO) have published an updated Construction & Demolition Waste, Soil and Stone Recovery / Disposal Capacity report (2020), which states that:

*"(Licensed) Capacity in the SR is growing with the latest data indicating the Region has 17% of the national capacity."*

A summary of facilities with a waste licence and the corresponding capacity for the SR is presented in **Table 15.2**. A summary of facilities with a waste facility permit and the corresponding capacity for the SR is presented in **Table 15.3**. A summary of facilities with a certificate of registration and the corresponding capacity for the SR is presented in **Table 15.4**.

**Table 15.2: Summary of SR waste capacity – facilities with waste licence (RWMO, 2020)**

| County | No. facilities | Annual capacity (application stage) (tonnes) | Annual capacity (licenced, un-commenced) (tonnes) | Annual capacity (active and available) (tonnes) |
|---|---|---|---|---|
| Wexford | 2 | 80,000 | - | 400,000 |
| Kilkenny | 1 | - | - | 125,000 |
| Cork (County) | 4 | 300,000 | 580,000 | - |
| **SR sub-total** | **7** | **380,000** | **580,000** | **525,000** |

**Table 15.3: Summary of SR waste capacity – facilities with waste facility permit (RWMO, 2020)**

| No. facilities | Permitted capacity (lifetime) (tonnes) | Intake 2018 (tonnes) | Remaining capacity (lifetime) (tonnes) |
|---|---|---|---|
| 80 | 5,749,119 | 820,035 | 1,919,779 |

**Table 15.4: Summary of SR waste capacity – facilities with certificate of registration (RWMO, 2020)**

| No. facilities | Registered capacity (lifetime) (tonnes) | Intake 2018 (tonnes) | Remaining capacity (lifetime) (tonnes) |
|---|---|---|---|
| 83 | 1,284,682 | 188,892 | 453,559 |

### 15.3.2 Imported material

A report entitled Essential Aggregates: Providing for Ireland's Needs to 2040 (Irish Concrete Federation, 2019) was published in 2019 which details and quantifies Ireland's natural aggregate reserves. At the time of publication of that report, Ireland had approximately 500 active large commercial quarries, approximately 220 ready mixed concrete plants, 20 large scale precast concrete plants and 40 plants producing bitumen bound road surfacing materials.

The Irish Concrete Federation quantifies the annual production of these materials in Ireland on their website (Irish Concrete Federation, 2023), with the 2019 figures (the most recent available) being as follows:

- Five million cubic metres of ready-mixed concrete;
- 135 million concrete blocks;
- 38 million tonnes of aggregates;
- Two million tonnes of bituminous road surfacing materials; and
- Two million square metres of paving products.

### 15.3.3 Municipal Waste

Municipal waste will be generated in small quantities during the Construction Phase of the Proposed Development. Municipal waste in Ireland is made up of household waste as well as commercial and other waste that, because of its nature or composition, is similar to household waste. According to the EPA, Ireland generated 3.2 million tonnes of municipal waste in 2020 (EPA, 2022b).

Of the 3.2 million tonnes of municipal waste generated in Ireland in 2020, 42% was used in energy recovery, 30% was used in material recycling, 16% was landfilled, 11% was used in composting/anaerobic digestion and 1% was unmanaged. Of the 3.2 million tonnes of municipal waste, 57% is estimated to be from households and 43% is estimated to be from commercial and public service sources. Since 2001, significant changes have occurred in the management of municipal waste in Ireland, notably the dramatic decline in landfilling over this period, accompanied by increased levels of recycling in the early 2000s and subsequently an increase in the share of municipal waste sent for energy recovery since 2011.

In September 2020, the Government published a new national waste strategy, the National Waste Action Plan. The following targets were noted in the Waste Action Plan for municipal waste in Ireland, which will be implemented using waste collection permit conditions:

- Municipal solid waste (MSW) recycling rate of 55%, 60%, and 65% by 2025, 2030 and 2035 respectively; and
- Limit the amount of MSW to landfill to 10% by 2035.

To achieve these targets from the 30% recycling rate in 2020, improvements are required in waste reduction, segregation and contamination rates. The EPA estimates that (Government of Ireland, 2019):

> *"… Ireland's municipal recycling (including organic waste for composting and anaerobic digestion through the organic bin) rate could increase from 41% to 62% if all recyclable (including organic) material was removed from the general waste bins and placed into the correct mixed dry recycling and organic waste bins."*

Biodegradable municipal waste (BMW) comprises those elements of the municipal waste stream that will degrade biologically, for example food waste, garden and parks waste, waste paper and cardboard. Under the Landfill Directive, Ireland is committed to meeting targets for the diversion of BMW from disposal to landfill, including a limit of less than 610,000 tonnes to landfill. The quantity of BMW disposed to landfill in 2022 was 129,572 tonnes (EPA, 2023c), which is well within Ireland's current limit.

Capacity from composting and anaerobic digestion, municipal waste landfill, Material Recovery Facilities (MRFs), integrated waste management facilities, municipal waste incinerators and cement kilns accepting wastes for co-incineration can all be used to treat municipal waste.

## 15.4 Potential Impacts

This section presents potential impacts that may occur due to the Proposed Development, in the absence of mitigation. This informs the need for mitigation or monitoring to be proposed (refer to Section 15.45). Predicted residual impacts taking into account any proposed mitigation measures are then presented in Section 15.7.

### 15.4.1 Characteristics of the Proposed Development

**Construction Phase**

Aspects considered in the assessment of resource use and waste management for the Construction Phase included the following:

- Site clearance: removal of vegetation;
- Excavation: excavation of below ground material such as soil and stones;
- Imported material: import of materials for the construction of the Proposed Development;
- Construction: waste materials generated from and in relation to the construction of the Proposed Development; and
- Municipal waste.

**Operational Phase**

The generation of project related C&D waste from the maintenance of the proposed bridge was considered in the assessment of resource use and waste generation for the Operational Phase.

**Decommissioning Phase**

Surplus material sources from the potential decommissioning of the Proposed Development were considered in the assessment for the Decommissioning Phase.

These impacts are addressed in further detail below.

### 15.4.2 'Do-Nothing' Impact

The 'Do-Nothing' alternative considers the likely scenario that would arise, assuming the Proposed Development were not progressed, i.e., if nothing were done. In the 'Do-Nothing' scenario, the Proposed Development would not be constructed and the waste materials described herein would not be generated. The resultant resource and waste impact would be neutral.

### 15.4.3 Construction Phase

#### *15.4.3.1 Introduction*

Typical C&D wastes that are likely to arise during the Construction Phase of the Proposed Development are set out in **Appendix 15.2** in **Volume 4** of this EIAR, including EPA LoW codes.

The most environmentally sustainable means of managing excavation and construction material is its prevention and minimisation. Refer to Section 15.1.1 for the principles of waste management. The appointed contactor will be responsible for the implementation of these for the Proposed Development. In recent years, there has been a shift in focus on best practice waste management and waste minimisation in construction and an increase in the reuse of construction by-products in projects.

#### *15.4.3.2 Site clearance*

There are no buildings or structures currently present on the proposed site which will require demolition. However, clearance of some areas of the site will be required, with the resultant generation of organic materials.

Organic materials, including vegetation from shrub, tree or grass clearance or deposits removed from within drainage ditches, will generate only minor quantities of waste material for treatment at organic waste facilities. It is estimated that approximately 415 tonnes of cleared vegetation will be generated as a result of the Proposed Development.

There is adequate capacity for the management of such wastes – refer to Section 15.3. Segregation facilities may be provided, where necessary, on the construction site to ensure that the recovery and recycling of such wastes is maximised.

Considering the minor quantities of organic waste that will be generated during the site clearance works and the available treatment capacity for the waste generated, the predicted impact of site clearance, in the absence of mitigation, is negative, not significant and short-term.

#### *15.4.3.3 Excavation*

Excavation waste will arise from such activities as:

- Excavation for utility diversions;
- Excavation for footways / embankments;
- Excavation for piling works; and
- Excavation for foundations / piers.

In total, it is estimated that the construction of the Proposed Development will require the excavation of approximately 5,950 tonnes (bulk weight) of material. This material will comprise made ground, topsoil and subsoil.

It is estimated that approximately 300mm will need to be excavated under the proposed embankments and tie ins at grade footways / cycleways to allow for competent formation layers to be placed. The total amount of material estimated to be generated from these works will be approximately 2,260 tonnes (bulk weight).

In addition to the excavated topsoil, it is estimated that approximately 1,950 tonnes (bulk weight) of piling spoil material and approximately 1,740 tonnes (bulk weight) of excavated material for the pile caps will be generated.

Following the completion of the construction works, it is estimated that approximately 32,400 tonnes of construction surfacing material will be removed from site.

In line with current practice in Ireland, surplus materials and wastes from the Proposed Development will be managed as follows:

- Where practicable, naturally occurring excavated material will be reused within construction in the Proposed Development in accordance with Article 3 of the Waste Management Act, 1996, as amended;

- Excavation material will be used as general landscape fill within the Proposed Development and on other projects requiring the types of materials generated, where practicable, through Article 27 of the European Union (Waste Directive) Regulations, 2020. Reuse of topsoil and excavated material within the Proposed Development is proposed, where practicable. The material will also be subject to testing to ensure it is suitable for its proposed end use;
- Should material meet the acceptance criteria set out in Article 28 of the Waste Directive Regulations (EPA 2020), this material will be delivered to recovery or disposal facilities which are authorised to collect this material under the Waste Management Act 1996 (i.e., which hold a Certificate of Registration, Waste Facility Permit or EPA Licence), should such recovery or disposal facilities become available by the time of commencement of construction of the Proposed Development;
- In accordance with the law, all excavation wastes requiring removal from site for recycling or recovery will be delivered to facilities which are authorised under the Waste Management Act, 1996 (i.e., which hold a Certificate of Registration, Waste Facility Permit or EPA Licence). Examples of recycling / recovery activities for excavation material include:
  - Processing of stone to produce construction aggregate;
  - Backfilling of quarries; and
  - Raising land for site improvement or development.
- Any hazardous waste arising will be managed by the appointed contractor in accordance with the applicable legislation;
- Screening of material may be undertaken for the Proposed Development, which will be a decision for the appointed contractor; and
- In accordance with the law all wastes removed from site will be transported by the holder of the appropriate waste collection permit, granted in accordance with S.I. No. 820/2007 - Waste Management (Collection Permit) Regulations, 2007.

It will be the responsibility of the appointed contractor to secure agreements for acceptance of surplus excavation materials from the Proposed Development in authorised and regulated facilities, in accordance with the Waste Management Act, 1996, as amended, and associated regulations.

All material from the excavation works will need to be tested by the appointed contractor for quality and contamination. Material that is not contaminated could potentially be reused as general landscape fill material in the construction works under the provisions of Article 27 of the European Union (Waste Directive) Regulations, 2020. Material that meets the necessary acceptance criteria but is not required on site will be delivered to an authorised soil recovery facility.

Material that requires recycling will be sent to authorised waste facilities and may be used in accordance with Article 28 of the European Union (Waste Directive) Regulations, 2020 – S.I. 126 of 2020 as amended. Article 28 sets the criteria which must be complied with, and the EPA must use to determine if a waste reaches *'end of waste'* status and becomes a material.

Should excavated material containing hazardous substances be discovered as part of the Proposed Development, this will be delivered to a facility authorised to accept hazardous wastes in accordance with the terms of an Industrial Emissions Licence or Waste Licence or exported from Ireland for treatment, recovery or disposal in accordance with current industry practice and the provisions of the Waste Management (Shipments of Waste) Regulations, 2007 – S.I. No. 419 of 2007.

Considering the available treatment capacity for the C&D waste generated during the excavation works and the proposed waste management procedures and controls outlined above, the predicted impact of excavation waste during the Construction Phase, in the absence of mitigation, is negative, slight and short-term.

#### 15.4.3.4 *Imported material*

The Construction Phase will require the importation of a number of key construction materials for the Proposed Development works. This material will include items such as concrete, hardcore, steel and fill material. An assessment of the climate impact from the carbon associated with these materials is included in **Chapter 12**, *Climate*. **Table 15.5** provides an estimate of the quantities of the major materials required during the Construction Phase of the Proposed Development.

**Table 15.5: Estimated quantities of major construction materials required**

| Material | Estimated quantity (tonnes) |
|---|---|
| Concrete | 3,000 |
| Clause 804 hardcore | 32,400 |
| Reinforcing steel | 187 |
| Structural steelwork | 88 |
| Precast concrete elements | 930 |
| Embankment fill material | 5,560 |
| Link footway / cycleway surfacing | 1,930 |

The quantities of materials listed in **Table 15.5** represent a very small proportion of the Irish quantities manufactured per year, as outlined in Section 15.3.2. As an example, the estimated quantity of concrete required represents less than 0.1% of the total quantity produced in Ireland per annum.

Importation of material to the Proposed Development site will be carried out throughout the Construction Phase, with different materials being required at different times. The main direct impacts associated with the importation of construction materials arise from the gathering / manufacture of the materials, and that once the materials are used within the Proposed Development, they are no longer available for other uses. There will also be impacts associated with the importation of materials through the requirement for heavy goods vehicles for delivery of the material and the use of materials. Impacts on other environmental aspects are addressed in **Chapter 7**, *Traffic and Transportation*, **Chapter 10**, *Noise and Vibration*, **Chapter 11**, *Air Quality* and **Chapter 12**, *Climate*.

As the materials required for the Construction Phase of the Proposed Development are generally readily available and the quantities of the materials required constitute an insignificant proportion of the quantities produced per annum in Ireland, the predicted impact associated with the requirement for imported materials is negative, slight and long-term.

#### 15.4.3.5 *Construction waste*

Construction works, site offices and temporary works facilities are also likely to generate waste. General construction waste can vary significantly from site to site but typically will include the following non-hazardous fractions:

- Soil and stone;
- Concrete;
- Bituminous mixtures;
- Metals; and
- Other.

The hazardous waste streams which could arise from construction activities include the following:

- Waste electrical and electronic equipment (WEEE) components;

- Batteries;
- Asbestos;
- Liquid fuels; and
- Contaminated soil.

Also included within this definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

In the case of the Proposed Development, the most likely type of general construction waste will be surplus concrete and steel that may arise on-site. Quantities of these materials are estimated to be small, assumed to be between approximately 5% to 15% of construction material delivered to site (WRAP, 2014). There is adequate capacity for the management of such wastes. Segregation facilities will be provided to ensure that recovery and recycling of such wastes are maximised.

Considering the minor quantities of construction waste that will be generated during the Construction Phase and the available treatment capacity for C&D waste, the predicted impact of construction waste during the Construction Phase, in the absence of mitigation, is negative, not significant and short-term.

#### *15.4.3.6 Municipal waste*

Minor quantities of general municipal waste will be generated by construction workers during the Construction Phase (e.g., from welfare facilities). Segregation facilities will be provided on the construction site, if necessary, to ensure that recovery and recycling of such wastes is maximised.

Considering the minor quantities of municipal waste that will be generated during the Construction Phase and the available treatment capacity for municipal waste, the predicted impact of municipal waste during the Construction Phase, in the absence of mitigation, is negative, imperceptible and short-term.

#### *15.4.3.7 Summary of predicted Construction Phase impacts*

A summary of the predicted (pre-mitigation) impacts during the Construction Phase is set out in **Table 15.6**. The Construction Phase of the Proposed Development is not predicted to give rise to significant impacts.

**Table 15.6: Summary of predicted Construction Phase impacts, in the absence of mitigation**

| Assessment topic | Predicted impact |
|---|---|
| Site clearance waste | Negative, not significant and short-term |
| Excavation waste | Negative, slight and short-term |
| Imported material | Negative, slight and long-term |
| Construction waste | Negative, not significant and short-term |
| Municipal waste | Negative, imperceptible and short-term |

### 15.4.4 Operational Phase

Minor maintenance works to infrastructure are likely to occur during the Operational Phase. The maintenance works will be routine and will comprise maintenance of the following elements:

- Bridge steelwork;
- Bridge sables;
- Reinforced concrete structures;
- Embankments;
- Bridge bearings;

- Lighting; and
- Deck surfacing.

Refer to **Chapter 5**, *Construction Strategy* for further details.

The maintenance works will be infrequent and will generate only minor quantities of C&D waste.

Considering the minor quantities of project related C&D waste that will be generated during the Operational Phase and the available treatment capacity for C&D waste, the predicted impact of project related C&D waste during the Operational Phase, in the absence of mitigation, is negative, not significant and long-term.

### 15.4.5 Decommissioning Phase

As outlined in **Chapter 4**, *Description of the Proposed Development*, the design life of the proposed new pedestrian and cyclist bridge is 120 years. During the potential future decommissioning works, the main bridge span and approach spans will be decommissioned by cutting the concrete decking and steel spans into a number of large sections. This will be done either *in situ* or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry.

Decommissioning of the Proposed Development would result in the generation of waste materials, with a subsequent requirement for its management and removal off site for re-use, recycling, recovery or disposal. The primary materials likely to be generated from the decommissioning works will be steel from the main bridge span and approach spans, and concrete from the concrete decking. Segregation facilities will be provided to ensure that recovery and recycling of such wastes are maximised.

Considering the waste management procedures and controls that will be implemented, the predicted impact of waste during the Decommissioning Phase, in the absence of mitigation, is negative, not significant and short-term.

## 15.5 Mitigation and Monitoring

### 15.5.1 Construction Phase

The Construction Phase is not predicted to give rise to significant negative impacts. However, a suite of mitigation measures is outlined which the appointed contractor will implement, and in any event, the appointed contractor will ensure that waste arisings will be managed in accordance with the waste hierarchy and in compliance with the provisions of the Waste Management Act, 1996, as amended.

A Construction Resource and Waste Management Plan (CRWMP) has been prepared and is included as **Appendix 15.3** in **Volume 4** of this EIAR. This has been prepared and will be implemented (and updated as necessary) by the appointed contractor in line with the Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (EPA, 2021b). The CRWMP outlines how waste arising during the Construction and Demolition Phase of the Proposed Scheme will be managed in a way that ensures compliance with the provisions of the Waste Management Act, 1996, as amended – refer to the CRWMP is included as **Appendix 15.3** in **Volume 4** of this EIAR. The appointed contractor will update the CRWMP in advance of construction commencing.

The following measures will be implemented during construction, where practicable, by the appointed contractor, to ensure the maximum quantity of material is reused in the Proposed Development, to comply with the provisions of the Waste Management Act, 1996, as amended, and to contribute to achieving the objectives set out in the Waste Action Plan for a Circular Economy (DECC, 2020):

- Where waste generation cannot be avoided, waste disposal will be minimised;
- Opportunities for reuse of materials, by-products and wastes will be sought throughout the Construction Phase of the Proposed Development;
- Possibilities for reuse of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use;

- Where non-hazardous excavation material cannot be reused within the Proposed Development works, material will be sent for recycling or recovery, where practicable;
- Excavations of made ground will be monitored by an appropriately qualified person to ensure that any hotspots of possible contamination are properly identified, with the contaminated material segregated and disposed of appropriately. Any potential contaminated material identified 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 that the hotspot does not cross contaminate clean soils elsewhere throughout the site;
- If encountered, any potential asbestos during the Construction Phase will be managed using standard health and safety measures as outlined in 'Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement' (HSA, 2013). This document states that *"removal of asbestos from contaminated soil will require a specialist asbestos contractor for any friable asbestos to be removed"* and *"a risk assessment by an independent competent person should determine the most appropriate control measures and remediation strategies"* (HSA, 2013);
- Only a suitably experienced contractor shall be used to carry out the excavation works. During construction, they shall employ standard practices to manage risk from contaminated soils. These will be determined by the contractor depending on their construction practices but are likely to include the use of gloves, dust masks and potentially disposable overalls. These and other appropriate measures will minimise the exposure of site workers and members of the public;
- The site will be maintained to prevent litter and regular litter picking will take place throughout the site;
- 'Just-in-time' delivery will be used, where practicable, to minimise material wastage;
- Paints, sealants and hazardous chemicals will be stored in secure, bunded locations;
- All staff on-site will be trained on how to minimise waste (i.e., training, induction, inspections and meetings);
- Materials on-site will be correctly and securely stored;
- Where possible, recyclable material will be segregated and removed off site to a permitted / licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation;
- On-site municipal waste arising swill be source separated at least into dry mixed recyclables, biodegradable and residual wastes;
- Waste bins, containers, skip containers and storage areas will be clearly labelled with waste types which they should contain, including photographs as appropriate;
- Segregated skips will be used within a designated waste segregation area to be located in the on-site construction compound (particularly for hazardous, inert waste and general waste);
- The appointed contractor will record the quantity in tonnes and types of waste and materials leaving the site during the Construction Phase. The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered, which is recycled and which is disposed of;
- Waste generated on-site will be removed as soon as practicable following generation for delivery to an authorised waste facility;
- The appointed contractor will ensure that any off-site interim storage facilities for excavation material have the appropriate waste licences or waste facility permits in place;
- Where Article 27 notifications are required in relation to the Proposed Development, the appointed contractor will complete and submit these Article 27 notifications to the EPA for by-product reuse; and
- The relevant appropriate waste authorisation will be in place for all facilities that wastes are delivered to (i.e., EPA Licence, Waste Facility Permit or Certificate of Registration).

### 15.5.2 Operational Phase

All project related C&D waste generated from the maintenance works during the Operational Phase will be transferred from site by a waste collection permit holder and delivered to an authorised waste facility (i.e., a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence) for the specific waste types it receives.

### 15.5.3 Decommissioning Phase

At the end of the Proposed Development's lifespan, data relating to the construction of the infrastructure on site, as built drawings and material specifications will be provided to the owners, where feasible. This data will inform and enable the reuse and recycling of all infrastructure elements.

All project related C&D waste generated during the Decommissioning Phase will be transferred from site by a waste collection permit holder and delivered to an authorised waste facility (i.e., a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence) for the specific waste types it receives.

## 15.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been proposed within the surrounding area that may give rise to cumulative impacts (refer to **Chapter 20**, *Cumulative and Interactive Impacts*).

Taking the nearby proposed projects together in combination with the Proposed Development, it is considered that they could give rise to short term, slight, negative resource and waste management impacts on the capacity of waste management facilities and waste industry trends in Ireland during the Construction Phase due to an increased demand on waste recovery and / or disposal sites.

Appropriate mitigation measures have been proposed in this EIAR and, where required, in the planning documents for the other permitted / Proposed Developments in the vicinity – such that significant negative cumulative impacts are not predicted to occur.

## 15.7 Residual Impacts

### 15.7.1 Construction Phase

The Construction Phase of the Proposed Development is not predicted to give rise to any significant residual impacts with the adoption of the waste management principles and with the implementation of the identified mitigation measures. A summary of the predicted residual impacts during the Construction Phase, following the implementation of the appropriate mitigation measures, is set out in **Table 15.7**.

**Table 15.7: Summary of predicted Construction Phase residual impacts**

| Assessment topic | Predicted impact (pre-mitigation and monitoring) | Residual Impact (post mitigation) |
|---|---|---|
| Site clearance waste | Negative, not significant and short-term | Negative, not significant and short-term |
| Excavation waste | Negative, slight and short-term | Negative, not significant and short-term |
| Imported material | Negative, slight and long-term | Negative, slight and long-term |
| Construction waste | Negative, not significant and short-term | Negative, not significant and short-term |
| Municipal waste | Negative, imperceptible and short-term | Negative, imperceptible and short-term |

### 15.7.2 Operational Phase

The Operational Phase of the Proposed Development is not predicted to give rise to any significant residual impacts with the adoption of the waste management principles and with the implementation of the identified mitigation measures. The predicted residual impact during the Operational Phase will be negative, not significant and long-term.

### 15.7.3 Decommissioning Phase

The Decommissioning Phase of the Proposed Development is not predicted to give rise to any significant residual impacts with the adoption of the waste management principles and with the implementation of the identified mitigation measures. The predicted residual impact during the Decommissioning Phase will be negative, not significant and short-term.

## 15.8 References


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S.I. No. 820 of 2007 - Waste Management (Collection Permit) Regulations 2007, as amended.

S.I. No. 821 of 2007 - Waste Management (Facility Permit and Registration) Regulations 2007.

S.I. No. 86 of 2008 - Waste Management (Facility Permit and Registration) Regulations 2008, as amended.

S.I. No. 26 of 2022 – Circular Economy and Miscellaneous Provisions Act 2022.

# Chapter 16

# Water

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# 16. Water

## 16.1 Introduction

This chapter of the EIAR presents the hydrological assessment of the Construction, Operation, and Decommissioning Phases of the Proposed Development, as described in **Chapter 4**, *Description of the Proposed Development* and **Chapter 5**, *Construction Strategy*. This chapter sets out the methodology used in the assessment, the baseline conditions, potential impacts, mitigation measures and residual impacts associated with the Proposed Development.

This chapter was prepared by Mesfin Desta. Mesfin's details, including relevant qualifications and experience, are included in **Chapter 1**, *Introduction.*

### 16.1.1 Characteristics of the Proposed Development

The Proposed Development, including the proposed temporary construction compounds and bridge assembly area, is illustrated in **Image 16.1**.

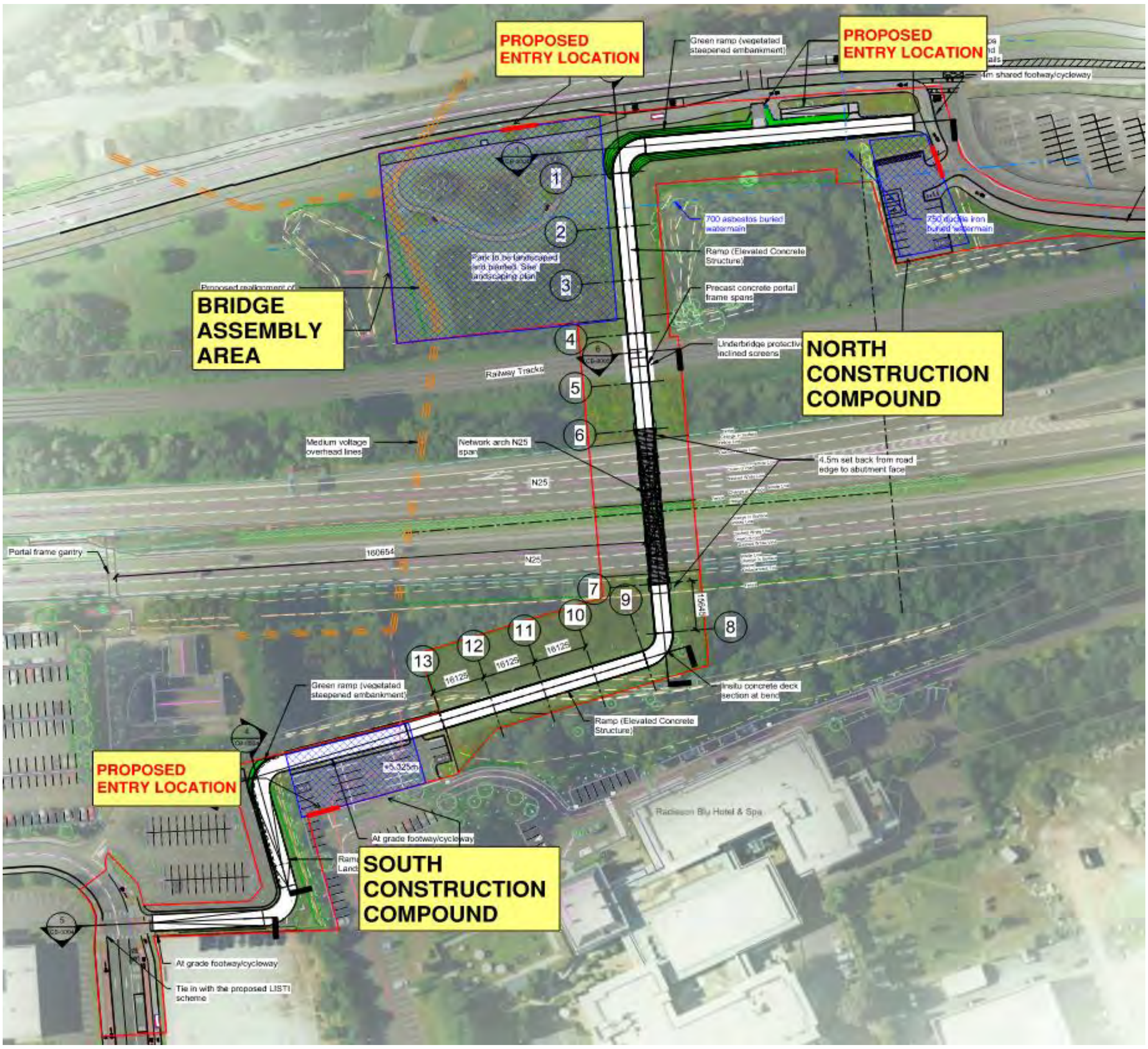


**Image 16.1: Extract of Proposed Development site layout, illustrating proposed construction compounds and bridge assembly area**

The proposed structure consists of a single span (approximately 49m) steel network arch structure over the N25, a 2 x 15m span precast segmental portal frame structure over the Irish Rail line, and access ramps to the north and south sides. The proposed bridge spans between the Eastgate Business Park (south access ramp) and the Little Island train station area (north access ramp). The proposed crossing will be approximately 460m long and the anticipated life span of the structure is 120 years, with the construction period lasting approximately 18 months.

## 16.2 Assessment Methodology

### 16.2.1 Study area

The study area is in Little Island Co. Cork, approximately 10km east of Cork City. The Proposed Development crosses the N25 dual carriageway and the Irish Rail line to the west of Little Island. The study area for this assessment has been set to extend to approximately 250m beyond the footprint of the Proposed Development as any significant impacts are considered to occur at local waterbodies at the stated offset. This distance is deemed adequate to capture all those waterbodies that will have direct hydrological connection to the works.

Any identified surface waterbodies within the study area have been considered as receptors including those classified under the Water Framework Directive (WFD), including riverine, transitional waterbodies, lakes, coastal waterbodies and non-WFD classified waterbodies.

Existing and proposed artificial drainage features such as Sustainable Drainage Systems (SuDS) have not been considered as receptors within the assessment.

### 16.2.2 Legislation and guidelines

This assessment has been undertaken in accordance with the Guidelines on the information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA, 2022). The following additional guidance was also consulted during the preparation of this chapter:

- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009);
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (referred to as the FRM Guidelines) (DEHLG and OPW, 2009);
- The WFD Regulations, S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009;
- S.I. No. 108/1978 - Local Government (Water Pollution) Regulations, 1978;
- Number 1 of 1977 - The Local Government (Water Pollution) Act; and
- Number 21 of 1990 - Local Government (Water Pollution) (Amendment) Act, 1990.

### 16.2.3 Data collection and collation

Information on the baseline environment including hydrology, hydromorphology and the water quality of the receptors within the study area was collected and collated by means of a desk study.

**Table 16.1** lists the data sources which were reviewed as part of the desktop assessment.

**Table 16.1: Data sources**

| Assessment Attribute | Title |
|---|---|
| **General** | • Ordnance Survey Ireland (OSI)<br>• Aerial photography (i.e., Google Earth, Google Maps) |
| **Surface Water Quality and Hydromorphology** | • EPA GIS Maps |

| Assessment Attribute | Title |
|---|---|
| **Hydrology** | • Catchment Summaries<br>• EPA Hydrometric Data System |
| **Flood Risk** | • OPW National Flood Information Portal (OPW, 2022) |

## 16.2.4 Methodology for assessment of impacts

Significance criteria referenced have generally followed the EPA guidelines (EPA, 2022), unless stated otherwise.

The overall impact on surface water receptors (i.e., rivers, canals, transitional waterbodies, coastal waterbodies and lakes, as applicable) as a result of the Proposed Development was determined based on two parameters:

- The sensitivity of the waterbody attributes (hydrology, water quality and geomorphology) to change; and
- The magnitude of the impacts on waterbody attributes.

The sensitivity of surface water attributes to change are determined by a set of criteria including their relative importance or 'value' (i.e., whether features are of national, regional or local value).

### *16.2.5.1 Sensitivity of receptors*

**Table 16.2** outlines the criteria for estimating the sensitivity of surface water receptors (NRA, 2009), adapted to reflect WFD assessment guidelines (Environment Agency, 2016).

**Table 16.2: Criteria used to evaluate the sensitivity of surface water receptors**

| Sensitivity | Criteria | Typical Example |
|---|---|---|
| **Extremely High** | Receptor (or receptor attribute) has a very high quality or value on an international scale | • Any WFD waterbody which is protected by European Union (EU) legislation (e.g., Designated European Sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) or 'Salmonid Waters'; and<br>• A waterbody that appears to be in natural equilibrium and exhibits a natural range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, free from any modification or anthropogenic influence. |
| **Very High** | Receptor (or receptor attribute) has a high quality or value on an international scale.<br><br>Or<br><br>very high quality or value at a national scale | • Any WFD waterbody (specific EPA segment) which has a direct hydrological connection of <2km to European Sites or protected ecosystems of international status (SAC / SPA or Salmonid Waters);<br>• WFD waterbody ecosystem protected by national legislation (Natural Heritage Area (NHA) status);<br>• A waterbody that appears to be largely in natural equilibrium and exhibits a diverse range of morphological features (such as pools and riffles);<br>• There is a diverse range of fluvial processes present, with very limited modifications; and<br>• Nutrient Sensitive Areas. |
| **High** | Receptor (or receptor attribute) has a moderate value at an international scale.<br><br>or<br><br>high quality or value on a national scale | • A WFD waterbody with High or Good WFD Status;<br>• A Moderate WFD Status (2022 - 2027) waterbody with some hydrological connection (<2km) to European Sites or protected ecosystems of international status (SAC / SPA or Salmonid Waters) further downstream;<br>• WFD waterbody which has a direct hydrological connection to sites / ecosystems protected by national legislation (NHA status);<br>• A waterbody that appears to be in some natural equilibrium and exhibits some morphological features (such as pools and riffles). There is a diverse range of fluvial |

| Sensitivity | Criteria | Typical Example |
|---|---|---|
| | | processes present, with very limited signs of modification or other anthropogenic influences; and<br>• Direct hydrological connectivity to Nutrient Sensitive Areas. |
| **Medium** | Receptor (or receptor attribute) has some limited value at a national scale | • WFD waterbody with Moderate WFD Status (2022 - 2027);<br>• WFD waterbody with limited (>2km; <5km) hydrological importance for sensitive or protected ecosystems (much further downstream);<br>• A waterbody showing signs of modification or culverting, recovering to a natural equilibrium, and exhibiting a limited range of morphological features (such as pools and riffles). The watercourse is one with a limited range of fluvial processes and is affected by modification or other anthropogenic influences;<br>• Evidence of historical channel change through artificial channel straightening and re-profiling; and<br>• Some hydrological connection downstream Nutrient Sensitive Areas. |
| **Low** | Receptor (or receptor attribute) has a low quality or value on a local scale | • Waterbody with Bad to Poor WFD Status (2022 - 2027);<br>• A WFD waterbody with >5km (or no) hydrological connection to European Sites or national designated sites;<br>• A non-WFD water feature with minimal hydrological importance to sensitive or protected ecosystems; and / or economic and social uses;<br>• A highly modified watercourse that has been changed by channel modification, culverting, or other anthropogenic pressures. The watercourse exhibits no morphological diversity and has a uniform channel, showing no evidence of active fluvial processes and not likely to be affected by modification. Highly likely to be affected by anthropogenic factors. Heavily engineered or artificially modified and could dry up during summer months; and<br>• Many existing pressures which are adversely affecting biodiversity. |

#### *16.2.5.2 Magnitude of impacts*

The scale or magnitude of potential impacts (both beneficial and adverse) depends on both the degree and the extent to which the Proposed Development may impact water bodies during the Construction, Operational and Decommissioning Phases.

Factors that have been considered to determine the magnitude of potential impacts include the following (EPA, 2022):

- Nature of the impacts;
- Intensity and complexity of the impacts;
- Expected onset, duration, frequency and reversibility of the impacts;
- Cumulation of the impacts with the impacts of other existing and / or approved projects; and
- Possibility of effectively reducing the impacts.

**Table 16.3** identifies a list of the criteria for determining the magnitude of impact on surface water receptors.

Table 16.3: Criteria determining the magnitude of impact on surface water receptors (NRA, 2009)

| Magnitude of impact | Criteria |
|---|---|
| **Large Adverse** | Results in loss of receptor and / or quality and integrity of receptor. |
| **Moderate Adverse** | Results in impact on integrity of receptor or loss of part of receptor. |
| **Small Adverse** | Results in minor impact on integrity of receptor or loss of small part of receptor. |
| **Negligible** | Results in an impact on receptor but of insufficient magnitude to affect either use or integrity. |
| **Small Beneficial** | Results in minor improvement of receptor quality. |
| **Moderate Beneficial** | Results in moderate improvement of receptor quality. |
| **Large Beneficial** | Results in major improvement of receptor quality. |

### *16.2.5.3 Significance of impacts*

The significance of an impact is determined by combining the sensitivity of the receptor with the predicted magnitude of impact as shown in **Image 16.2**. Descriptions of the categories in the context of the water environment are outlined in **Table 16.4**.

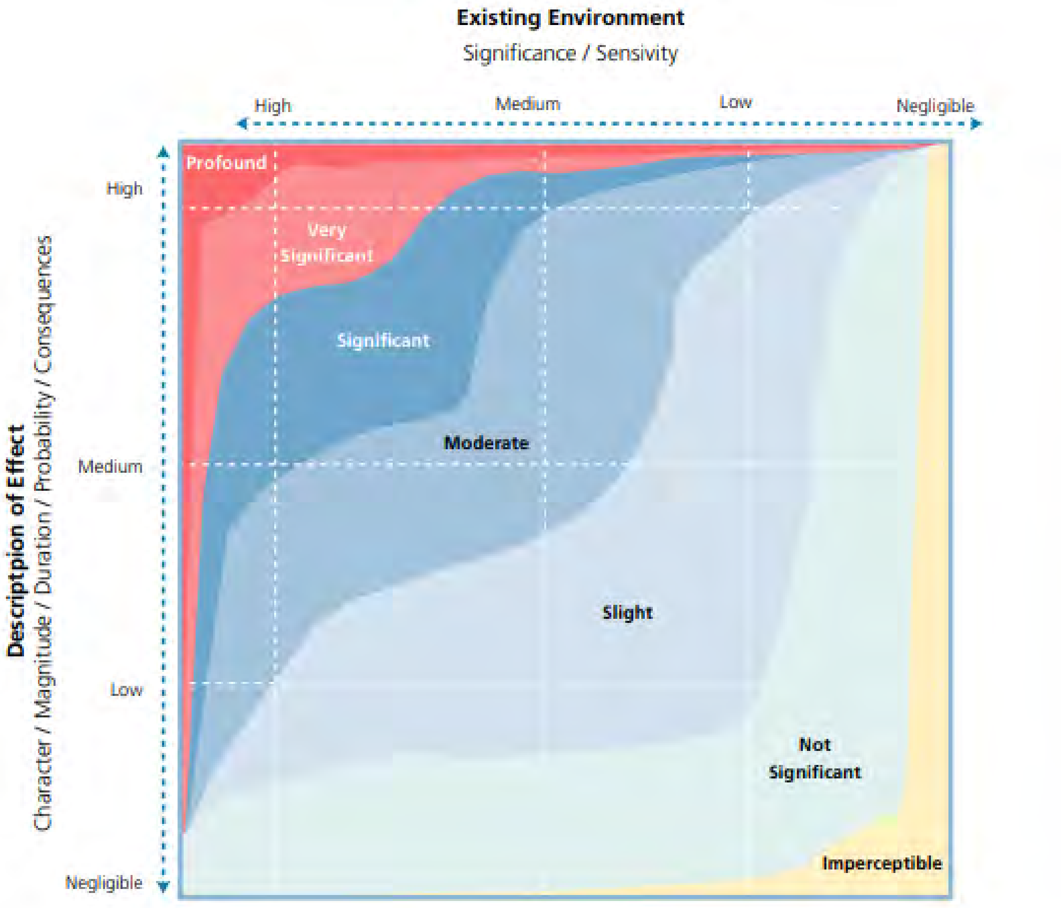


Image 16.2: Categories of environmental impacts (EPA, 2022)

**Table 16.4: Descriptions of environmental impacts**

| Impact Category | Description |
|---|---|
| **Profound** | An impact which obliterates sensitive characteristics |
| **Very Significant** | An impact which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment |
| **Significant Effects** | An impact which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment |
| **Moderate Effects** | An impact that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends |
| **Slight Effects** | An impact which causes noticeable changes in the character of the environment without affecting its sensitivities |
| **Not Significant** | An impact which causes noticeable changes in the character of the environment but without significant consequences |
| **Imperceptible** | An impact capable of measurement but without significant consequences |

#### *16.2.5.4 Assessment limitations*

No limitations were identified which had the potential to affect the conclusions of this chapter.

## 16.3 Baseline Environment

The baseline environment describes the existing waterbodies within the study area as identified and categorised under the Second Cycle River Basin Management Plan (RBMP) 2018-2021 (Government of Ireland, 2018) and reported by the EPA. The RBMP categorises significant pressures impacting waterbodies and identifies measures and actions aimed at addressing each at the sub-catchments. It should be noted that at the time of writing, the Third Cycle RBMP for Ireland 2022-2027 (Government of Ireland, 2022) is still in draft form, with the finalised plan yet to be published.

An illustration of the baseline surface water area surrounding the Proposed Development site is presented in **Figure 16.1** in **Volume 3** of this EIAR.

### 16.3.1 Hydrometric area

The Proposed Development site is in Hydrometric Area 19 (Lee, Cork Harbour and Youghal Bay), within the WFD sub-catchment of Tibbotstown_SC_010. The WFD risk status of the Tibbotstown_010 WFD sub-catchment is under 'review' due to its unassigned status. However, urban runoff and urban wastewater are known pressures from existing surface water drainage systems within the sub-catchment.

### 16.3.2 Existing surface water and foul water drainage system

The main surface water drainage system directly connected to the Proposed Development is the Kilcoolishal Stream. The Kilcoolishal Stream drains the wetland area that encroaches the Proposed Development site to the north of the N25 before discharging to Cork Harbour. The stream is completely culverted south of the N25 within the Eastgate Business Park car park. No record of water quality data or monitoring station data is available on this stream or any other stream within the 500m wide corridor from the subject site.

The harbour at the discharge location for this stream is a Special Protection Area (SPA) – the Cork Harbour SPA (Site Code: 004030). It is located approximately 2.5km west of the Proposed Development and has a hydrological connection to the Proposed Development via the Kilcoolishal Stream and the underlying groundwater body discharging to Lough Mahon; a transitional water body. Cork Harbour, downstream of the site, is also designated as a proposed Natural Heritage Area (pNHA). The WFD risk status assigned to the Cork Harbour SPA is under 'review'. The sensitivities of the waterbodies with a hydrological connection to the study area are outlined in **Table 16.5**.

Table 16.5: Baseline receptor sensitivity

| No. | Waterbody name | Sensitivity of receptor | Sensitivity |
|---|---|---|---|
| 1 | Kilcoolishal Stream (Tibbotstown_010) | High Sensitivity watercourse due its hydrological connectivity to the Cork Harbour SPA. WFD risk status under review. Good status, No high-status objective. | High |
| 2 | Lough Mahon | Lough Mahon is a transitional waterbody with a high sensitivity to nutrients. WFD status: at risk from urban wastewater. | High |
| 3 | The Cork Harbour SPA | The Cork Harbour SPA is a SPA under the EU Birds Directive and supports several wintering birds. | High |

The existing drainage system at the Proposed Development site is serviced by surface water and sewer drainage networks. Flows are typically collected in standard gullies and routed via a culvert system to its outfall at Cork Harbour. There are no SuDS / attenuation features within the existing drainage system.

### 16.3.3 Flood Risk

A detailed Flood Risk Assessment (FRA) has been undertaken for the Proposed Development (refer to **Appendix 16.1** in **Volume 4** of this EIAR). Through Catchment Flood Risk Assessment and Management (CFRAM) map analysis, the FRA identified the main source of flood risk to be coastal. The Proposed Development location lies within the 0.5% AEP coastal floodplain (within Flood Zone A) on the northern access ramp. Refer to **Image 16.3**.

The Cork County Development Plan Mapper 2022-2028 (CCC, 2022) also identifies a flood risk to the south of the N25. However, the Proposed Development location lies outside of the 0.5% AEP coastal floodplain (within Flood Zone C) on the southern access ramp. Hence, the southern access ramp is under low risk. Refer to **Image 16.4**.

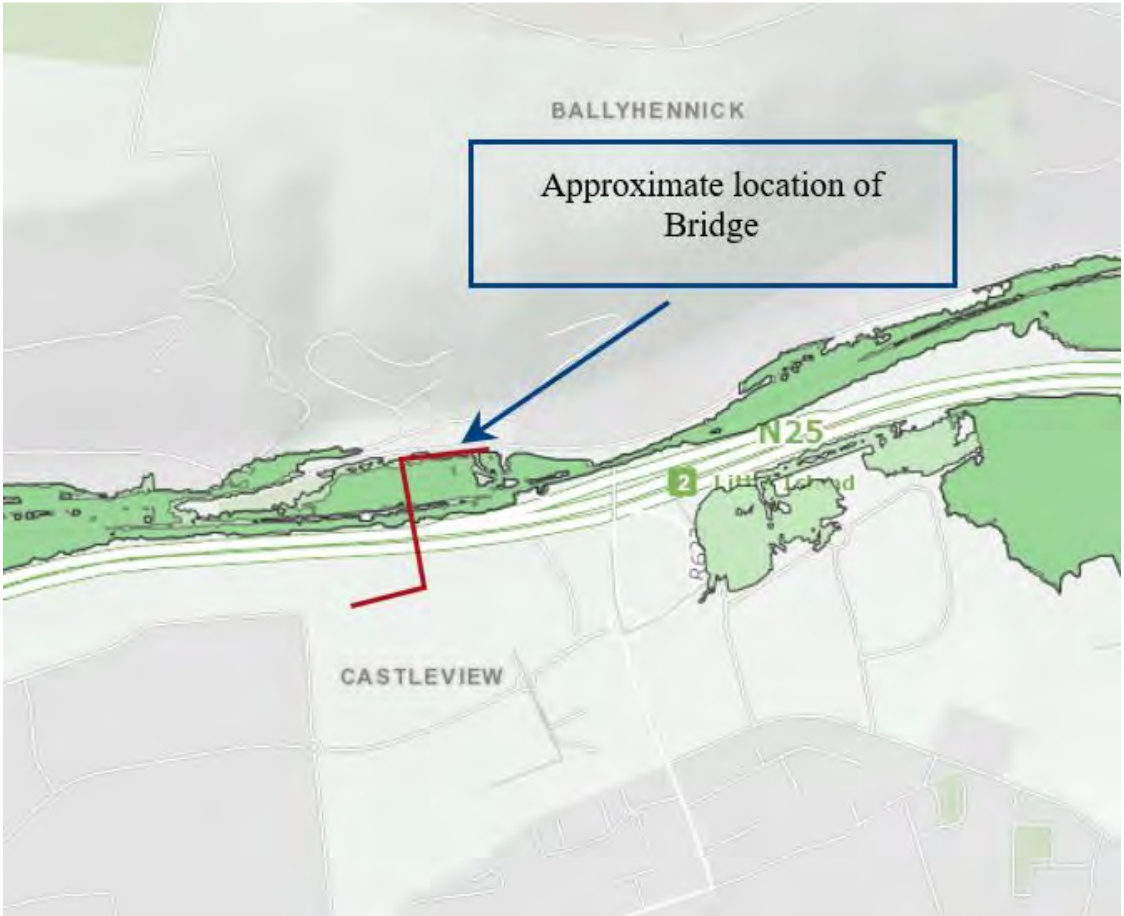


Image 16.3: Extract from South Western CFRAMS coastal flood extents, current scenario (0.5% AEP)

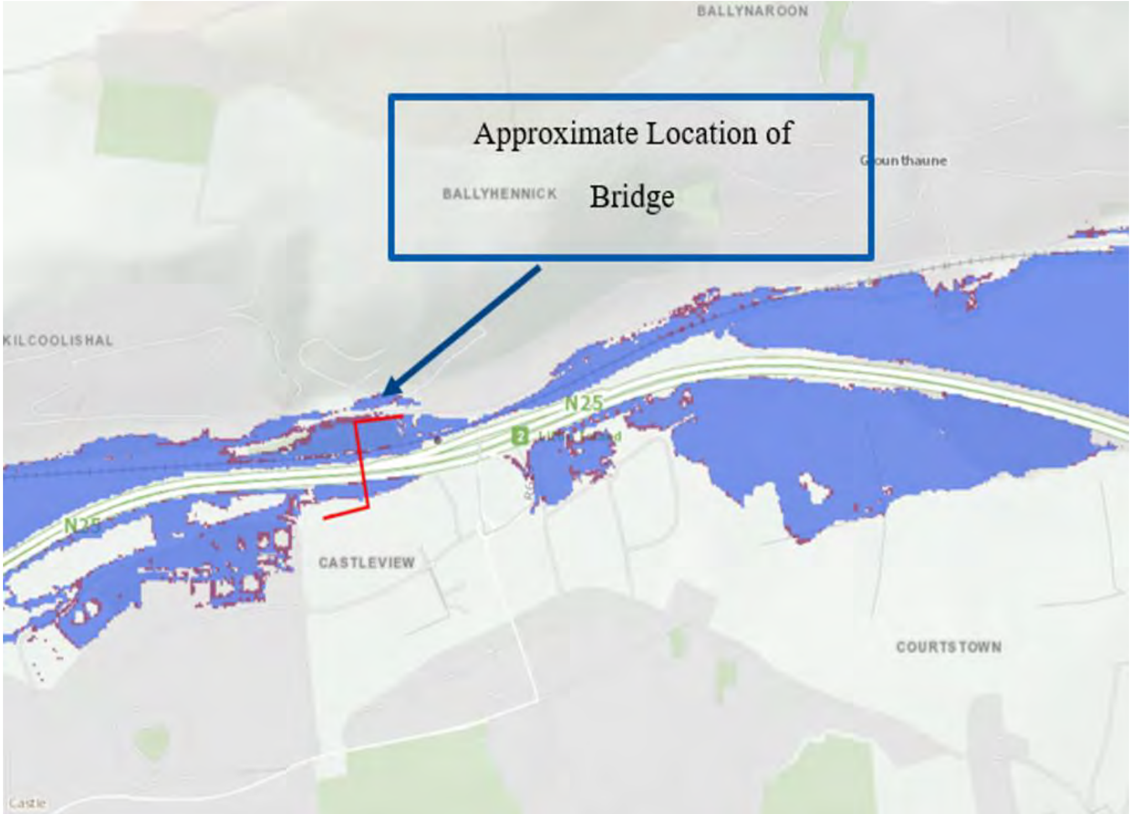


Image 16.4: Cork County Development Plan Mapper 2022-2028 coastal flood extents (0.5% AEP) (CCC, 2022)

## 16.4 Potential Impacts

### 16.4.1 'Do-Nothing' Impact

The 'Do-Nothing' scenario considers the likely scenario that would arise assuming the Proposed Development were not progressed, i.e., if nothing was done. The baseline environment would be as described in Section 16.3, with water bodies identified and categorised under the RBMP 2018-2021 and reported by the EPA.

The most significant pressures to the waterbodies 'at risk' of achieving Good status within the Tibbotstown_010 WFD sub catchment is urban runoff and urban wastewater. The current trend on pressures will continue for the foreseeable future unless a planned intervention is implemented.

Therefore, in the absence of the Proposed Development, the baseline surface water environment will not be impacted. The 'Do-nothing' scenario is contrasted with the 'Do-something' scenario where the Proposed Development proceeds as planned. The following subsections document the potential impacts of the Construction, Operational and Decommissioning Phases of the Proposed Development.

### 16.4.2 Construction Phase

**Chapter 5,** *Construction Strategy* outlines the strategy to construct the Proposed Development. In addition to a detailed description and methodologies of the works involved, details on sequencing and duration, the location of the temporary construction compounds and bridge assembly area, the proposed traffic management plan, hours of working, and numbers of personnel involved are also provided.

This assessment considers the potential impacts from the construction of the Proposed Development prior to mitigation or control measures being implemented.

The following construction activities have the potential to result in hydrological effects:

- Site clearance and construction of access and haul roads;
- Establishment and use of temporary construction compounds and bridge assembly area;

- Utility diversion;
- Foundation construction; and
- Transportation of concrete, fuel, and other chemicals with a potential to impact on water quality.

The construction of the Proposed Development will result in the removal of topsoil or vegetation which may increase the risk of sediment laden runoff, leading to water quality degradation.

#### *16.4.2.1 Surface water quality*

There are numerous substances used on construction sites that are potential pollutants to water bodies and which could affect surface water quality. Runoff from the working areas during construction may contain increased sediment loads, suspended solids and contaminants. This is typical on construction sites and working areas of this nature. A summary of potential pollutants of relevance to water quality is provided below:

- Potential sources of pollution from site drainage include runoff and erosion from site earthworks and stockpiles. This has the potential to pose a risk to the nearby Kilcoolishal Stream as the site will be exposed to rainfall which has the potential to produce silt laden runoff;
- Any accidental spillages of fuel and / or discharge of oil from leaks in vehicles or fuel tanks;
- Any accidental spillages of other major pollutants present, including fuels and lubricants required for plant and equipment on site;
- The washing of construction vehicles and equipment poses a pollution risk to the nearby Kilcoolishal Stream if undertaken in inappropriate locations and in the absence of effective management and mitigation; and
- Surface water run-off from construction activities has the potential to be contaminated and pose a risk to the water quality of the nearby Kilcoolishal Stream.

In the absence of mitigation measures, all of the above have the potential to alter the water quality of the Kilcoolishal Stream. However, given the size of the stream in question the impact is considered to be short-term and not significant.

#### *16.4.2.2 Wastewater*

Effluent and sanitary waste will be generated from facilities provided for the construction staff on site. Temporary foul drainage at the construction compounds will cater for welfare facilities. The welfare facilities will be either mobile welfare vans, towed units or self-contained units, and will be fully bunded with foul sewage and wastewater removed and disposed of off-site to appropriately licensed treatment facilities. This will have a short-term impact and the significance of this impact will be imperceptible.

#### *16.4.2.3 Water supply*

The contractor will require a water supply connection for onsite personnel during construction. In addition to supplying potable water for the welfare facilities, the existing water main will supply water for the wheel washes, if required, and for dust control in dry windy weather. The quantity of water required for these uses will be weather dependent. Where connection to the existing water main is not possible, mobile bowsers will be provided. This will have a short-term impact and the significance of this impact will be imperceptible.

#### *16.4.5.2 Assessment of potential impacts on sensitive receptors*

An assessment of the potential impacts on sensitive receptors is presented in **Table 16.6**.

**Table 16.6: Construction impact risk assessment for surface waters**

| No. | Waterbody name | Construction activity | Potential impacts (pre-mitigation) | | | |
|---|---|---|---|---|---|---|
| | | | Description of impacts | Magnitude of impacts | Sensitivity of receptor | Significance of impacts |
| 1 | Kilcoolishal Stream (Tibbotstown _010) | Northern access ramp and temporary construction compounds | Impacts on water quality from construction activities at the northern access ramp and temporary construction compounds | Low to negligible | High Sensitivity. Kilcoolishal Stream is a high sensitivity watercourse due its hydrological connectivity to the Cork Harbour SPA. WFD risk status: under review. Good status, no high-status objective. | Short-term and not significant impact if unmitigated |
| 2 | Lough Mahon | | | | High Sensitivity. Lough Mahon is a transitional waterbody with a high sensitivity to nutrients. WFD status: at risk from urban wastewater. | |
| 3 | The Cork Harbour SPA | | | | High Sensitivity. The Cork Harbour SPA is a SPA under the EU Birds Directive and supports several wintering birds. | |

### 16.4.3 Operational Phase

The operation of the Proposed Development will not significantly increase surface runoff as the access ramps will be vegetated and the main bridge deck will be constructed from steel or concrete materials with non-slip surfacing and associated drainage collection, which will not result in any significant increase in surface water runoff.

The potential impacts during the Operational Phase are limited to the effect of maintenance activities on water quality and surface runoff due to accidental spills and pollution incidents, including oils, silt and other waste potentially entering nearby surface water receptors. Maintenance activities will occur on an infrequent basis.

The Operational Phase of the Proposed Development is predicted to have a long term, imperceptible hydrological impact in the absence of mitigation measures.

### 16.4.4 Decommissioning Phase

The design life of the proposed new pedestrian and cycle bridge is 120 years. Should the Proposed Development be decommissioned, temporary supports will be used, and the bridge will be removed in a sequence that does not require interaction with the adjacent Kilcoolishal Stream.

It is therefore predicted that the decommissioning of the Proposed Development will have an imperceptible hydrological impact.

### 16.4.5 WFD assessment summary

The Proposed Development is located within the Tibbotstown-SC_010 (Code 19_2) WFD sub-catchment. The Kilcoolishal stream has a hydraulic connection to the Cork Harbour SPA and is an unassigned water body.

There will be no direct discharges from the Proposed Development during the Construction, Operational or Decommissioning Phases. Therefore, the status of the existing environment is not anticipated to be altered. It is considered that mitigation measures and good construction management practices (refer to Section 16.5) will ensure that the status of the receiving aquatic environment remains unaffected.

Taking into consideration the anticipated impacts of the Proposed Development on the biological, physico-chemical and hydromorphological quality elements, and the mitigation measures proposed, it is concluded that the Proposed Development will not compromise progress towards achieving Good Ecological Status

(GES) or cause a deterioration of the overall Good Ecological Potential (GEP) of any of the water bodies that have been assessed.

### 16.4.6 Flood Risk

As the flooding is coastal, the 0.5% AEP tidal level (2.86m OD), approximately 1.75km upstream of the Proposed Development site can be conservatively applied to the Proposed Development. Accordingly, the maximum flood level on site will be 3.66m OD, taking account of the 0.5m mid-range future scenario climate change allowance and a freeboard of 0.5m. The lowest point on the northern side of the access ramp is at 3.40m OD and hence a short section of the ramp will be at risk of flooding from this event. This is deemed acceptable as the bridge structure is considered a 'less vulnerable' development, considering the embankment at the access ramp will be vegetated and will be made flood resilient.

However, given that the site is partially located in Flood Zone A, a development management Justification Test was completed to ensure that the Proposed Development complies with the requirements of the Guidelines. The Justification Test satisfied all the criteria and deemed the Proposed Development to be appropriate at the proposed location and that it will not interfere with the floodplain area.

Refer to the FRA in **Appendix 16.1** in **Volume 4** of this EIAR for further details.

## 16.5 Mitigation and Monitoring

### 16.5.1 Mitigation

The preceding sections have assessed the potential impacts of the Proposed Development in the absence of mitigation measures. The Proposed Development, as outlined in **Chapter 4**, *Description of the Proposed Development*, has considered a range of best practice construction measures which will ensure the impacts are reduced, or avoided where possible. In addition, the following mitigation measures are outlined to further mitigate the impacts identified in the preceding sections.

#### *16.5.1.1 Construction Phase*

The nearest environmental receptor is the Cork Harbour SPA, approximately 2.6km downstream of the Proposed Development site. This SPA has a hydrological connection to the Proposed Development via the Kilcoolishal Stream.

The employment of good construction management practices will minimise the risk of adverse impacts on water quality, the hydrological regime and flood risk. All construction activities will be undertaken in accordance with the guidance 'Environmental Good Practice on Site' (CIRIA, 2015) and 'The control of water pollution from construction sites' (CIRIA, 2001).

The following standard measures will be implemented during the construction of the Proposed Development:

- Earthworks operations will be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding;
- Run-off will be controlled to minimise the water effects in outfall areas;
- All concrete mixing and batching activities will be in areas away from watercourses and drains;
- Collection systems will be used to prevent any contaminated drainage entering surface water drains, watercourses or groundwater, or draining onto the land;
- The use of cleaning chemicals will be minimised;
- Good housekeeping (site clean-ups, use of disposal bins, etc.) will be implemented on the site;
- Careful consideration will be given to the location of any fuel storage facilities. All vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site;

- Where dewatering may be required, it will be overseen and approved by a qualified hydrogeologist and treated appropriately in a site water treatment facility before being discharged to the local drainage network. No outfall will be permitted into existing watercourses;
- Where practicable, soil excavation will be completed during dry periods;
- No materials will be stored in floodplains or in areas which would impede flood flow paths (northern side of Proposed Development site); and
- To prevent the accidental release of hazardous materials (fuels, cleaning agents, etc.), all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil / diesel storage tanks will be used on the site during the Construction Phase of the project. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the Proposed Development.

The following addition measures will be implemented for the protection of the Kilcoolishal Stream:

- Works in the vicinity of the stream will be carried out in the summer months, when water levels and flows within the stream are minimal. In the eventually that the stream is not dry, construction works to the section of the Kilcoolishal stream crossing the construction boundary (approximately 28m) will be bunded on either side with earthen bunds and silt screens. Water would be over pumped in the flow direction. Environmental control measures will be implemented during construction in line with standard guidelines (i.e., 'The Control of Water Pollution from Construction Sites' (CIRIA, 2001) and "The Control of Water Pollution from Linear Construction Projects' (CIRIA, 2006)) for best practice measures for controlling water pollution. The Report for Screening for Appropriate Assessment submitted as part of the planning application concluded that the proposed project, in the absence of mitigation, and either alone or in ‐ combination with other plans and / or projects, does not have the potential to significantly affect any European Site, in light of their conservation objectives. The environmental control measures which will be implemented relate to the minimisation of localised potential impacts;
- Apart from the area of the Kilcoolishal Stream directly affected by the bridge construction (i.e., Irish Rail portal frame), a buffer strip of 10m will be implemented around the stream with no works taking place in this area. Where this is not possible, in particular for the construction of the Irish Rail portal frame, the streambed and stream banks of the Kilcoolishal Stream in this location will be reprofiled and reinstated following construction and the bunds and silt traps removed;
- No plant or tools will be washed in the stream, should it contain water; and
- Spill kits will be permanently on hand and kept close to the works areas. Staff will be trained in how to use the spill kits correctly.

The above mitigation measures are also incorporated into the CEMP – refer to **Appendix 5.1 in Volume 4** of this EIAR.

#### *16.5.1.2 Operational Phase*

The Proposed Development will incorporate appropriate surface water drainage features which will collect and discharge surface water, thereby reducing the risk of flooding from surface water. Surface water drainage from the main span of the bridge will be captured in drainage channels and discharged into the N25 or railway line drainage system, as appropriate.

#### *16.5.1.3 Decommissioning Phase*

Should decommissioning activities occur, the proposed works will be undertaken in a safe manner by minimising interaction with the nearby watercourse. As such, mitigation measures will be limited to ensuring that no temporary works are placed in nearby watercourses during the Decommissioning Phase. No materials will be deposited in nearby watercourses during the Decommissioning Phase.

### 16.5.2 Monitoring

#### *16.5.2.1 Construction Phase*

The following monitoring activities will be undertaken for the Construction Phase:

- Visual monitoring will be undertaken as part of the regular site audits during the construction of the Proposed Development to ensure that existing surface water runoff is draining from the site and is not exposed to any contaminants;
- The contractor will be required to ensure that the sanitary facilities for site personnel are maintained as per the CEMP (refer to **Appendix 5.1 in Volume 4** of this EIAR) and that effluent storage is regularly emptied and disposed of appropriately;
- The contractor will be required to ensure that the water supply to the site is maintained as per the CEMP (refer to **Appendix 5.1 in Volume 4** of this EIAR) and that it is free of contaminants; and
- The contractor will be required to monitor the weather forecast to inform the programming of earthworks and stockpiling of materials so as to minimise the risk of flooding.

#### *16.5.2.2 Operational Phase*

There are no monitoring activities required during the Operational Phase of the Proposed Development.

#### *16.5.2.3 Decommissioning Phase*

There are no monitoring activities required during the Decommissioning Phase of the Proposed Development.

## 16.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

Taking the nearby projects together in combination with the Proposed Development, no significant cumulative construction or operation impacts are predicted.

## 16.7 Residual Impacts

### 16.7.1 Construction Phase

Following the implementation of the mitigation measures described in Section 16.5, there will be no significant residual impacts on water quality, the hydrological regime and onsite drainage infrastructure, including both surface water and foul drainage, during construction.

### 16.7.2 Operational Phase

The Proposed Development is predicted to have an overall imperceptible, long-term residual impact on water quality, the hydrological regime and onsite drainage infrastructure, including both surface water and foul drainage, within the study area during operation.

A small section of the approach ramp on the northern side of the bridge will be at risk of flooding during the Operational Phase. However, the flood extent is small, and the volume of flood displaced will also be small. Furthermore, a development management Justification Test has been completed which concluded that the Proposed Development would be appropriate at the proposed location and would not interfere with the floodplain area. Therefore, there will be no significant residual impact on flood risk caused by the operation of the Proposed Development.

### 16.7.3 Decommissioning Phase

It is not anticipated that there will be any significant residual impacts arising from the Decommissioning Phase of the Proposed Development.

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# Chapter 17

# Land, Soils, Geology and Hydrogeology

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# 17. Land, Soils, Geology and Hydrogeology

## 17.1 Introduction

This chapter of the EIAR has considered the potential land, soils, geology and hydrogeology impacts associated with the Construction, Operational and Decommissioning Phases of the N25 Little Island Pedestrian and Cyclist Bridge (hereafter referred to as the Proposed Development).

**Chapter 4**, *Description of the Proposed Development* includes a full description of the Proposed Development while **Chapter 5**, *Construction Strategy* describes the proposed construction strategy for the Proposed Development.

During the Construction Phase, the potential land, soils, geology and hydrogeology impacts associated with the Proposed Development have been assessed. This includes the potential for the contamination of soils and groundwater, and the loss of natural soils from excavation activities associated with utility diversions, road resurfacing and road realignments.

During the Operational Phase, the potential land, soils, geology and hydrogeology impacts associated with changes to water supply and the pollution of groundwater and watercourses have been assessed.

During the Decommissioning Phase, the potential land, soils, geology and hydrogeology impacts associated with accidental leakage of oil, petrol or diesel have been assessed.

Potential impacts in the surface water environment are not considered in this assessment but are considered separately in **Chapter 16**, *Water*.

The assessment has been carried out according to best practice and guidelines relating to land, soils, geology and hydrogeology assessment, and in the context of similar scale infrastructural projects.

An assessment is made of the likely significant impacts associated with the Construction, Operational and Decommissioning Phases of the Proposed Development on these resources. Measures are presented to mitigate or eliminate the impacts of the Proposed Development on the soils, subsoils, bedrock, geological resources and geological heritage and hydrogeology.

## 17.2 Study Area

The land, soils, geology and hydrogeology study area for the Proposed Development extends to a radius of 2km from the planning (red line) boundary of the Proposed Development (refer to **Figure 17.1** in **Volume 3** of this EIAR) which is in line with the Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environmental Impacts Statements (IGI, 2013) and the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008).

The study area stretches from the Dunkettle Interchange in the west to Glounthaune Village in the east and Cork Harbour to the south. The Cork Midleton railway line and the N25 carriageway crosscut the Proposed Development in an approximately west-east direction.

## 17.3 Assessment Methodology

The following sections outline the legislation and guidelines considered, and the adopted methodology for defining the baseline environment and undertaking the assessment in terms of land, soils, geology and hydrogeology.

The potential impacts of the Proposed Development on land, soils, geology and hydrogeology have been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any impact on these attributes.

### 17.3.1 Relevant guidelines, policy and legislation

The main documents that have been followed for the preparation of the land, soils, geology and hydrogeology assessment are:

- European Communities (Water Policy) Regulations 2014 (S.I. No. 350 of 2014);
- European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010), as amended by the European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2011 (S.I. No. 389 of 2011), the European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2012 (S.I. No. 149 of 2012) and the European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (S.I. No. 366 of 2016);
- European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009) as amended by the European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012 (S.I. No. 327 of 2012);
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 (SI No. 386 of 2015);
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) as amended by the European Communities (Water Policy) (Amendment) Regulations, 2005 (S.I. No. 413 of 2005);
- European Communities (Water Policy) (Amendment) Regulations, 2008 (S.I. No. 219 of 2008);
- European Communities (Water Policy) (Amendment) Regulations, 2010 (S.I. No. 93 of 2010);
- European Communities (Drinking Water) Regulations 2014 (S.I. No 122 of 2014), as amended by the European Union (Drinking Water) (Amendment) Regulations 2017 (S.I. No. 464 of 2017);
- European Communities (Quality of Salmonid Waters) Regulations 1988 (SI no. 293 of 1988);
- European Union (Water Policy) (Abstractions Registration) Regulations 2018 (SI no. 261 of 2018) ;
- National Roads Authority (NRA 2008). Environmental Impact Assessment of National Road Schemes – A Practical Guide;
- Directive 2000/60/EC Water Framework Directive (WFD);
- Directive 2006/118/EC Groundwater Directive;
- Water Services Acts (2007 – 2017);
- CL:AIRE (2010a). Soil Generic Assessment Criteria for Human Health Risk Assessment;
- CL:AIRE / SuRF (2010b). A Framework for Assessing the Sustainability of Soil and Groundwater Remediation;
- CL:AIRE (2017). Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies;
- Environmental Protection Agency (EPA) (2008). A Framework for the Assessment of Groundwater-Dependent Terrestrial Ecosystems under the Water Framework Directive. EPA Strive Programme 2007-2013;
- EPA (2011a). Evaluating the Influence of Groundwater Pressures on Groundwater-Dependent Wetlands. EPA Strive Programme 2007-2013;
- EPA (2011b). Guidance on the Authorisation of Discharges to Groundwater;
- EPA (2013). Guidance on the Management of Contaminated Land and Groundwater at EPA Licenced Sites;
- EPA (2022). Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA Guidelines);

- European Union Floods Directive, 2007/60/EC;
- European Communities (Assessment and Management of Flood Risks) Regulations 2010 (S.I. No. 122/2010); and
- Regulation 15 of S.I. No. 323/2020 – European Union (Waste Directive) Regulations 2020.

### 17.3.2 Data collection and collation

Data was compiled from publicly available datasets, the findings of ground investigations, design information, a scheme walkover survey and other sources, as outlined below.

#### *17.3.2.1 Publicly available datasets*

The publicly available datasets listed in **Table 17.1** have been acquired and consulted in the assessment of the baseline conditions. All datasets were accessed in April 2023.

**Table 17.1: Publicly available datasets**

| Source | Name | Description |
|---|---|---|
| Ordnance Survey Ireland Geohive (OSI) | Current and historical ordnance survey maps | Current and historical survey maps produced by the OSI |
| | Aerial photography | Current and historical survey maps produced by the OSI |
| Google | Aerial photography | Current aerial imagery produced by Google |
| | Topography | Topography from transects in Google Earth. |
| Bing | Aerial photography | Current aerial imagery produced by Bing |
| Teagasc | Teagasc Soils Data | Surface soils classification and description |
| Geological Survey Ireland (GSI) | Quaternary Mapping | Geological maps of the site area produced by the GSI and available on GSI online map viewer |
| | Teagasc Classification | |
| | Bedrock Mapping | |
| | Aggregate Potential Mapping | |
| | Mineral Localities | |
| | Geotechnical Sites | |
| | Bedrock Aquifer Mapping | |
| | Groundwater Vulnerability | |
| | Groundwater Recharge | |
| | Groundwater Resources | |
| | Groundwater Flooding | |
| | National Landslide Database | |
| | Karst Database | |
| | Groundwater wells and springs | |
| | Historic Mine Sites - Inventory and Risk Classification | |

| Source | Name | Description |
|---|---|---|
| | Active Quarries and pits | |
| | County Geological Sites and Geological Heritage Areas | |
| | GSI, Memoirs | |
| | Historic Mine Sites - Inventory and Risk classification | |
| | LiDAR Digital Terrain Model (DTM) | |
| Environmental Protection Agency (EPA) | Corine Land Cover 2018 | These datasets are based on interpretation of satellite imagery and national in-situ vector data |
| | Historic Mine Sites - Inventory and Risk classification | |
| | River Network Map | |
| | EPA Licence & Permit Databases | Information on any EPA IE/IPC licences and Permits in the area |
| | EPA HydroNet | Reports of groundwater level monitoring points |
| | Waste Boundaries | Boundaries of all waste facilities within Ireland that are or will be licensed by the EPA |
| | Radon Risk Map | This map shows the level of Radon across Ireland. High Radon Areas are shown in red. |
| National Parks and Wildlife Service | Designated Natural Heritage Areas (NHA), Special Protection Areas (SPA), Special Areas of Conservation (SAC) Sites | This dataset provides information on national parks, protected sites and nature reserves |
| National Monuments Service (2018) (Archaeological Survey of Ireland) | Archaeological Monuments | This dataset provides all recorded archaeological monuments |
| Department of Communications, Energy and Natural Resources | State Mining and Prospecting Facilities | A booklet contains a list of all current and prospecting mining facilities |
| | Historic Mine Sites - Inventory and Risk Classification | Inventory of Irelands Historic Mine Sites with investigations and potential risk posed by these sites |

#### *17.3.2.2 Scheme walkover*

A scheme walkover survey was carried out on 17th February 2022 to inform and verify the review of publicly available datasets and the findings made during the initial stage of ground investigations in December 2022.

The findings of the scheme walkover survey including photos and scheme walkover survey notes are included in **Appendix 17.1** in **Volume 4** of this EIAR.

#### *17.3.2.3 Ground Investigation*

A project-specific intrusive ground investigation was carried out during 2022 and 2023. The factual records received are contained in **Appendix 17.2** in **Volume 4** of this EIAR and discussed further in the assessment of the site-specific conditions in Section 17.4.3.

Two previous ground investigations conducted within the study area adjacent to the site were also used in the assessment of the baseline conditions. These previous reports are presented in **Table 17.2** and the relevant data included in **Appendix 17.3** in **Volume 4** of this EIAR. One of these reports (SIL, 1976) is publicly available from the 'EXT GSI Geotechnical Sites layer' of the GSI Spatial Resources Map Viewer (GSI, 2019a).

**Table 17.2 Existing ground investigations**

| GSI Report ID | Title | Year | Author | Location | Relevant scope |
|---|---|---|---|---|---|
| 1530 | Gas pipeline route from Powerhead Bay to Cork, Aghada and Marino Point | 1976 | Site Investigations Ltd. | Co. Cork | 2 cable percussion boreholes |
| n/a | Dunkettle Advance ITS Works Ground Investigation – Factual Report. | 2020 | Priority Geotechnical Ltd. | Co. Cork | 1 cable percussion borehole<br>1 rotary core borehole<br>3 slit trenches |

### 17.3.3 Technical limitations

The land and soils baseline data included in this assessment comprises information available in the region and consolidated in the desk study. This review was completed by studying local geological maps, aerial photography, historic ground investigation and completing site walkovers to provide an understanding of the study area. By examining the previous information collected and understanding the geology and geomorphology of the site a ground model was constructed. This ground model was assessed and confirmed through the project specific ground investigation.

Based on the information collected in the desk study and site walkover, dedicated field surveys were commissioned for the Proposed Development. The locations and the spacing of the exploratory locations used as part of the intrusive investigation were chosen to gain an understanding of the land and soils within the study area. Between each point the baseline data from the intrusive investigation has been assessed by conservative interpretation. The findings from the investigations for most cases compared favourably with the desk study of existing information on the baseline conditions.

Based on the comparability of the results from the investigations commissioned for the Proposed Development and baseline conditions from the desk study, the information on the baseline conditions is sufficient to complete the assessment.

### 17.3.4 Appraisal method for the assessment of impacts

The likely significant impacts have been assessed by classifying the importance of the relevant attributes and quantifying the magnitude of any likely significant impacts on these attributes. This has been undertaken in accordance with the NRA (NRA, 2008a) and IGI Guidelines (IGI, 2013) as outlined in the following sections.

#### *17.3.4.1 Baseline – initial assessment*

In order to identify and quantify the likely significant impacts of the Construction Phase and Operational Phase of the Proposed Development, it is first necessary to undertake a detailed study of the (baseline) geological and hydrogeological environment of the study area for the Proposed Development.

The existing land, soils, geology and hydrogeology conditions in the study area have been interpreted from review of existing data, consultation, scheme walkover surveys and from Proposed Development specific ground investigations.

This assessment includes the development of a preliminary Conceptual Site Model (CSM), which describes the ground conditions expected throughout the study area of the Proposed Development based on existing literature. Also, as part of this initial assessment, the preliminary generic type of geological / hydrogeological environment is determined.

The IGI Guidelines (IGI, 2013) provide five types of environments as examples (Types A to E), as described in Step 3 of the IGI Guidelines. These assist the assessor by establishing the sensitivity of the environment and level of investigation required.

### *17.3.4.2 Baseline - direct and indirect site investigation*

Information gathered on the baseline environment during specific ground investigations for the Proposed Development corresponds to the second element of the methodology; 'Direct and Indirect Site Investigation and Studies'.

As part of the second element, relevant site investigations and studies close to the Proposed Development are gathered and assessed. Then, the preliminary CSM is refined accordingly.

### *17.3.4.3 Gradation of impacts*

The NRA Guidelines (NRA, 2008a) provide criteria and examples for determining likely significant impacts. The relevant tables from the NRA Guidelines (NRA, 2008a) are as follows:

- Box 4.1: Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes (refer to **Table 17.3**);
- Box 4.3: Criteria for Rating Site Attributes – Estimation of the Importance of Hydrogeology Attributes (refer to **Table 17.4**);

The magnitude of impacts should be defined in accordance with the criteria provided in the NRA Guidelines (refer to **Table 17.5**):

- Box 5.1: Criteria for Rating Site Attributes at Environmental Impact Assessment (EIA) Stage – Estimation of Magnitude of Impact on Soil / Geology Attribute (refer to **Table 17.6**);
- Box 5.3: Criteria for Rating Site Attributes at EIA Stage – Estimation of Magnitude of Impact on Hydrogeology Attributes (refer to **Table 17.7**); and
- Box 5.4: Rating of Significant Environmental Impacts at EIA Stage (refer to **Table 17.8**).

The NRA Guidelines criteria use similar significance terminology as the EPA Guidelines (EPA, 2022). However, it has intermediate steps to justify using that terminology:

- Step 1: Quantify the importance of a feature for geology (Box 4.1) and hydrogeology (Box 4.3);
- Step 2: Estimate the magnitude of the impact on the feature from the Proposed Development (Box 5.1, Box 5.3); and
- Step 3: Determine the significance of the impact on the feature from the matrix (Box 5.4) based on the importance of the feature and the magnitude of the impact.

**Table 17.3: Criteria for rating the importance of identified geological features (Table C2 (IGI, 2013) and Box 4.1 (NRA, 2008a)).**

| Importance | Criteria | Typical example |
|---|---|---|
| Very High | Attribute has a high quality, significance or value on a regional or national scale.<br>Degree or extent of soil contamination is significant on a national or regional scale.<br>Volume of peat and / or soft organic soil underlying route is significant on a national or regional scale. | Geological feature rare on a regional or national scale (NHA)<br>Large existing quarry or pit<br>Proven economically extractable mineral resource |
| High | Attribute has a high quality, significance or value on a local scale.<br>Degree or extent of soil contamination is significant on a local scale.<br>Volume of peat and / or soft organic soil underlying route is significant on a local scale. | Contaminated soil on site with previous heavy industrial usage<br>Large recent landfill site for mixed wastes<br>Geological feature of high value on a local scale (County Geological Site)<br>Well drained and / or highly fertility soils<br>Moderately sized existing quarry or pit<br>Marginally economic extractable mineral resource |

| Importance | Criteria | Typical example |
|---|---|---|
| Medium | Attribute has a medium quality, significance or value on a local scale.<br>Degree or extent of soil contamination is moderate on a local scale.<br>Volume of peat and / or soft organic soil underlying route is moderate on a local scale. | Contaminated soil on site with previous light industrial usage<br>Small recent landfill site for mixed wastes<br>Moderately drained and / or moderate fertility soils<br>Small existing quarry or pit<br>Sub-economic extractable mineral resource |
| Low | Attribute has a low quality, significance or value on a local scale.<br>Degree or extent of soil contamination is minor on a local scale.<br>Volume of peat and / or soft organic soil underlying route is small on a local scale*. | Large historical and / or recent site for construction and demolition wastes<br>Small historical and / or recent landfill site for construction and demolition wastes<br>Poorly drained and / or low fertility soils.<br>Uneconomically extractable mineral resource |

**Table 17.4: Criteria for rating the importance of identified hydrogeological features (Box 4.3 (NRA, 2008a))**

| Importance | Criteria | Typical example |
|---|---|---|
| Extremely High | Attribute has a high quality or value on an international scale | Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g., cSAC or SPA status |
| Very High | Attribute has a high quality or value on a regional or national scale | Regionally important aquifer with multiple well fields.<br>Groundwater supports river, wetland or surface water body ecosystem protected by national legislation –<br>NHA status<br>Regionally important potable water source supplying >2500 homes<br>Inner source protection area for regionally important water source |
| High | Attribute has a high quality or value on a local scale | Regionally Important Aquifer<br>Groundwater provides large proportion of baseflow to local rivers<br>Locally important potable water source supplying >1000 homes<br>Outer source protection area for regionally important water source<br>Inner source protection area for locally important water source |
| Medium | Attribute has a medium quality or value on a local scale | Locally Important Aquifer<br>Potable water source supplying >50 homes<br>Outer source protection area for locally important water source |
| Low | Attribute has a low quality or value on a local scale | Poor Bedrock Aquifer<br>Potable water source supplying <50 homes |
| Major Beneficial | Results in major improvement of attribute quality | Major enhancement of geological heritage feature |

**Table 17.5: Definition of magnitude of impact (Table 5.1 (NRA, 2008a))**

| Importance | Criteria | Typical example |
|---|---|---|
| Very High | Attribute has a high quality, significance or value on a regional or national scale.<br>Degree or extent of soil contamination is significant on a national or regional scale.<br>Volume of peat and / or soft organic soil underlying route is significant on a national or regional scale. | Geological feature rare on a regional or national scale (NHA)<br>Large existing quarry or pit<br>Proven economically extractable mineral resource |
| High | Attribute has a high quality, significance or value on a local scale.<br>Degree or extent of soil contamination is significant on a local scale.<br>Volume of peat and / or soft organic soil underlying route is significant on a local scale. | Contaminated soil on site with previous heavy industrial usage<br>Large recent landfill site for mixed wastes<br>Geological feature of high value on a local scale (CGS)<br>Well drained and / or highly fertility soils<br>Moderately sized existing quarry or pit<br>Marginally economic extractable mineral resource |
| Medium | Attribute has a medium quality, significance or value on a local scale.<br>Degree or extent of soil contamination is moderate on a local scale.<br>Volume of peat and / or soft organic soil underlying route is moderate on a local scale. | Contaminated soil on site with previous light industrial usage<br>Small recent landfill site for mixed wastes<br>Moderately drained and / or moderate fertility soils<br>Small existing quarry or pit<br>Sub-economic extractable mineral resource |
| Low | Attribute has a low quality, significance or value on a local scale.<br>Degree or extent of soil contamination is minor on a local scale.<br>Volume of peat and / or soft organic soil underlying route is small on a local scale*. | Large historical and / or recent site for construction and demolition wastes<br>Small historical and / or recent landfill site for construction and demolition wastes<br>Poorly drained and / or low fertility soils.<br>Uneconomically extractable mineral resource |

**Table 17.6: Criteria for rating soil and geology impact significance and magnitude at EIA stage (Table C4 (IGI, 2013) and Box 5.1 (NRA, 2008a))**

| Magnitude of Impact | Criteria | Typical example |
|---|---|---|
| Large Adverse | Results in loss of attribute | Loss of high proportion of future quarry or pit reserves<br>Irreversible loss of high proportion of local high fertility soils<br>Removal of entirety of geological heritage feature<br>Requirement to excavate / remediate entire waste site<br>Requirement to excavate and replace high proportion of peat, organic soils and / or soft mineral soils beneath alignment |
| Moderate Adverse | Results in impact on integrity of attribute or loss of part of attribute | Loss of moderate proportion of future quarry or pit reserves<br>Removal of part of geological heritage feature<br>Irreversible loss of moderate proportion of local high fertility soils<br>Requirement to excavate / remediate significant proportion of waste site<br>Requirement to excavate and replace moderate proportion of peat, organic soils and / or soft mineral soils beneath alignment |

| Magnitude of Impact | Criteria | Typical example |
|---|---|---|
| Small Adverse | Results in minor impact on integrity of attribute or loss of small part of attribute | Loss of small proportion of future quarry or pit reserves<br>Removal of small part of geological heritage feature<br>Irreversible loss of small proportion of local high fertility soils and / or high proportion of local low fertility soils<br>Requirement to excavate / remediate small proportion of waste site<br>Requirement to excavate and replace small proportion of peat, organic soils and / or soft mineral soils beneath alignment |
| Negligible | Results in an impact on attribute but of insufficient magnitude to affect either use or integrity | No measurable changes in attributes |
| Minor Beneficial | Results in minor improvement of attribute quality | Minor enhancement of geological heritage feature |
| Moderate Beneficial | Results in moderate improvement of attribute quality | Moderate enhancement of geological heritage feature |

**Table 17.7: Criteria for rating hydrogeological impact significance and magnitude at EIA stage (Box 5.1 (NRA, 2008a))**

| Magnitude of Impact | Criteria | Typical example |
|---|---|---|
| Large Adverse | Results in loss of attribute and / or quality and integrity of attribute | Removal of large proportion of aquifer<br>Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems<br>Potential high risk of pollution to groundwater from routine run-off<br>Calculated risk of serious pollution incident during operation >2% annually |
| Moderate Adverse | Results in impact on integrity of attribute or loss of part of attribute | Removal of moderate proportion of aquifer<br>Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems<br>Potential medium risk of pollution to groundwater from routine run-off<br>Calculated risk of serious pollution incident during operation >1% annually |
| Small Adverse | Results in minor impact on integrity of attribute or loss of small part of attribute | Removal of small proportion of aquifer<br>Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems<br>Potential low risk of pollution to groundwater from routine run-off<br>Calculated risk of serious pollution incident during operation >0.5% annually |
| Negligible | Results in an impact on attribute but of insufficient magnitude to affect either use or integrity | Calculated risk of serious pollution incident during operation <0.5% annually |

**Table 17.8: Rating of environmental impacts at EIA stage (NRA, 2008a)**

| | | Magnitude of Impact | | | |
|---|---|---|---|---|---|
| | | **Negligible** | **Small** | **Moderate** | **Large** |
| **Importance of Attribute** | **Extremely High** | Imperceptible | Significant | Profound | Profound |
| | **Very High** | Imperceptible | Significant / Moderate | Profound / Significant | Profound |
| | **High** | Imperceptible | Moderate / Slight | Significant / Moderate | Severe / Significant |
| | **Medium** | Imperceptible | Slight | Moderate | Significant |
| | **Low** | Imperceptible | Imperceptible | Slight | Slight / Moderate |

#### *17.3.4.4 Mitigation measures, residual impacts and final impact assessment*

The third element of the recommended steps builds on the outcome of the preceding two elements, by identifying mitigation measures to address potential significant or profound impacts and then assessing the significance of any residual impacts. Embedded design measures which have been incorporated into the design for the Proposed Development are also considered in this Section 17.5.

The final impact assessment includes a description of any residual impacts. The significance of any residual impact is determined based on the same methodology and reported.

## 17.4 Baseline Environment

### 17.4.1 Introduction

This section describes the existing conditions and important features in terms of the land, soils, geology and hydrogeology associated with the Proposed Development.

A regional overview (Section 17.4.2) is followed by a description of the site-specific environment (refer to Section 17.4.3). Features are then identified, and their importance ranked in accordance with the NRA and IGI Guidelines, in Section 17.4.3.17.

### 17.4.2 Regional overview

This section discusses the regional conditions within the study area, that is defined as a 2km radius from the Proposed Development, as described in Section 17.2. The regional geomorphology, topography, soils and subsoils, bedrock geology and hydrogeology are discussed in this section. A list of regional figures used in this assessment is included in **Table 17.9**, with the figures presented in **Volume 3** of this EIAR.

**Table 17.9: List of figures from the regional characterisation**

| Figure | Title |
|---|---|
| Figure 17.1 | Land, Soils, Geology and Hydrogeology Study Area |
| Figure 17.2 | Regional Land Use |
| Figure 17.3 | Regional Topography and Geomorphology |
| Figure 17.4 | Regional Soils (Teagasc Classification) |
| Figure 17.5 | Regional Subsoils (Quaternary Sediments) |
| Figure 17.6 | Regional Bedrock Geology (1:100k) |

| Figure | Title |
|---|---|
| Figure 17.7 | Regional Crushed Rock Aggregate Potential |
| Figure 17.8 | Regional Aggregate Resources |
| Figure 17.9 | Regional Bedrock Aquifers and Abstractions |
| Figure 17.10 | Regional Gravel Aquifers |
| Figure 17.11 | Regional Groundwater Bodies |
| Figure 17.12 | Regional Groundwater Vulnerability |
| Figure 17.13 | Regional Groundwater Recharge |
| Figure 17.14 | Regional NPWS Designated Sites |

#### *17.4.2.1 Regional land use, topography and geomorphology*

The study area is centred on the N25 dual carriageway and the Cork to Midleton railway immediately west of Little Island train station, Little Island, Co. Cork, approximately 10km east of Cork City. According to the EPA Corine 2018 dataset, as shown on **Figure 17.2** in **Volume 3** of this EIAR, the study area is characterised by mixed land use classes, including large areas of artificial surfaces in the south and west, and agricultural land in the north and east. The study area is subdivided by the N25 itself and the parallel railway line, with the area to the North of the N25 predominantly agricultural and greenfield with increasing residential and mixed uses in Glounthaune to the east. The southern half of the study area is dominated by mixed use developments in Little Island. There are 12 no. EPA licensed facilities (refer to **Figure 17.2** in **Volume 3** of this EIAR) within the study area, indicating industrial land use throughout. Therefore, there are likely to be sources of contamination within the made ground throughout the study area.

The EPA 20m contour mapping, as shown in **Figure 17.3** in **Volume 3** of this EIAR, indicates a variable topography within the study area. The highest elevation of 130m is to the north of the study and then slopes down to approximately 10mOD in Little Island, to the south of the Proposed Development.

The river network of the study area is influenced by the underlying geology, resulting in a primarily east-west trending river network, with north-south trending rivers, such as the Glashaboy River, making use of north-south trending bedrock faults. The main surface drainage system directly connected to the Proposed Development is the Kilcoolishal Stream. The Kilcoolishal Stream drains the wetland area (close to the Proposed Development site) to the north of the N25 before discharging to Cork Harbour. The stream is completely culverted south of the N25 within Eastgate Business Park car park. **Chapter 16**, *Water* includes a full description of hydrological regime.

The GSI Quaternary Geomorphology mapping (refer to **Figure 17.3** in **Volume 3** of this EIAR), demonstrates that there are widespread glaciofluvial terrace deposits within the study area, mostly noticeably in Little Island to the south of the Proposed Development. The glaciofluvial terrace is associated with the 'Lee River system'. The study site is intersected by the Lee Buried Valley trending east-west (Long and Roberts, 2008).

#### *17.4.2.2 Regional soils*

The Teagasc national indicative soil map classifies the soils of Ireland into simplified categories. Soil information is categorised from the Irish Forest Soils (IFS) project, which indicates the predominant soil type for each area, and the drainage characteristics of the soil. The Teagasc soil database is available on the GSI public data viewer and can be seen on **Figure 17.4** in Volume 3 of this EIAR. The main soils within the study area are listed in **Table 17.10**. The Irish Soil Information System (SIS) classification related to soil property data in the study area is presented in **Table 17.11**.

The majority of the Proposed Development is underlain by alluvium (mineral). The observed alluvium continues to both the west and east of the Proposed Development roughly paralleling and surrounding the N25 carriageway and railway line and appears to follow the outline of the reclaimed historic river to the southwest. However, the majority of these soils have been altered by reclamation of land and the construction of the railway, local roads and N25 dual carriageway. Immediately to the north and south there are deep well drained minerals (mainly acidic) with pockets of shallow well drained minerals (mainly acidic), rock outcrops and made ground to the north. The south of the study area is dominated by the made ground associated with the urban development of Little Island. The east of the study area is dominated by deep well drained mineral (basic) with pockets of shallow well drained mineral (basic) on the east of Little Island and made ground in Glounthaune Village.

**Table 17.10: Soils within the study area (Teagasc classification)**

| Soil type | Notes / description | Location |
|---|---|---|
| Made Ground - Made | Associated with urban development | Widespread under the Proposed Development |
| Alluvium – (Mineral) | Typically found along current and historic watercourses | Widespread under the Proposed Development |
| Deep or shallow well drained mineral (mainly acidic or basic) | Typically found in agricultural areas at higher elevations. | Little Island and hill / ridge north of the Proposed Development |

**Table 17.11: Summary of soil types within the study area (SIS national soil)**

| Classification | Description | Location |
|---|---|---|
| Marine alluvium | Marine alluvium | Through the centre and west of the study area along the valley base |
| Clonroche | Fine loamy drift with siliceous stones | Northern side of the study area |
| Clashmore | Coarse loamy drift with siliceous stones | South and east of the study area where not replaced with urban. |
| Tidal Marsh | Mineral alluvium | To the east in the mudflats |
| Urban | Urban | Glounthaune Village and Little Island |

#### *17.4.2.3 Regional subsoils*

The subsoil comprises the unconsolidated geological deposits which overlie the solid geology. These subsoils, as classified by the GSI Quaternary mapping, are presented in **Figure 17.5** in **Volume 3** of this EIAR.

The majority of the north of the study area is underlain by Glacial Till derived from Devonian Sandstones. Large areas of the southern study site are classified as urban. The southeast of the study area is underlain by Glacial Till derived from limestones. The centre of the study area, including the Proposed Development, is characterised by more recent alluvial deposits, and Gravels derived from Devonian sandstone. The list of subsoil types as classified by the GSI Quaternary mapping are listed in **Table 17.12**.

Subsoil depths in the study area can be highly variable within short distances due to the underlying bedrock levels which were extensive eroded during Quaternary glaciation that resulted in a large east-west trending valley (Long and Roberts, 2008). This valley is located within the centre of the study area. Areas with minimal subsoil deposits with bedrock outcrop at or near the surface are indicated in the northern portion of the study area. The subsoil thickness in areas of deeper subsoil, such as in the centre of the study area, can only be determined from ground investigations.

Table 17.12: Subsoils within the study area

| Subsoil type | Description | Location |
|---|---|---|
| Made Ground - Urban | Associated with urban development | Widespread to the south of Little Island |
| Estuarine silts and clays | In tidal areas | To the east of the Proposed Development |
| Alluvium – (Mineral) | Typically found along current and historic watercourses | Widespread under the Proposed Development running in an east-west direction |
| Gravels GDS | Gravels derived from Devonian sandstones | Immediately to the south and north of the Proposed Development |
| Glacial till -TDs | Till derived from Devonian sandstones | Hill immediately north of Proposed Development and small area of Little Island |
| Glacial till -TLs | Till derived from Limestone | East of Little Island |

#### *17.4.2.4 Regional bedrock*

The regional bedrock geology derived from the GSI 1:100K bedrock mapping (refer to **Figure 17.6** in **Volume 3** of this EIAR) indicate that the study area is underlain by several geological formations of the Upper Devonian and Lower Carboniferous. The study area is traversed by the east-west trending geological fold known as the Cork Syncline that dominates the geology at a regional scale. The Cork Syncline comprises Carboniferous Limestone and Lower Limestone Shales which were brought down in a deep infold between older Devonian Old Red Sandstone (ORS) rocks of the corresponding fold known as the Central Anticline. The syncline is about 3km wide in the study area (Lampugh *et al*., 1905).

There are frequent occurrences of rock close to the surface within the study area, as displayed in **Figure 17.6** in **Volume 3** of this EIAR. However, the depth to rock beneath the Proposed Development is expected to be in excess of 20mBGL (Davis, *et al*., 2006). A summary of the geological formations within the study area is shown in **Table 17.13**.

Table 17.13: Summary of the bedrock geology within the study area

| Geological period | Formation | Rock type | Approximate thickness (m) | Description | Stage | Location |
|---|---|---|---|---|---|---|
| Carboniferous | Cuskinny Member (KNcu) | Sandstone | 200-235m | Flaser-bedded sandstone & mudstone. Sand dominant | Courceyan | North and east of the Carrigada Fault. Occurs in the north of the study area |
| | Ballysteen (BA) | Limestone | 100-200m | Dark muddy limestone, shale | Courceyan | Poorly exposed in South Cork. Occurs in the north and south of the study area |
| | Waulsortian Limestone (WA) | Limestone | Typically, 300-500m. >1200m in the Shannon Estuary area | Massive, unbedded lime-mudstone | Tournaisian – lower Visean | It is the centre of the Cork Syncline and underlying the whole Proposed Development site and most of the study area |
| | Cork Red Marble Formation (CK) | Limestone | 80m | Red brecciated calcilutite limestone | Chadian | It is found in the Cork Syncline separating the Waulsortian Limestones from the Little Island Formation. Occurs in the south of the study area |

| Geological period | Formation | Rock type | Approximate thickness (m) | Description | Stage | Location |
|---|---|---|---|---|---|---|
| | Little Island formation (LI) | Limestone | 500m | Massive and crinoidal fine limestone | Chadian – Asbian | The formation occurs to the south of the study area and extends from the west end of the Cork Syncline to Youghal. |
| | Clashavodig Formation (CV) | Limestone | 180m | Oolitic, peloidal, cherty, fine limestone | Asbian | The formation is only known from the Cork Syncline between Little Island and Midleton. |
| Devonian | Ballytrasna (BS) | Mudstone | 360-1500m | Dusky red to purple mudstone & siltstones with subordinate fine-grained pale-red sandstone | Famennian | South Cork on either side of the Cork Syncline, and as far west as Awboy River Fault. Occurs in both the south and north of the study area |
| | Gyleen (GY) | Siltstone | <460m | Sandstone with mudstone and siltstone | Strunian | Along the edges of the Cork Syncline in the north of the study area |

#### *17.4.2.5 Regional mineral / aggregate resources*

The following datasets were consulted in order to assess the impact of the Proposed Development on the economic geology of the study area:

- GSI: aggregate potential mapping (GSI, 2016b);
- GSI: mineral localities (GSI, 2014);
- GSI active quarries (GSI, 2019); and
- GSI APM pits and quarries (GSI, 2016c).

The crushed rock aggregate potential (refer to **Figure 17.7** in **Volume 3** of this EIAR) throughout the majority of the study area is considered to be of very high potential. However, this drops to high potential beneath the Proposed Development. Considering the depth to rock expected and the urban nature of the Proposed Development, crushed rock aggregate potential is not considered further. The granular aggregate potential (refer to **Figure 17.8** in **Volume 3** of this EIAR) within the study area is centred on the location of the Proposed Development due to the presence of the glaciofluvial gravel terraces. The potential ranges from low to very high but due to the urban nature of the Proposed Development, granular aggregate potential is not considered further in this assessment.

There is one non-metallic mineral locality in the south of the study area (refer to **Figure 17.8** in **Volume 3** of this EIAR), as presented in **Table 17.14**.

**Table 17.14: Mineral / aggregate resources within the study area**

| Mineral type | Description | Location |
|---|---|---|
| Limestone (in general) | Several quarries where Cork Red Marble was produced. Most quarries are located in industrial estate with no potential for further development. | Southern portion of the study area in Little Island. |

### *17.4.2.6 Regional geological heritage*

The GSI maintains a register of geological / geomorphological sites in need of protection through Natural Heritage Area (NHA) designation and are classified as Geological Heritage sites. There are two unaudited County Geological Sites (CGS) located within the study area, as shown in **Figure 17.8** in **Volume 3** of this EIAR and summarised in **Table 17.15**. Due to the nature and distance of the geological heritage sties from the Proposed Development, the GSI Geological Heritage Sites is not considered further in this assessment.

**Table 17.15: GSI Geological Heritage Sites within the study area**

| Geological Heritage Site | Description | Location | Distance from Project Area |
|---|---|---|---|
| Rock Farm Quarry, Little Island | A series of limestone quarries which display three distinctive zones of the Visean (Lower Carboniferous) | Little Island. Southern portion of the study area | Approximately 1.5km to the south of the Proposed Development |
| Little Island | Little Island provides the type section for the Cork Red Marble Formation. | Little Island. Southern portion of the study area | Approximately 1.8km to the south of the Proposed Development |

### *17.4.2.7 Regional aquifer type and classification*

The GSI system for classifying the aquifers in Ireland is based on the hydrogeological characteristics, size, and productivity of the groundwater resource. There are three principal types of aquifers, corresponding to whether they are major, minor, or unproductive resources, whereby:

- Regionally Important Aquifers are capable of supplying regionally important abstractions (e.g., large public water supplies), or excellent yields (>400 $m^3$/d);
- Locally Important Aquifers are capable of supplying locally important abstractions (e.g., smaller public water supplies, group schemes), or good yields (100–400 $m^3$/d); and
- Poor Aquifers are capable of supplying small abstractions (e.g., domestic supplies), or moderate to low yields (<100 $m^3$/d).

The aquifers present within the regional study area are presented in **Figure 17.9** and **Figure 17.10** in **Volume 3** of this EIAR and summarised in **Table 17.16**.

**Table 17.16: GSI Aquifers within the study area**

| Aquifer Type | Description | Code | Location |
|---|---|---|---|
| Regionally Important Aquifer | Karstified (diffuse) | (Rkd) | Southern portion of the study area. Area is underlain by Carboniferous calcareous geological formations of the Cork Syncline. |
| Locally Important Aquifer | Bedrock which is Moderately Productive only in Local Zones | (Ll) | Northern portion of the study area. |
| Locally Important Gravel Aquifer | Highly permeable gravel aquifer with a continuous area of between 1-10$km^2$ and may supply excellent yield but is limited due to the extends of the gravel | (Lg) | Central part of study area mostly overlying the locally important bedrock aquifer. |

Groundwater bodies (GWBs) are delineated and described by the GSI (GSI, 2004) as Water Framework Directive (WFD) groundwater management units to manage and protect groundwater and linked surface waters. There are three GWBs present within the study area, which are listed in **Table 17.17** and shown in **Figure 17.11** in **Volume 3** of this EIAR.

The Ballinhassig East GWB extends across the uplands of the Lee catchment and its tributaries comprising predominantly of Devonian Old Red Sandstones and Dinantian Mudstones & Sandstones (Cork Group). Groundwater flow is concentrated in the upper 15m of the bedrock, where permeability is higher, although deeper groundwater flows can be encountered at depth associated with faults and major fractures. Fractures, joints and faults provide the main pathways for groundwater to flow through the aquifer. Fracturing is confined to local zones and the connectivity between fractures can be limited. Therefore, flow paths are expected to be relatively short (30-300m) and groundwater typically discharges to springs or streams which traverse the aquifer. Groundwater is generally unconfined and follows the surface topography.

GSI groundwater body descriptions are not available for the Industrial Facility (P0016-02) or Little Island GWBs.

The WFD status for the Ballinhassig East groundwater body is 'good' and is currently *'At Risk'* regarding the maintenance of that status. The WFD status for both the Industrial Facility (P0016-02) and the Little Island GWBs is 'Good' and currently 'Not at Risk' regarding the risk of not maintaining that status. The water quality status and risk for these water features is summarised in **Table 17.17**.

**Table 17.17: EPA WFD Groundwater Body status and risk**

| Water feature | European code | WFD risk | WFS status (2016–2021) | Location |
|---|---|---|---|---|
| Ballinhassig East | IE_SW_G_004 | At risk | Good | Northern portion of the study area |
| Industrial Facility (P0016-02) | IE_SW_G_089 | Not at risk | Good | Southern portion of the study area |
| Little Island | IE_SW_G_090 | Not at risk | Good | South-eastern portion of the study area |

### *17.4.2.8 Regional aquifer vulnerability*

Aquifer vulnerability of a groundwater body is a term used to describe the intrinsic geological and hydrogeological characteristics which determines the ease with which a groundwater body may be contaminated by human activities.

The vulnerability is determined by the travel time and the attenuation capacity of the overlying deposits, mostly by the permeability and thickness of the subsoils that underlie the topsoil. For example, bedrock with a thick, low permeability, clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, gravelly overburden.

Aquifer vulnerability classification guidelines, as published by the GSI, are presented in **Table 17.18**.

The regional groundwater vulnerability varies significantly across the study area, as shown in **Figure 17.12** in **Volume 3** of this EIAR, ranging from low to extreme and with pockets of rock at or near the surface at higher elevations.

**Table 17.18: Aquifer vulnerability classification (DELG, EPA & GSI, 1999)**

| Vulnerability rating | Hydrogeological conditions | | | | |
|---|---|---|---|---|---|
| | Subsoil permeability (type) and thickness | | | Unsaturated zone | Karst features |
| | High permeability (sand / gravel) | Moderate permeability (e.g., sandy subsoil) | Low permeability (e.g., clayey subsoil, clay, peat) | Sand / gravel aquifers only | (<30m radius) |
| Extreme (E) | 0 – 3.0m | 0 – 3.0m | 0 – 3.0m | 0 – 3.0m | - |
| High (H) | >3.0m | 3.0 – 10.0m | 3.0 – 5.0m | >3.0m | Not applicable |
| Moderate (M) | Not applicable | >10.0m | 5.0-10.0m | Not applicable | Not applicable |

| Vulnerability rating | Hydrogeological conditions | | | | |
|---|---|---|---|---|---|
| | Subsoil permeability (type) and thickness | | | Unsaturated zone | Karst features |
| | High permeability (sand / gravel) | Moderate permeability (e.g., sandy subsoil) | Low permeability (e.g., clayey subsoil, clay, peat) | Sand / gravel aquifers only | (<30m radius) |
| Low (L) | Not applicable | Not applicable | >10.0m | Not applicable | Not applicable |

### *17.4.2.9 Regional recharge*

Recharge is the amount of rainfall that replenishes a groundwater aquifer. Recharge is a function of the effective rainfall (i.e., rainfall minus evaporation and runoff), the permeability and thickness of the subsoil, and the aquifer characteristics.

The GSI annual groundwater recharge map of the study area is presented in **Figure 17.13** in **Volume 3** of this EIAR. Groundwater recharge is between 150 and 200 mm/year across much of the study area, particularly to the north where the area is underlain by locally important aquifer (Ll) which has a groundwater recharge cap of 200mm. Recharge rates are more variable in the southern portion of the study area underlain by the regionally important aquifer (Rkd), ranging from 100 to 600 mm/year.

### *17.4.2.10 Regional groundwater abstractions*

Groundwater resources describe any large well, spring or borehole which is used as groundwater abstraction source by domestic, agricultural, commercial, industrial, local authority or group water scheme users (refer to **Figure 17.9** in **Volume 3** of this EIAR).

The GSI holds records of groundwater wells drilled, however these records do not state which wells are currently used for abstraction and the database does not contain all groundwater wells. The GSI lists approximately seven wells and springs within the study area. The yield rates for most of these wells and springs are unknown. One well in the north of the study area has a yield of 32.7 $m^3$/day, which is classified as a poor yield.

Based on available data sources from the GSI there are no Public Water Supply or National Federation of Group Water Scheme groundwater source protection areas within the study area.

### *17.4.2.11 Regional karst*

Karst is a type of geological feature characterised by caves, caverns and other types of underground drainage resulting from the dissolution of the underlying calcareous bedrock. This typically occurs in areas of high rainfall with soluble rock. There are no karst features identified within the study area in the GSI karst database (GSI, 2020). There is a Regionally Important Aquifer which displays diffuse karstification underlying much of the calcareous geological formations of the Cork Syncline in the south of the study area.

### *17.4.2.12 Regional environmentally sensitive sites*

The National Parks and Wildlife Services (NPWS) is responsible for the designation of environmentally protected sites in Ireland and maintains a publicly available database of these sites. These sites include Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Natural Heritage Areas (NHAs). In addition to these sites, the NPWS also maintains a database of proposed Natural Heritage Areas (pNHAs).

Further information regarding the designated sites within the study area are detailed in **Chapter 9**, *Biodiversity*.

The protected areas within the study area are shown on **Figure 17.14** in **Volume 3** of this EIAR and are listed in **Table 17.19**. These protected sites do not contain groundwater dependant habitats in the vicinity of the site development. While these sites may not be groundwater dependent, they may receive groundwater flow from within the study area, with the exception of Rockfarm Quarry, Little Island. The gravel aquifer which underlies the site extends to the east and west along the former river channel. The gravels in Cork are considered to be highly permeable with a hydraulic conductivity in the order of 0.005m/s (Long *et al.*, 2015). Therefore, the gravels have the potential to provide a pathway for contamination to migrate towards downgradient ecologically sensitive habitats.

Rockfarm Quarry, Little Island is located upgradient of the site and is underlain by the Regionally Important aquifer. It is therefore unlikely have a hydrogeological connection to the study site and will not be assessed any further.

**Table 17.19: Ecological designated sites within the study area**

| Designated Site | Designation code | Status | Description | Location | Justification for further assessment |
|---|---|---|---|---|---|
| Cork Harbour | 004030 | SPA | Internationally important wetland site/bay system which stretches from the two main estuaries of the River Lee, near Cork City in the northwest, and the Owenacurra River, near Midleton, in the northeast. | Southern portion of the study area, along the coastline of Little Island | Potential hydrogeological connection through gravels |
| Great Island Channel | 001058 | SAC and pNHA | [1140] Tidal Mudflats and Sandflats<br>[1330] Atlantic Salt Meadows | Southern portion of the study area, along the coastline of Little Island | Potential hydrogeological connection through gravels |
| Dunkettle Shore pNHA | 001082 | pNHA | Mudflats | West of the study area | Potential hydrogeological connection through gravels |
| Rockfarm Quarry, Little Island | 001074 | pNHA | Habitats include grassland, scrub woodland and exposed rock and spoil of quarries. | Southern portion of the study area. | Not considered further |

### 17.4.3 Site specific environment

This section discusses the site-specific conditions within the study area for the Proposed Development as defined in Section 17.2. Where applicable, the importance of the attributes for which the impact of the Proposed Development is to be assessed are reported in this section. A list of site-specific figures used in this assessment is included in **Table 17.20**, with the figures presented in **Volume 3** of this EIAR.

**Table 17.20: List of figures from the site specific environment**

| Figure | Title |
|---|---|
| Figure 17.15 | Site-Specific Topography and Geomorphology |
| Figure 17.16 | Site-Specific Soil (Teagasc Classification) |
| Figure 17.17 | Site-Specific Subsoil (Quaternary Sediments) |
| Figure 17.18 | Site-Specific Bedrock Geology (1:100k) |
| Figure 17.19 | Site-Specific Historic and Project Specific Ground Investigations |
| Figure 17.20 | Site-Specific Radon Risk |
| Figure 17.21 | Site-Specific Bedrock Aquifers and Abstractions |
| Figure 17.22 | Site-Specific Gravel Aquifers |

| Figure | Title |
|---|---|
| Figure 17.23 | Site-Specific Groundwater Vulnerability |
| Figure 17.24 | Site-Specific Groundwater Recharge |

#### *17.4.3.1 Current and historic land use*

The current and historic land use is discussed in order to give context to any potential changes to land, soils, geology and hydrogeology that have the potential to influence the importance of a feature and the magnitude of any impacts. The current land use is based on current aerial imagery and mapping available from Ordnance Survey Ireland (OSI) (OSI, 2020), Google (Google, 2020), Bing (Bing, 2020) and the Corine Land Cover maps (EPA, 2018). The historic land use is based on the following OSI (OSI, 2020) historic aerial imagery and historic maps:

- OSI 6-inch mapping produced between 1837 and 1842;
- OSI 25-inch mapping produced between 1888 and 1913;
- OSI 6-inch Cassini mapping produced between 1830 and 1930s;
- OSI mapping produced between 1945-1962; 1977-1980; 1991 and 1992; and
- OSI 1995, 1999–2003, 2004–2006 and 2005-2012 aerial photography.

There has been considerable altering of the land use through the reclamation of land, infilling of waterbodies and the construction of the railway line and N25 dual carriageway since the middle of the $19^{th}$ century.

The Corine land mapping (EPA) indicates that there are variable land use classes across the Proposed Development. The N25 carriageway is classified as 'road and rail network'. To the north of the N25, the Proposed Development lands are classified as 'discontinuous urban fabric'. The Proposed Development is bordered by 'pasture' lands to the north. To the south of the N25 carriageway, the lands in the Proposed Development are classified as 'industrial and commercial units'.

The OSI 6" historical map (1837–1842) shows a river trending approximately from east / southeast to west/northwest through the Proposed Development adjacent to, and north of the present-day railway line. The river redirects on the western boundary of the Proposed Development to trend southwards. A quarry was located approximately 120m west / northwest of the Proposed Development.

The OSI 25" historical map (1888–1913) shows that the river was infilled, with the Great Southern and Western Railway line and Little Island station constructed. The quarry to the west/northwest of the Proposed Development is still documented.

The OSI Aerial Map (1995) shows the N25 carriageway under construction and commercial development around the Proposed Development.

The OSI Aerial Maps (2000–2012) show progressive residential and commercial development surrounding the Proposed Development.

The site walkover indicated that little change has occurred to the site since the construction of the N25 carriageway. The northern portion of the site is a public green space showing localised areas of ponding. A number of partially filled drainage ditches were located running parallel to the railway and N25 dual carriageway. Immediately south of the N25 carriageway is a densely wooded area and then a number of paved car parks, showing possible signs of settlement. There are a number of services identified in the area both above and below ground including a watermain running east west through the green space to the north. The depth of the watermain indicated by the records suggests an extensive area of cut and fill was carried out to install it resulting in a large proportion of the green area being likely made ground.

### 17.4.3.2 Geomorphology and topography

The geomorphology and topography are discussed to give context to any potential changes to land and soils that could influence the importance of a feature and the magnitude of any impacts. The geomorphology (GSI, 2016a) and the topography are shown on **Figure 17.15** in **Volume 3** of this EIAR.

The topography of the Proposed Development has been heavily altered from a relatively flat alluvial valley floor overlying the glaciofluvial terrace deposits to one that consists of a series of parallel ditches and embankments running east west through the centre of the Proposed Development and a variation in levels between the car parks to the south of the Proposed Development.

Levels at the tie in with the Little Island train station are approximately +2.2mOD. In the north of the site is an amenity parkland area, this park slopes from north to south with levels dropping from approximately 2.9mOD to 1.7mOD along the southern Irish Rail Boundary. The main crossings are over the Irish Rail tracks with max top of rail level approx. 3.2mOD, and over the N25 with max carriageway level of approx. 3.94mOD. There is a drop off in levels in the southern wooded area which raises again to meet the Radisson Blu Hotel car park at approx. 5.2mOD. On the southwest of the site there is a 1m drop in elevation between the Radisson Blu Hotel car park and the adjacent Eastgate Business Park car park (5mOD to 4mOD).

### 17.4.3.3 Soils (Teagasc soil classification)

The soils beneath the Proposed Development site, as classified by Teagasc (Teagasc, et al., 2017), are presented on **Figure 17.16** in **Volume 3** of this EIAR and listed in **Table 17.21** along with their importance with respect to drainage and fertility. Where these soils are important features with respect to possible soft ground or contamination, their importance is detailed in Section 17.4.3.7 and Section 17.4.3.8.

Several soil typologies are encountered across the Proposed Development site. The majority of the site is historically underlain by mineral alluvium (AlluvMIN), associated with the river that historically flowed through the site with deposits of deep well drained mineral soils that are mainly acidic (AminDW) located along the northern boundary and in the southern section of the Proposed Development site. However, due to the extensive development of the Proposed Development to date the majority of the site is expected to be underlain by made ground with some topsoil overlying this in the amenity parkland area to the north and southern wooded area. The existing alluvium was either excavated and replaced with made ground or buried during the land filling.

**Table 17.21: Summary of soil types within the Proposed Development site (Teagasc classification)**

| Soil code | Description | Location | Importance | Justification for importance rating |
|---|---|---|---|---|
| Made ground | Associated with urban development | Northwest boundary of the Proposed Development site | Low | Poorly drained and / or low fertility soils |
| AminDW | Acid Brown Earths / Brown Podzolic | Northern boundary and southern section of the Proposed Development site | High | Deep well drained mineral (mainly acidic) |
| AlluvMIN | Mineral alluvium | Central section of the Proposed Development site | Medium | Moderately drained and / or moderate fertility soils |

### 17.4.3.4 Subsoils (GSI quaternary classification)

Superficial deposits (subsoil) comprise the unconsolidated geological deposits which overlie the solid bedrock geology. The subsoils within the Proposed Development site, as classified by the GSI Quaternary mapping (GSI, 2016), are presented on **Figure 17.17** in **Volume 3** of this EIAR. They are also listed in **Table 17.22**, along with their importance with respect to feature quality and significance as deemed by Table C2 Criteria for Rating Site Importance of Geological Features (NRA, 2008; IGI, 2003). Where these subsoils are important features with respect to possible soft ground or contamination, their importance is detailed in Section 17.4.3.7 and Section 17.4.3.8.

The GSI Quaternary mapping indicates that the Proposed Development site is underlain by recent alluvium over deep glaciofluvial gravel deposits in the historic glacial channel. However, it is expected that portions of the alluvium have been excavated and replaced with made ground as part of the previous developments and over buried.

**Table 17.22: Summary of soil types within the Proposed Development site (Teagasc classification)**

| Soil type | Description | Location | Importance | Justification for Importance rating |
|---|---|---|---|---|
| A | Alluvium | Underlying the mineral alluvium in the centre of the Proposed Development site. | Low | Low value on a local scale. Widespread throughout the study area. |
| GDSs | Gravels derived from Devonian sandstones | Large deposit location in the southern section of the Proposed Development site, to the south of the N25 carriageway. Potential for minor deposits in the northwest of the site. | Low | Low value on a local scale. Widespread throughout the study area. |
| TDSs | Till derived from Devonian sandstones | Northern edge of the Proposed Development | Low | Low value on a local scale. Widespread throughout the study area. |

### *17.4.3.5 Bedrock geology*

The Proposed Development lies on the centre of the Cork Syncline on the boundary between two distinct bedrock groups, the Carboniferous Cuskinny Member (sandstone) and the much older Devonian Gyleen Formation (siltstone) (refer to **Figure 17.18** in **Volume 3** of this EIAR). A summary of the geological formations within the study area is shown in **Table 17.23**. The Proposed Development is dissected by a fault running east west between these two formations. The GSI bedrock mapping indicates that there is a north south fault running slightly to the west of the bridge alignment resulting in the east west fault to the west being offset slightly either side of the railway line. The exact location of the faults is not known. Due to the depth of the bedrock beneath the Proposed Development (>20m) (Davis, *et al*., 2006), it is unlikely that the bedrock will be encountered during the construction works.

**Table 17.23: Summary of the bedrock geology within the Proposed Development**

| Geological period | Formation | Rock Type | Approximate depth to top of strata (m) | Location | Importance | Justification for Importance rating |
|---|---|---|---|---|---|---|
| Carboniferous | Cuskinny Member (KNcu) | Sandstone | >30m | North and west of the Proposed Development | Low | Low value on a local scale. Widespread throughout the study area. |
| Devonian | Gyleen (GY) | Siltstone | <30m | South of the Proposed Development. | Low | Low value on a local scale. Widespread throughout the study area. |

### *17.4.3.6 Local geology (historic and project specific ground investigations)*

In addition to the project specific ground investigation (refer to **Appendix 17.2** in **Volume 4** of this EIAR), the following site-specific ground investigations have been completed within and adjacent to the Proposed Development (refer to **Appendix 17.3** in **Volume 4** of this EIAR):

- Site Investigations Ltd, 1976. Intrusive ground investigation, carried out within the Proposed Development to collect information to inform the design of earth works for the installation of a gas pipeline. Within the Proposed Development the investigation comprised the excavation of two cable percussion boreholes to depths of 6.50m and 7.00m depths BGL; and
- Priority Geotechnical Ltd, 2020. Intrusive ground investigation, carried out within the Proposed Development to collect information to inform the design of earth works and collect geo environmental

information as part of the Dunkettle Advance ITS Works. Within the Proposed Development, the investigation comprised the excavation of one cable percussion with a follow-up Rotary Core to a depth of 24.00m BGL.

The locations of the boreholes are shown on **Figure 17.19** in **Volume 3** of this EIAR. An interpreted generalised stratigraphy based on the results of these ground investigations is presented in **Table 17.24** and is broadly consistent with the baseline data presented within this chapter.

The boreholes carried out on the N25 embankment are consistent with expectations, showing approximately 3m of made ground (embankment and land reclamation fill) overlying 5.5 to 7m of alluvial clays and silts over glacial sands and gravels to 31.2mBGL. Boreholes and trial pits in the northern amenity park area show made ground overlying clays and silts to 6.2 to 15m BGL overlying either glacial till and or glacial sands and gravels suggesting the boundary between the glaciofluvial gravels and the glacial till indicated on the GSI quaternary mapping may be further south than indicated (refer to **Figure 17.17** in **Volume 3** of this EIAR). South of the N25 is characterised by made ground to 3m BGL overlying 4m of alluvial gravel over clay and silts to 21m BGL over glacial gravels to 30m BGL. Rock was not encountered during the historical and project-specific ground investigations, indicating that bedrock depths are in excess of 31.2m BGL at the Proposed Development.

**Table 17.24: Summary of the ground model within the Proposed Development**

| Stratum | Depth to top of stratum (mOD) | Depth to base of stratum (mOD) | Estimated stratum thickness (m) |
|---|---|---|---|
| Topsoil | 2.6 to 1.9 | 2.3 to 1.6 | 0.2 to 0.3 |
| Made ground | 5.3 to 1.6 | 4.1 to 0.2 | 0.3 to 3.2 |
| Clay and silt (alluvium) | 3.1 to -2.1 | 1.7 to -15.7 | 0.45 to 15 |
| Sands and gravels | 4.1 to -15.7 | 3.1 to -28.1 | 1.0 to 27 |

### *17.4.3.7 Soft and / or unstable ground*

Soft soils consist of peat, fine grained alluvium, or very soft cohesive material. Their presence beneath the Proposed Development could result in an impact on nearby important features if they require excavation or dewatering. Various sources of information were consulted in establishing these areas within the Proposed Development namely:

- GSI mapping;
- Ground investigation data; and
- Scheme walkover survey.

The site history shows a tributary of the River Lee running north of Little Island, directly through the Proposed Development. Historic GI also shows several metres of soft alluvium underlying the areas adjacent to the Proposed Development. It was noted that the field north of site was damp during the site walkover.

Soft ground was encountered as alluvial clays and silts across the site during the project-specific ground investigation. **Table 17.25** presents the soft soils encountered within the study area.

**Table 17.25: Soft soils within the Proposed Development**

| Feature | Description | Location | Importance | Justification for Importance rating |
|---|---|---|---|---|
| Soft ground: Alluvial deposits | Typically found along current and historic watercourses | Throughout Proposed Development beneath the made ground | Medium | Volume of soft soil underlying the Proposed Development is moderate on a local scale |

The GSI database (GSI, 2017) shows no recorded landslide events within the study area and therefore unstable ground is not considered further in this assessment.

### *17.4.3.8 Soil contamination*

The following sources of information were consulted in assessing the potential for areas of contaminated land:

- CORINE land cover mapping (EPA, 2018);
- Teagasc soil map (Teagasc *et al*., 2017);
- Historical landfill sites and dump sites (EPA viewer - online);
- OSI mapping (OSI, 2019); and
- The project specific Ground Investigation (GI) carried out to inform the Proposed Development and EIAR is listed in **Table 17.24**. This provides verification for the data already compiled relating to the baseline environment.

The known potential sources of contamination relevant to the Proposed Development identified within the study area are detailed in **Table 17.26** along with their importance as determined by the NRA Guidelines Box 4.1 (NRA, 2008).

**Table 17.26: Summary of potential sources of contaminated land within the Proposed Development**

| Feature | Description | Location | Importance | Justification for importance rating |
|---|---|---|---|---|
| Made ground | Made ground associated with the historic development of the existing infrastructure. | Throughout the Proposed Development | Medium | Predominately non-hazardous waste. Imported inert soils and stone material to reclaim land and construct the various existing infrastructure. Degree or extent of soil contamination is moderate on a local scale |

The Proposed Development is underlain by made ground due to the reclamation of land, construction of the railway, N25 dual carriageway, installation of various underground services and the construction of various roads and car parks. There were no signs of uncontrolled stockpiling of material on the site during the walkover and the observations from the ground investigation to date is that there are pockets of possibly contaminated ground as expected given the history of the location.

Nine geo-environmental samples were taken during the ground investigation. Seven of these samples were described as made ground, with two samples described as natural ground. The geo-environmental results were interpreted as follows:

- Of the seven made ground samples tested, six of the samples are suitable for disposal to an inert licenced landfill, and one sample requires disposal to a non-hazardous licenced landfill; and
- Of the two natural ground samples tested, one sample is suitable for disposal to a Soil Recovery Facility (SRF), whilst the other requires disposal to an inert licenced landfill.

### *17.4.3.9 Radon gas*

Radon is a radioactive gas that is harmful to human health. Radon gas is formed in the ground by the radioactive decay of uranium which is present in all soil and rocks. The EPA radon risk mapping, as shown in **Figure 17.20** in **Volume 3** of this EIAR, indicates that much of the study area is at a medium radon risk with the edges deemed to be high risk.

However, as the Proposed Development does not include for a building or enclosed structure, the radon risk is deemed negligible and will not be further assessed.

### *17.4.3.10 Aquifer type and classification*

The GSI Aquifer mapping for the study area (refer to **Figure 17.21** and **Figure 17.22** in **Volume 3** of this EIAR) indicates that there are two aquifer types considered within the assessment, as summarised in **Table 17.27** along with their importance as determined by the NRA Guidelines Box 4.3.

The GSI Bedrock Aquifer mapping suggests that most of the site is underlain by a Locally Important Gravel (Lg) aquifer. The bedrock underlying the gravel aquifer is a Locally Important aquifer (Ll) where bedrock is moderately productive only in local zones.

According to the GSI mapping the gravels are located at the base of the slope of the Gyleen formation bedrock. The gravels lie at an elevation of approximately 0mOD and the ground to the north rise steeply to 120m within 1km to the north. There is also evidence from historical mapping of former streams rising close to or within the site boundary and flowing to the east and west, discharging into Lough Mahon and Cork Harbour. This indicates that the site is an area of groundwater discharge where the flows are now contained within a modified drainage network.

Considering the presence of the former stream along the base of the it is likely that the site is a groundwater discharge area.

**Table 17.27: Summary of aquifer types beneath the Proposed Development**

| Feature | Potential | Location | Importance | Justification for importance rating |
|---|---|---|---|---|
| **Locally Important Gravel Aquifer** | Gravel which is moderately productive only in local zones (Lg) | Throughout | Medium | Attribute has a medium quality or value on a local scale |
| **Locally Important Aquifer** | Bedrock which is moderately productive only in local zones (Ll) | Throughout | Medium | Attribute has a medium quality or value on a local scale |

### *17.4.3.11 Groundwater vulnerability*

Groundwater vulnerability is indicated to be high at the Proposed Development as shown on **Figure 17.23** in **Volume 3** of this EIAR.

### *17.4.3.12 Groundwater quality and levels*

The national groundwater monitoring network is maintained by the EPA. There are no active groundwater level monitoring points within the study area.

As part of the project-specific ground investigation, one set of groundwater level readings were taken after the fieldworks. A summary of the groundwater readings across the Proposed Development is outlined in **Table 17.28**.

**Table 17.28: Groundwater monitoring readings**

| Hole ID | Ground level (mOD) | Standpipe response zone stratum | Groundwater level (mBGL) | | Groundwater level (mOD) | |
|---|---|---|---|---|---|---|
| | | | 10/07/2023 | 10/08/2023 | 10/07/2023 | 10/08/2023 |
| RC03 | 2.73 | Gravel | 2.00 | 0.80 | 0.73 | 1.93 |
| RC09 | 3.44 | Gravel | 2.55 | 2.53 | 0.89 | 0.91 |
| RC10 | 1.63 | Gravel | 0.87 | 1.76 | 0.76 | -0.13 |

Groundwater quality sampling and analysis was completed from groundwater monitoring boreholes drilled as part of the project-specific ground investigation. The results were compared to a suite of Generic Assessment Criteria (GACs), including:

- Groundwater Threshold Values from the Groundwater Regulations;
- Drinking Water Standards from the Drinking Water Regulations; and
- Thresholds for Petroleum Hydrocarbons in Groundwater – CL:AIRE 2017 (WHO TPHCWG fractions in drinking water).

The majority of the samples tested have test results below the GAC threshold values. The test results demonstrate that there are four volatiles with the limit of detected (LOD) above the GAC threshold values. These results indicate that there are low concentrations of these volatiles, but there is potential for concentrations to be above the GAC threshold values. The results with LOD exceeding the GAC threshold values are presented in **Table 17.29**. A full breakdown of the groundwater quality test results is presented in **Appendix 17.2** in **Volume 4** of this EIAR as part of the ground investigation results.

**Table 17.29: Groundwater quality tests with limit of detection above GAC threshold values**

| Test | Units | LOD | GAC threshold | Maximum |
|---|---|---|---|---|
| Total Petroleum Hydrocarbons | µg/l | 10 | 7.5 | <10 |
| Vinyl Chloride | µg/l | 1.0 | 0.375 | <1.0 |
| cis 1,2-Dichloroethene | µg/l | 1.0 | 0.375 | <1.0 |
| Benzene | µg/l | 1.0 | 0.75 | <1.0 |

### *17.4.3.13 Groundwater recharge*

The rate of groundwater recharge corresponds to the soil type as shown in **Figure 17.24** in **Volume 3** of this EIAR. The study area has an annual recharge range between 150 and 200 mm/year.

### *17.4.3.14 Karst*

Karst is a type of geological feature characterised by caves, caverns and other types of underground drainage resulting from the dissolution of the underlying bedrock. This typically occurs in areas of high rainfall with soluble rock.

There are no karst features identified within the study area in the GSI Karst database. The site is underlain by bedrock which is not associated with karst features. Therefore, the risk of karst is deemed negligible and will not be further assessed.

### *17.4.3.15 Groundwater resources (abstraction)*

There are no groundwater abstractions or identified by the GSI within the study area.

Source Protection Zone (SPZ) reports have been produced by the GSI and the EPA for groundwater sources, particularly public water supplies, group water schemes or important industrial supplies. The reports aim to guide development planning and regulation to provide protection to groundwater sources. To date, no SPZ reports have been produced for any location within the study area.

### *17.4.3.16 Environmentally sensitive sites*

There are no groundwater dependant habitats within the study area. However, there are environmentally sensitive sites which may receive groundwater from the site where a hydrogeological connect is present. The gravel aquifer extends along the former river channel between the Dunkettle Shore pNHA and Harbour SPA in the west of Little Island to the Great Island Channel SAC and pNHA and Cork Harbour SPA in the northeast of Little Island (refer to **Figure 17.14** in **Volume 3** of this EIAR). The gravels present a potential pathway for contamination from the site to migrate to these environmentally sensitive areas.

The sites considered within the assessment are summarised in **Table 17.30** along with their importance as determined by the NRA Guidelines Box 4.3.

**Table 17.30: Summary of environmentally sensitive sites which may receive flow from the Proposed Development**

| Designated Site | Designation code | Status | Description | Importance | Justification for importance rating |
|---|---|---|---|---|---|
| Cork Harbour | 004030 | SPA | Internationally important wetland site/bay system which stretches from the two main estuaries of the River Lee, near Cork City in the northwest, and the Owenacurra River, near Midleton, in the northeast. | Extremely High | Groundwater supports wetland and/or surface water body ecosystem of international importance. |
| Great Island Channel | 001058 | SAC and pNHA | [1140] Tidal Mudflats and Sandflats<br>[1330] Atlantic Salt Meadows | Extremely High | Groundwater supports wetland and/or surface water body ecosystem of international importance. |
| Dunkettle Shore pNHA | 001082 | pNHA | Mudflats | Very High | Groundwater supports river, wetland or surface water body ecosystem protected by national legislation |

#### *17.4.3.17 Summary of features of importance*

The feature importance ranking is based on the Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environmental Impacts Statements (IGI, 2013) and the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008a). Features with an importance ranking are summarised in **Table 17.31** and the potential impact of the Proposed Development are assessed in Section 17.7**.**

**Table 17.31: Summary of Land, Soils, Geology and Hydrogeology features of importance**

| Category | Feature | Location | Description | Importance | Justification for importance rating |
|---|---|---|---|---|---|
| Topsoil | Made Ground | Associated with urban development | Northwest boundary of the Proposed Development site | Low | Poorly drained and / or low fertility soils |
| | AminDW | Acid Brown Earths / Brown Podzolic | Northern boundary and southern section of the Proposed Development site | High | Deep well drained mineral (mainly acidic) |
| | AlluvMIN | Mineral alluvium | Central section of the Proposed Development site | Medium | Moderately drained and / or moderate fertility soils |
| Subsoil | A | Alluvium | Underlying the mineral alluvium in the centre of the Proposed Development site. | Low | Low value on a local scale. Widespread throughout the study area. |
| | GDSs | Gravels derived from Devonian sandstones | Large deposit location in the southern section of the Proposed Development site, to the south of the N25 carriageway. Potential for minor deposits in the northwest of the site. | Low | Low value on a local scale. Widespread throughout the study area. |
| | TDSs | Till derived from Devonian sandstones | Northern edge of the Proposed Development | Low | Low value on a local scale. Widespread throughout the study area. |
| Bedrock | Cuskinny Member (KNcu) | North and west of the Proposed Development | Sandstone | Low | Low value on a local scale. Widespread throughout the study area. |
| | Gyleen (GY) | South of the Proposed Development. | Siltstone | Low | Low value on a local scale. Widespread throughout the study area. |
| Soft ground | Alluvial deposits | Throughout Proposed Development beneath the made ground | Recent soft ground silts and clays | Medium | Volume of soft soil underlying the Proposed Development is moderate on a local scale. |
| Contaminated Land | Made ground | Throughout the Proposed Development | Made ground associated with the historic development of the existing infrastructure. | Medium | Predominately non-hazardous waste. Imported inert soils and stone material to reclaim land and construct the various existing infrastructure. Degree or extent of soil contamination is moderate on a local scale |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Gravel which is moderately productive only in local zones | Medium | Medium value on a local scale |

| Category | Feature | Location | Description | Importance | Justification for importance rating |
|---|---|---|---|---|---|
| | Bedrock – Locally Important Aquifer | Throughout | Bedrock which is moderately productive only in local zones | Medium | Medium value on a local scale |
| Environmentally sensitive sites | Cork Harbour SPA | Less than 1km to the east of the Proposed Development | Wetland | Extremely High | Groundwater supports attribute with value on international importance. |
| | Great Island Channel SAC and pNHA | Less than 1km to the east of the Proposed Development (SAC) and less than 500m to the east of the Proposed Development (pNHA) | Tidal Mudflats and Sandflats<br>Atlantic Salt Meadows | Extremely High | Groundwater supports attribute with value on international importance. |
| | Dunkettle Shore pNHA | Between 1-2km west of the Proposed Development. | Tidal Mudflats and Sandflats<br>Atlantic Salt Meadows | Very High | Groundwater supports attribute with value on international importance. |

## 17.5 Conceptual Site Model

A Conceptual Site Model (CSM) has been developed for the Proposed Development based on the ground investigation data and all publicly available data. The CSM is a summary of the underlying geological conditions and considers the likely significant impacts of the Proposed Development.

The CSM can be summarised as follows:

- The Proposed Development is underlain predominantly by made ground overlying recent alluvial deposits which are underlain by Glacial Deposits including fluvioglacial sands and gravels and glacial till derived from Old Red Sandstone in a deep paleochannel running through the site. These are in turn are underlain by either the Carboniferous Cuskinny sandstone member or Devonian Gyleen siltstone formation;
- The thickness of made ground varies across the Proposed Development from 0 to 4m with the thickest depths expected on the N25 dual carriageway embankment where the ground level is higher than the original ground level by 1 to 2m;
- The cohesive alluvial deposits extend to typically 3 to 5mBGL and the glacial deposits extend to depths greater than 20mBGL. The presence of glacial till in the ground investigation suggests the extent of the gravel aquifer beneath the Proposed Development may not be as widespread as indicated in the GSI mapping;
- Bedrock was not proven at depths of 30mGL. Both bedrock types are interpreted as a Locally Important aquifer;
- The gravels underlying the site are relatively thick with a high permeability with a limited local extent. The gravels are considered to be a Locally Important Gravel Aquifer. Recharge into the gravel aquifer is from outside the study area and the gravels are within an area of groundwater discharge; and
- There is likely a groundwater connection between the gravel aquifer underlying the Proposed Development and environmentally sensitive sites, on the edges of the study area.

### 17.5.1 Environment type

The environment type across the study area has been categorised in accordance with the IGI Guidelines (IGI, 2013). As the site is within a groundwater discharge area and underlain by a Locally Important Gravel aquifer gravel, the environment type within the study area is considered as:

- **Type B** – Naturally dynamic hydrogeological environments, e.g., groundwater discharge areas, areas underlain by regionally important aquifers, nearby spring rises, areas underlain by permeable subsoils.

## 17.6 Proposed Development

A description of the Proposed Development is provided in **Chapter 4**, *Description of the Proposed Development* and construction activities are described in **Chapter 5**, *Construction Strategy*. Refer also to the planning drawings in **Volume 3** of this EIAR for further information.

A summary of the characteristics of the Proposed Development relevant to land and soils is outlined in this section.

The Proposed Development will consist of a new pedestrian and cyclist bridge that encompasses a segregated footway and cycleway that will be 5m wide (3m two way cycleway and 2m footway), connecting the Little Island train station and the Dunkettle to Carrigtwohill pedestrian and cycle route with the Radisson Blu Hotel, Eastgate Business Park and the wider surrounds of Little Island.

The proposed crossing will be approximately 460m long and will consist of a combination of different structural forms as follows:

- Northern approach ramp: Combination of earthen embankment and elevated ramp structure;
- Irish Rail span: Concrete portal frame structures;

- N25 span: Steel network arch structure; and
- South approach ramp: Combination of elevated ramp structure, at grade sections and earthen embankment.

All structural forms will sit on reinforced concrete piled foundations. It is expected, subject to detailed design, that piles will be approximately 900mm diameter and 20-30m in length (pile lengths may vary locally to shallower or deeper depths). The piling methodology is assumed to be rotary bored and cased piles or Continuous Flight Auger (CFA) piles. All pile caps are to sit below the existing ground level by approximately 500mm.

The ramp structures will consist of a combination of elevated structures, embankments, landscaping and at grade sections. The southern ramp section between the Radisson Blu Hotel car park and the N25 bridge tie in will be an elevated structure due to the fall off in level to the north and east of the Radisson Blu Hotel car park. An earthen embankment is also proposed on the west side tie into the Radisson Blu Hotel car park due to the level difference. Ramp embankments are proposed to consist of steepened slope reinforced earth embankment with a green vegetated finish. For details of proposed makeup of approach ramps, refer to Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0004 and Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0005 in **Volume 3** of this EIAR.

Subsurface drainage will be implemented in accordance with DN-STR-03012 (TII, 2016). It is proposed that bridge run off will tie into existing drainage networks in the area. Subject to discussions with Uisce Eireann, it is proposed that the 750mm diameter asbestos water main will remain in place with suitable protection measures and easements to allow piling works and bridge assembly / protection works.

In total, it is estimated that the construction of the Proposed Development will require the excavation of approximately 5,950 tonnes (bulk weight) of material. This material will comprise made ground, topsoil and subsoil.

It is estimated that approximately 300mm will need to be excavated under the proposed embankments and tie ins at grade footways / cycleways to allow for competent formation layers to be placed. The total amount of material estimated to be generated from these works will be approximately 2,260 tonnes (bulk weight). Topsoil material which is proposed to be reused within the Proposed Development will be stored in designated areas.

In addition to excavated topsoil, pile arisings / spoil is expected to amount to 1,950 tonnes (bulk weight) in total and excavation for pile caps is expected to amount to 1,740 tonnes (bulk weight). Surplus excavation material will be removed off site by a waste collection permit holder and delivered to an authorised waste facility (i.e., a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence).

Two construction compounds will be provided, one in the northern amenity park area / Little Island train station area and one in the Radisson Blu Hotel / Eastgate Business Park car park area. A bridge assembly area will also be provided in the northern amenity park area. Once construction works are complete, structures and facilities will be removed, with the construction compounds and bridge assembly area reinstated to their original condition.

## 17.7 Potential Impacts

This section presents potential impacts that may occur due to the Proposed Development, in the absence of mitigation. This informs the need for mitigation or monitoring to be proposed (refer to Section 17.8). Predicted ‘residual’ impacts considering any proposed mitigation are presented in Section 17.10.

### 17.7.1 Do-Nothing Scenario

In the do-nothing scenario the Proposed Development would not be implemented and there would be no resulting impacts on the land, soils, geology and hydrogeology along the route of the Proposed Development.

### 17.7.2 Construction Phase

The potential land, soils, geology and hydrogeology impacts during the Construction Phase for the relevant construction activities described in Section 17.6 are presented in this section, along with their impact significance. These potential impacts also relate and interact with other environmental factors which are described within the EIAR.

The Proposed Development could have the following potential impacts on the land, soils, geology and hydrogeology as discussed below and summarised in Section 17.7.2.8.

Though the magnitude of the impact may vary depending on the scale of activities and location of the Proposed Development relative to the impacted important feature, in order to ensure a robust assessment, only the maximum magnitude or "worst case" of the impact of the Proposed Development is considered.

#### *17.7.2.1 Loss of topsoil*

The quantity of topsoil estimated to be excavated is approximately 740$m^3$. Where practicable, this material will be reused for landscape fill and topsoil within the Proposed Development. However, it is expected that where this is not achievable, topsoil and overburden will be appropriately transported off site for reuse, recovery or disposal at an appropriate licenced facility.

Topsoil is a non-renewable source which if removed or damaged can result in a permanent irreversible negative impact. There are a number of ways this could happen:

- Potential for materials on site to be spilled resulting in the pollution of the topsoil;
- Excavated topsoil will be stockpiled using appropriate methods to minimise the impacts of weathering. Materials that are stockpiled incorrectly can be exposed to erosion and weathering which reduces the quality of the resource;
- Excavations in areas of contaminated ground for the construction works may mobilise pollution contained in the soils into the nearby topsoil; and
- Permanent damage of topsoil through waterlogging and erosion due to the trafficking of plant, regrading of slopes and storage of materials in areas not intended to be paved as part of the Proposed Development.

**Chapter 5**, *Construction Strategy* highlights that excavations will be required in places to construct the foundations and divert services. Where practicable, this material will be reused for landscape fill and topsoil within the Proposed Development. However, it is expected that where this is not achievable, topsoil and overburden will be appropriately transported off site for reuse, recovery or disposal at an appropriate licenced facility. The reuse of soil and stone is addressed in detail in **Chapter 15**, *Resources and Waste.*

Where it is not practicable to reuse the material on site, the topsoil may be reused on another site. Where it is proposed to use an Article 27 EPA notification in relation to excavation material from the Proposed Development, the appointed contractor will be responsible for ensuring compliance with Regulation 27 of the European Union (Waste Directive) Regulations 2011-2020, including notification to the EPA, seeking a determination from the EPA on the matter and compliance with all relevant Agency guidance on the matter.

Where topsoil and subsoil are stripped to accommodate the works outlined above, all the above impacts have the potential to occur at these locations. The magnitude of this potential impact is **moderate adverse**, and the highest significance of this potential impact is **significant / moderate** for topsoil of high importance.

#### *17.7.2.2 Loss of solid geology*

It is estimated that no bedrock will be encountered or excavated as part of the Construction Phase.

The magnitude of this potential impact is **negligible**. The significance of the potential impact is **imperceptible** and will not be considered further.

#### *17.7.2.3 Earthwork activities*

**Earthworks haulage**

During construction, large plant and equipment will be used throughout the Proposed Development causing noise, ground vibrations, soil compaction and disturbance of natural ground.

This will also result in increased traffic on the roads to and from the Proposed Development. Internal haul roads (access tracks) within the site would be used where possible during the Construction Phase. Increased noise, dust and vibration will also be generated.

These works are expected to have a limited impact given the volume of the material for removal. The magnitude of this potential impact is **small adverse**. The highest significance of the potential impact is **moderate / slight** for topsoil of high importance.

**Chapter 10**, *Noise and Vibration* and **Chapter 11**, *Air Quality* provide more information on noise, dust and vibration. **Chapter 7**, *Traffic and Transport* provides more information on earthworks haulage within the Proposed Development.

**Impact on the surrounding ground**

Soil excavation during the Construction Phase has the potential to induce movement and settlement of surrounding ground. Due to the shallow depth of excavations, the nature of the subsoil and the gentle slopes, the magnitude of the impact of this activity would be **small adverse**. The highest significance of the potential impact is **moderate / slight** for topsoil of high importance.

#### *17.7.2.4 Excavation of potentially contaminated land*

The excavation of made ground will result in the production of excess material that requires placement elsewhere in the Proposed Development or removal off site, and / or the mobilisation of possible contaminants. Made ground will be encountered within the entirety of the Proposed Development site, as discussed in Section 17.4.3.

Exposure of locations of contamination and excavation of contaminated soil may potentially lead to a risk to the surrounding environment or underlying soil, if not dealt with in an appropriate manner, in accordance with EPA Guidance on Land Contamination (EPA, 2013). The underlying soil could be impacted from the exposure of previous buried hazardous material, e.g., in an unlicensed dumping site.

The magnitude of this impact is **small adverse** as it results in the excavation of a small proportion contaminated land. As the potential contaminated ground is of **medium importance**, the resulting significance of the permanent **small adverse impact** is **slight.**

#### *17.7.2.5 Mobilisation of contamination into aquifers*

The underlying bedrock is classified as a Locally Important Aquifer where bedrock is moderately productive only in local zones (LI). The underlying gravel aquifer is classified as a Locally Important Gravel Aquifer which is also moderately productive only in local zones (Lg). The mobilisation of contaminants into the aquifer either through accidental spillage or disturbance of contaminated ground during excavation will reduce the quality of the groundwater within the aquifer.

The construction of pile foundations either using drilling rotary bored and cased piles or Continuous Flight Auger (CFA) piles will involve the injection of concrete. Potential pollutants associated with construction activities (i.e., fuel and lubricants etc.) will be stored at the temporary construction compounds. During the Construction Phase there is a risk of pollution to the groundwater in the Locally Important Aquifer by the spillage of fuels or chemicals used by the plant operated on site.

The magnitude of this potential impact on the Locally Important aquifers could potentially be **moderate adverse** leading to a significance rating of **moderate**.

#### *17.7.2.6 Mobilisation of contamination into environmentally sensitive sites*

The environmentally sensitive sites may receive groundwater flow from the gravel aquifer underlying the site. There is a risk of pollution to the groundwater as a result of the spillage of fuels or chemicals associated with construction activities used within the Proposed Development. The gravel aquifer may act as a pathway for these contaminants to enter the environmentally sensitive sites.

The risks from hazardous substances are similar to those highlighted above for the mobilization of contamination into the aquifers. However, due to the distance from the site to the environmentally sensitive areas and the potential for dilution / attenuation of contamination, the significance of this adverse impact on the environmentally sensitive sites is deemed to be **small adverse**. The highest significance rating of the impact on the environmentally sensitive sites is considered to be **significant**.

#### *17.7.2.7 Dewatering*

Localised pumping of excavations may be required during the Construction Phase to allow works to be carried out in dry excavations. This could lead to a temporary reversible small change in the groundwater levels and flow within the locally important aquifer underlying the Proposed Development.

Since the pumping is expected to be limited, localised and temporary, the magnitude of this impact is considered to be **negligible**. As the importance of the Locally Important Aquifers is **medium**, the resulting significance is **imperceptible.**

#### *17.7.2.8 Summary of potential impacts during the Construction Phase*

The potential impacts on the land, soils, geology and hydrogeology during the Construction Phase of the Proposed Development are summarised as follows and in **Table 17.32**.

- Loss of topsoil;
- Loss of solid geology;
- Earthworks haulage;
- Impact on the surrounding ground;
- Excavation of potentially contaminated land;
- Contamination by Radon gas;
- Mobilisation of contamination into aquifers;
- Mobilisation of contamination into environmentally sensitive sites; and
- Dewatering.

**Table 17.32: Summary of potential Land, Soils, Geology and Hydrogeology impacts during the Construction Phase**

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Significance |
|---|---|---|---|---|---|---|---|---|---|
| **Loss or damage of topsoil** | | | | | | | | | |
| Topsoil | AlluvMIN | Northwest boundary of the Proposed Development site | Medium | Loss or damage of topsoil | Negative | Permanent | Local | Moderate adverse | Moderate |
| | AminDW | Northern boundary and southern section of the Proposed Development site | High | Loss or damage of topsoil | Negative | Permanent | Local | Moderate adverse | Significant / Moderate |
| | BminSW | Central section of the Proposed Development site | Medium | Loss or damage of topsoil | Negative | Permanent | Local | Moderate adverse | Moderate |
| **Loss of solid geology** | | | | | | | | | |
| Bedrock | Cuskinny Member (KNcu) | North and west of the Proposed Development | Low | Loss of solid geology | Negative | Permanent | Local | Negligible | Imperceptible |
| | Gyleen (GY) | South of the Proposed Development. | Low | Loss of solid geology | Negative | Permanent | Local | Negligible | Imperceptible |
| **Earthworks haulage** | | | | | | | | | |
| Topsoil | Made ground | Site construction areas | Low | Loss or damage of topsoil | Negative | Temporary | Local | Small adverse | Imperceptible |
| | AminDW | Site construction areas | High | Loss or damage of topsoil | Negative | Temporary | Local | Small adverse | Moderate / Slight |
| | AlluvMIN | Site construction areas | Medium | Loss or damage of topsoil | Negative | Temporary | Local | Small adverse | Slight |
| **Impact on the surrounding ground** | | | | | | | | | |
| Topsoil | Made ground | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Small adverse | Slight |
| | AminDW | Site construction areas | High | Soil movement or settlement | Negative | Temporary | Local | Small adverse | Moderate / Slight |

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Significance |
|---|---|---|---|---|---|---|---|---|---|
| | AlluvMIN | Site construction areas | Medium | Soil movement or settlement | Negative | Temporary | Local | Small adverse | Slight |
| Subsoil | A | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Small adverse | Imperceptible |
| | GDSs | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Small adverse | Imperceptible |
| | TDSs | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Small adverse | Imperceptible |
| **Excavation of potentially contaminated land** | | | | | | | | | |
| Contaminated Ground | Made ground | Throughout the Proposed Development | Medium | Soil contamination | Negative | Permanent | Local | Small adverse | Slight |
| **Mobilisation of contamination into aquifers** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Moderate adverse | Moderate |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Moderate adverse | Moderate |
| **Mobilisation of contamination into environmentally sensitive sites** | | | | | | | | | |
| Environmentally sensitive sites | Cork Harbour SPA | Less than 1km to the east of the Proposed Development | Extremely High | Contamination of the site | Negative | Temporary | Local | Small adverse | Significant |
| | Great Island Channel SAC and pNHA | Less than 1km to the east of the Proposed Development (SAC) and less than 500m to the east of the Proposed Development (pNHA) | Extremely High | Contamination of the site | Negative | Temporary | Local | Small adverse | Significant |
| | Dunkettle Shore pNHA | Between 1-2km west of the Proposed Development. | Very High | Contamination of the site | Negative | Temporary | Local | Small adverse | Significant / Moderate |
| **Dewatering** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Significance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |

### 17.7.3 Operational Phase

#### *17.7.3.1 Contamination*

The Operational Phase has the potential to lead to occasional accidental leakage of oil, petrol or diesel, resulting in contamination of the surrounding environment. While the likelihood of an accidental spillage may increase in comparison to the Do Nothing scenario, the magnitude of the impact is **negligible**.

Therefore, the significance of the impact is **imperceptible** on any of the land, soils, geology and hydrogeology.

#### *17.7.3.2 Reduction in recharge to the locally important aquifers*

Recharge to the Locally Important aquifers is from outside the Proposed Development area. Therefore, the magnitude of the reduction in recharge as a result of the Proposed Development is anticipated to be **negligible** and the significance will be **imperceptible.**

#### *17.7.3.3 Summary of potential impacts during the Operational Phase*

The potential impacts on the land, soils, geology and hydrogeology during the Operational Phase of the Proposed Development are summarised as follows and in **Table 17.33**.

- Contamination; and
- Reduction in recharge of locally important aquifer.

**Table 17.33: Summary of potential Land, Soils, Geology and Hydrogeology impacts during the Operational Phase**

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Significance |
|---|---|---|---|---|---|---|---|---|---|
| **Mobilisation of contamination into aquifers** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |
| **Mobilisation of contamination into environmentally sensitive sites** | | | | | | | | | |
| Environmentally sensitive sites | Cork Harbour SPA | Less than 1km to the east of the Proposed Development | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| | Great Island Channel SAC and pNHA | Less than 1km to the east of the Proposed Development (SAC) and less than 500m to the east of the Proposed Development (pNHA) | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| | Dunkettle Shore pNHA | Between 1-2km west of the Proposed Development. | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| **Loss of recharge to aquifer** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |

### 17.7.4 Decommissioning

If decommissioning activities occur, the proposed works will be undertaken in a safe manner by minimising interaction with the soils and underlying aquifers.

The Decommissioning Phase has the potential to result in accidental leakage of oil, petrol or diesel, resulting in contamination of the surrounding environment. While the likelihood of an accidental spillage may increase in comparison to the Do Nothing scenario, the magnitude of the impact is **negligible**.

Therefore, the significance of the impact is **imperceptible** on any of the land, soils, geology and hydrogeology.

## 17.8 Mitigation and Monitoring

The following sections outline the mitigation and monitoring measures associated with the potential impacts identified in Section 17.7 for the Construction, Operational and Decommissioning Phases of the Proposed Development.

### 17.8.1 Construction Phase

The mitigation strategy outlined in this section will be implemented during the Construction Phase of the Proposed Development. The strategy will be incorporated into the Construction Environmental Management Plan (CEMP – refer to **Appendix 5.1** in **Volume 4** of this EIAR) and the Construction Resource and Waste Management Plan (CRWMP – refer to **Appendix 15.3** in **Volume 4** of this EIAR).

Construction techniques that comply with the requirements of statutory bodies (Cork County Council and the EPA) in terms of noise, vibration, soil and groundwater contamination, and the disposal of possible contaminated material will be adopted.

The Proposed Development will be constructed in accordance with the relevant design standards by means of good practice measures under appropriate engineering supervision.

#### *17.8.1.1 Earthworks management*

These mitigation measures relate to the following potential impacts:

- Loss of topsoil;
- Loss of solid geology;
- Earthworks haulage; and
- Impact on the surrounding ground.

Excavated topsoil will be stockpiled using appropriate methods to minimise the effects of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff. Any surplus suitable material excavated that is not required elsewhere for the Proposed Development will be reused for other projects where possible, subject to appropriate approvals / notifications or removed off site to a suitable licensed facility.

In order to reduce the compaction and erosion of topsoil outside the areas of direct construction, haul routes will be along predetermined routes within the Proposed Development and deliveries will be along predetermined routes outside the Proposed Development. 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. Where practical, compaction of any soil or subsoil which is not part of the works or to remain *in situ* within the Proposed Development will be avoided.

The contractor will ensure that any topsoil or subsoil is assessed for re-use within the Proposed Development, ensuring the appropriate handling, processing and segregation of the material. Where practical the removal of soil from the Proposed Development will be avoided. All earthworks will be undertaken in accordance with TII Specification for Road Works (SPW) Series 600 Earthworks (TII, 2013) and project specific earthworks specifications ensuring that all excavated material and imported material is classified using the same methodology so as to allow maximum opportunity for the reuse of materials on site.

#### *17.8.1.2 Contaminated land management*

These mitigation measures relate to the following potential impacts:

- Excavation of potentially contaminated land;
- Mobilisation of contamination into aquifers; and
- Mobilisation of contamination into environmentally sensitive sites.

Excavations in made ground will be monitored by an appropriately qualified person to ensure that any potential hotspots of encountered contamination are properly identified, segregated and disposed of appropriately. Any identified hotspots 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 that the hotspot does not cross contaminate clean soils elsewhere throughout the site.

In areas with the potential to encounter asbestos containing materials the following measures will apply:

- During construction, the potential risk to site users and member of the public from contaminated dust will be managed using standard health and safety measures as outlined in the Health and Safety Authority (HSA) guidance document, Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement (HSA, 2013). This document states that *"Removal of asbestos from contaminated soil will require a specialist asbestos contractor for any friable asbestos to be removed"* and *"A risk assessment by an independent competent person should determine the most appropriate control measures and remediation strategies."*;
- Control measures for the Construction Phase will be devised based on a risk assessment carried out by the contractor prior to the commencement of the construction works and will be specific to the construction methods. Such methods could include the prompt removal of excavated soils to avoid stockpiling on site of material or dampening down of soil to prevent dust generation. In the rare instances where stockpiles are required, they will not be allowed in the areas which are identified as public interfaces; and
- Only suitably experienced contractors shall be used to carry out the excavation work. During construction, they shall employ standard practices to manage risk from contaminated soils. These will be designed by the contractor dependent on his construction practices and are likely to include the use of gloves, dust masks and potentially disposable overalls. These and other appropriate measures will minimise the exposure of the site workers and member of the public.

If a potential soil and water pollution are identified, this will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel wash and dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association (CIRIA) provides guidance on the control and management of water pollution from construction sites in their publication Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams *et al.*, 2001) and this will be reflected in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR).

Any dewatering in areas of contaminated ground will be designed to minimise the mobilisation of contaminants into the surrounding environment. Where dewatering in such areas is unavoidable, the water will be adequately treated prior to discharge. Good construction management practices will be employed to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater.

#### *17.8.1.3 Spills from temporary storage of hazardous substances*

These mitigation measures relate to the following potential impacts:

- Loss of topsoil;
- Excavation of potentially contaminated land;
- Mobilisation of contamination into aquifers; and

- Mobilisation of contamination into environmentally sensitive sites.

Good construction management practices, as outlined in the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams *et al.*, 2001) will be employed by the appointed contractor to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater. The construction management of the site will take account of these recommendations to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Measures to be implemented to minimise the risk of spills and contamination of soils and waters include:

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

An Emergency Incident Response Plan will be implemented by the appointed contractor, which will identify the actions to be taken in the event of a pollution incident. It will address such aspects as containment measures, emergency discharge routes, a list of appropriate equipment and clean-up materials and notification procedures to inform the relevant environmental protection authority. Refer to the CEMP included as **Appendix 5.1** in **Volume 4** of this EIAR.

Sediment control methods will be outlined in the Surface Water Management Plan to be prepared by the contractor and included in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), and these will be implemented by the appointed contractor.

The CEMP also addresses good construction management practices that will be employed to prevent the risk of pollution of the existing land, soils, geology and hydrogeology during construction.

#### *17.8.1.4 Management of concrete during piling*

These mitigation measures relate to the following potential impacts:

- Loss of topsoil;
- Impact on the surrounding ground;
- Mobilisation of contamination into aquifers; and
- Mobilisation of contamination into environmentally sensitive sites.

During the Construction Phase, concrete levels and volumes used will be monitored and compared against theoretical estimates to understand potential losses.

Before and during piling, it is proposed to monitor groundwater pH at the available groundwater monitoring points (trial wells and boreholes with standpipe installations). This will highlight any potential impacts on groundwater and surface water quality during piling. Where a change from baseline pH is identified, appropriate measures can then be adopted which may include an alternative grout / cement mix to limit migration or the use of temporary casing. The groundwater monitoring will utilise monitoring locations installed during the project specific ground investigation that are located outside the footprint of the Proposed Development. These monitoring locations will be maintained during the Construction Phase of the Proposed Development.

Where ground bearing foundations are being constructed, the formation will be inspected for potential features that may result in concrete losses. Appropriate earthwork details, developed during detailed design phases, will be applied to limit losses.

##### *17.8.1.5 Monitoring*

Soil, groundwater and surface water verification testing shall be carried out by the contractor during the Construction Phase to confirm the findings of the risk assessment.

### 17.8.2 Operational Phase

No significant impacts were highlighted. Therefore, no mitigation is proposed.

#### *17.8.2.1 Monitoring*

No monitoring is proposed for the Operational Phase.

### 17.8.3 Decommissioning Phase

Mitigation measures will be limited to ensuring that no temporary works occur that would damage the topsoil or aquifer permanently during the Decommissioning Phase.

## 17.9 Cumulative Impacts

A review of Cork County Council, An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

This section considers the potential for cumulative effects arising from the Proposed Development in association with these projects. Specifically, it considers a worst case scenario, where both the Proposed Development and the other projects are under construction at the same time.

The nature and scale of the projects listed in **Chapter 20,** *Cumulative and Interactive Impacts* are such that the development of these projects in combination with the Proposed Development would not give rise to significant impacts on land, soils, geology and hydrogeology.

## 17.10 Residual Impacts

### 17.10.1 Construction Phase

With the effective implementation of the above mitigation measures, there will be no significant residual impacts on land, soils, geology and hydrogeology as a result of the construction of the Proposed Development. Refer to **Table 17.34**.

### 17.10.2 Operational Phase

Based on the assessment in Section 17.7.3, it is expected that there will be no significant residual impacts on land, soils, geology and hydrogeology as a result of the operation of the Proposed Development. Refer to **Table 17.35**. Please note that as the potential impacts during the Operational Phase were all imperceptible in significance there is no change in the regards to the post mitigation significance between **Table 17.33** and **Table 17.35**.

### 17.10.3 Decommissioning Phase

It is not anticipated there will be any significant residual impacts on land, soils, geology and hydrogeology arising from the Decommissioning Phase of the Proposed Development.

**Table 17.34: Summary of residual Land, Soils, Geology and Hydrogeology impacts during the Construction Phase**

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| **Loss or damage of topsoil** | | | | | | | | | |
| Topsoil | AlluvMIN | Northwest boundary of the Proposed Development site | Medium | Loss or damage of topsoil | Negative | Permanent | Local | Negligible | Imperceptible |
| | AminDW | Northern boundary and southern section of the Proposed Development site | High | Loss or damage of topsoil | Negative | Permanent | Local | Negligible | Imperceptible |
| | BminSW | Central section of the Proposed Development site | Medium | Loss or damage of topsoil | Negative | Permanent | Local | Negligible | Imperceptible |
| **Loss of solid geology** | | | | | | | | | |
| Bedrock | Cuskinny Member (KNcu) | North and west of the Proposed Development | Low | Loss of solid geology | Negative | Permanent | Local | Negligible | Imperceptible |
| | Gyleen (GY) | South of the Proposed Development | Low | Loss of solid geology | Negative | Permanent | Local | Negligible | Imperceptible |
| **Earthworks haulage** | | | | | | | | | |
| Topsoil | Made ground | Site construction areas | Low | Loss or damage of topsoil | Negative | Temporary | Local | Negligible | Imperceptible |
| | AminDW | Site construction areas | High | Loss or damage of topsoil | Negative | Temporary | Local | Negligible | Imperceptible |
| | AlluvMIN | Site construction areas | Medium | Loss or damage of topsoil | Negative | Temporary | Local | Negligible | Imperceptible |
| **Impact on the surrounding ground** | | | | | | | | | |
| Topsoil | Made ground | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| | AminDW | Site construction areas | High | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| | AlluvMIN | Site construction areas | Medium | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| Subsoil | A | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| | GDSs | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| | TDSs | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| **Excavation of potentially contaminated land** | | | | | | | | | |
| Contaminated Ground | Made Ground | Throughout the Proposed Development | Medium | Soil contamination | Negative | Permanent | Local | Small adverse | Slight |
| **Mobilisation of contamination into aquifers** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Small adverse | Slight |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Small adverse | Slight |
| **Mobilisation of contamination into environmentally sensitive sites** | | | | | | | | | |
| Environmentally sensitive sites | Cork Harbour SPA | Less than 1km to the east of the Proposed Development | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| | Great Island Channel SAC and pNHA | Less than 1km to the east of the Proposed Development (SAC) and less than 500m to the east of the Proposed Development (pNHA) | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | Dunkettle Shore pNHA | Between 1-2km west of the Proposed Development. | Very High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| **Dewatering** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |

**Table 17.35: Summary of residual Land, Soils, Geology and Hydrogeology impacts during the Operational Phase**

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| **Mobilisation of contamination into aquifers** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |
| **Mobilisation of contamination into environmentally sensitive sites** | | | | | | | | | |
| Environmentally sensitive sites | Cork Harbour SPA | Less than 1km to the east of the Proposed Development | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| | Great Island Channel SAC and pNHA | Less than 1km to the east of the Proposed Development (SAC) and less than 500m to the east of the Proposed Development (pNHA) | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| | Dunkettle Shore pNHA | Between 1-2km west of the Proposed Development | Extremely High | Contamination of the site | Negative | Temporary | Local | Negligible | Imperceptible |
| **Loss of recharge to aquifer** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Change to groundwater regime | Negative | Temporary | Local | Negligible | Imperceptible |

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# Chapter 18

# Material Assets

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# 18. Material Assets

## 18.1 Introduction

This chapter describes the material assets in the form of land use and utilities that could potentially be affected by the Proposed Development. Material assets in the form of resources are addressed in **Chapter 15**, *Resources and Waste.*

A detailed description of the Proposed Development including design, operation and decommissioning is provided in **Chapter 4**, *Description of the Proposed Development*. The construction methodology is described in **Chapter 5**, *Construction Strategy*.

## 18.2 Assessment Methodology

### 18.2.1 General

Material assets are defined in the Guidelines on the information to be contained in Environmental Impact Assessment reports (EIAR) (EPA, 2022) (hereafter referred to as the EPA guidelines) as *'built services and infrastructure'*.

Using the EPA guidelines and taking account of aspects which are covered separately in this EIAR, the material assets considered herein address built services and infrastructure (including electricity, gas, telecommunications, water supply infrastructure and foul and surface water drainage) and land use.

The purpose of this assessment is therefore to consider the potential significant impacts of the Proposed Development on material assets under the following headings:

- Electricity;
- Gas;
- Telecommunications;
- Foul and surface water drainage;
- Water supply infrastructure; and
- Land use.

The use of natural resources in the context of other environmental factors such as soil (**Chapter 17**, *Land, Soils, Geology and Hydrogeology*) and biodiversity (**Chapter 9**, *Biodiversity*) are addressed elsewhere in this EIAR. There are no quarries or mineral resources on, or adjacent to the site – refer to **Chapter 17**, *Land, Soils, Geology and Hydrogeology*. The impacts of the Proposed Development on land in the context of '*landscape and visual*' are addressed in **Chapter 8**, *Landscape and Visual*.

The potential impacts on water quality and the hydrological environment and the potential for flooding is discussed in **Chapter 16**, *Water*.

The EPA guidelines state the following issues should be noted in particular in the consideration of land use:

- Hotels and holiday accommodation;
- Tourism and recreational facilities and amenities;
- Economic activities such as visitor attractions based on cultural / historic or natural assets; and
- Other premises which although located elsewhere, may be the subject of secondary effects such as alteration of traffic flows or increased urban development, should also be considered.

### 18.2.2 Study area

The study area for this assessment is the Proposed Development site in its entirety and the area immediately adjacent. A detailed description of the existing environment of the study area is given in **Chapter 4**, *Description of the Proposed Development*.

### 18.2.3 Impact assessment methodology

The significance criteria used to categorise significant effects on material assets are set out in in **Table 18.1** and have been developed based on the description of significant effects as outlined in the EPA guidance.

**Table 18.1: Significance criteria for likely significant effects on material assets**

| Significance level | Criteria |
|---|---|
| Imperceptible | An effect capable of measurement but without significant consequences. |
| Not significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| Slight Effects | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| Moderate Effects | An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. |
| Significant Effects | An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| Very Significant | An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment. |
| Profound Effects | An effect which obliterates sensitive characteristics |

## 18.3 Baseline Environment

There are a range of different utilities and localised land uses within or adjacent to the boundary of the Proposed Development. The footprint of the Proposed Development is situated on both a greenfield site and a brownfield site. Some diversions and relocation of existing services will be required to facilitate the Proposed Development.

Refer to **Chapter 4**, *Description of the Proposed Development* for a detailed description of the Proposed Development.

The Cork County Development Plan 2022 – 2028 (CCC, 2022) indicates that the area in which the Proposed Development is located is zoned as ZU 18-15 Business and General Employment Areas. The objective of this land zone is: "*to facilitate opportunities for a wide range of compatible business and general employment uses*."

### 18.3.1 Utilities

**Figure 4.3** in **Volume 3** of this EIAR illustrates the various utilities within and around the Proposed Development site. These are described further below.

#### *18.3.1.1 Electricity*

ESB Networks maintains underground and overhead power lines within and around the Proposed Development site. ESB Network's infrastructure in the immediate vicinity of the Proposed Development that is of relevance includes the following:

- Medium voltage (MV) (10kV) overhead line traversing the northern amenity park area in a north / south direction; and
- MV (10kV) underground line in the Eastgate Business Park, to the west of the Radisson Blu Hotel.

#### 18.3.1.2 Gas

Gas Networks Ireland maintains pipelines in the immediate vicinity of the Proposed Development site. The following Gas Networks Ireland infrastructure is located nearby:

- 600mm 19 bar transmission pipeline traversing the northern amenity park area (west of the Proposed Development boundary) in a north / south direction under the N25 road to the Eastgate Business Park; and
- 180mm 4 bar Polyethylene (PE) distribution pipeline traversing the N25 road in a north / south direction between the Little Island train station and the Eastgate Business Park.

#### 18.3.1.3 Telecommunications

BT Ireland maintain infrastructure within and around the Proposed Development site. Infrastructure of relevance includes a cable duct running from the Little Island train station, along the off ramp to Little Island and across the existing bridge into Eastgate Business Park.

Aurora Telecom maintain a duct running parallel to the railway line, between the railway line and the N25 road.

E-Net maintain a duct that runs through the median of the N25 road and travels into the Eastgate Business Park.

Eir maintain ducts that cross under the N25 road between the Little Island train station and the Eastgate Business Park.

#### 18.3.1.4 Surface water and foul water

The Kilcoolishal Stream drains the wetland area that encroaches the Proposed Development site to the north of the N25 before discharging to Cork Harbour. The stream is completely culverted south of the N25 within the Eastgate Business Park car park.

The existing drainage system at the Proposed Development site is serviced by Uisce Eireann surface water and sewer drainage networks. Flows are typically collected in standard gullies and routed via a culvert system to its outfall at Cork Harbour. There are no SuDS / attenuation features within the existing drainage system.

Refer to **Chapter 16**, *Water* for further details on surface water and foul water.

#### 18.3.1.5 Water supply

Uisce Eireann maintain infrastructure within and around the Proposed Development site. Uisce Eireann’s infrastructure in the immediate vicinity of the Proposed Development that is of relevance includes the following:

- Gravity foul main pipeline traversing through the northern amenity park area, under the N25 road to a pumping station within the Eastgate Business Park; and
- 750mm diameter ductile iron water main running north / south under the proposed north embankment ramp; and
- 700mm diameter asbestos water main pipeline running east / west across the northern amenity park area and subsequently under the N25 road to the Eastgate Business Park.

### 18.3.2 Land use

The Proposed Development site is bounded by the L3004 Glounthaune Road to the north, with an amenity park area located in the northern part of the site. This amenity area slopes from north to south along the southern Irish Rail boundary. The Dunkettle to Carrigtwohill pedestrian and cycle route also travels in a west to east direction to the north of the site. The site is bounded by the Eastgate Business Park to the south.

The Proposed Development is located in an urban setting, approximately 10km to the east of Cork City. The footprint of the Proposed Development is situated on both a greenfield site and a brownfield site. The

Proposed Development footprint area is categorised as *'Artificial Surfaces'* for urban fabric and *'Artificial Surfaces'* for industrial, commercial and transport units, according to the EPA's Corine land cover viewer (EPA, 2023). The Proposed Development is also surrounded by other land use zonings, such as zoned '*Agricultural areas'* including pastures and arable land to the north of the Proposed Development site.

The Proposed Development will cross the following areas from north to south:

- Northern amenity park area;
- Cork City to Middleton / Cobh Irish Rail line;
- N25 national road dual carriageway;
- Wooded area, south of the N25; and
- Radisson Blu Hotel and Eastgate Business Park car parks.

Refer to **Image 18.1** for a map illustrating the neighbouring land uses.

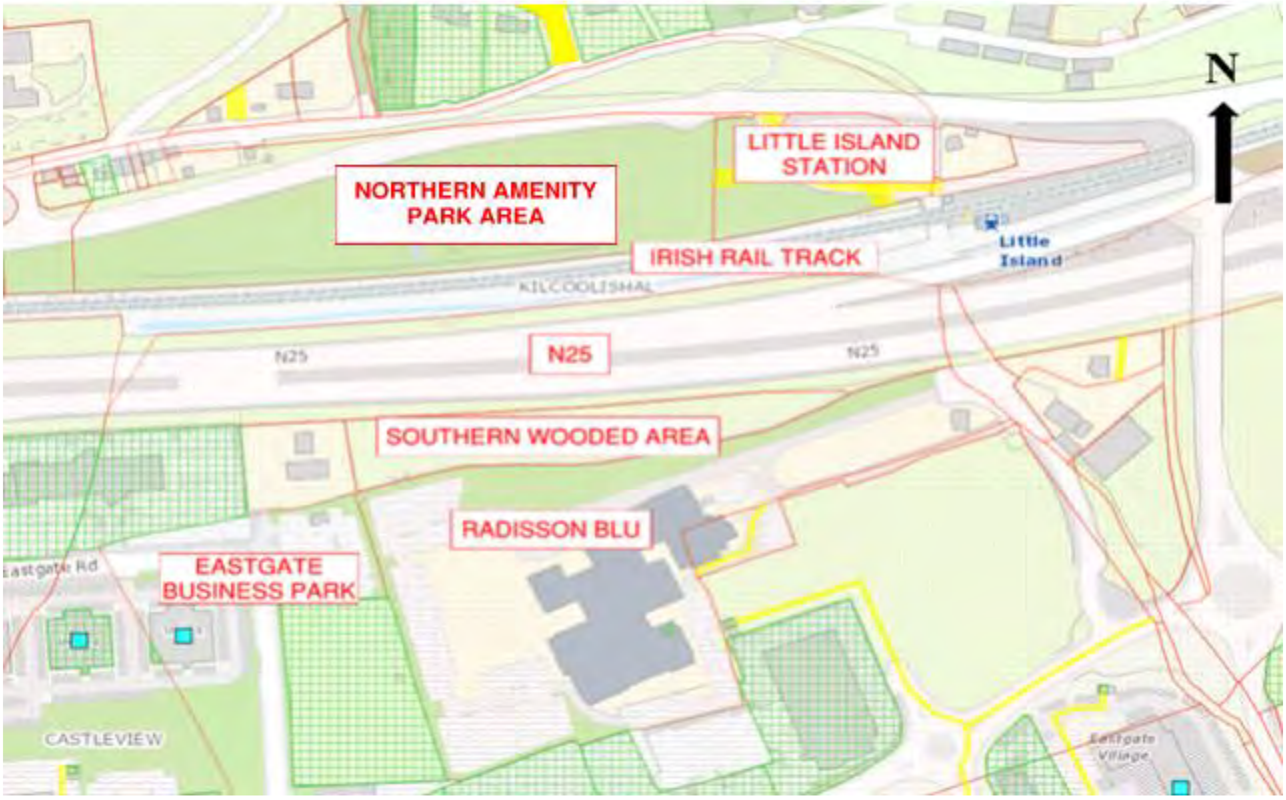


Image 18.1: Neighbouring land uses. Not to scale.

## 18.4 Potential Impacts

### 18.4.1 Do-Nothing Scenario

In the 'Do -Nothing' scenario, where the Proposed Development does not proceed as planned, none of the impacts as set out in this chapter would occur. Under the 'Do-Nothing' scenario, the baseline as presented in Section 18.3 would persist and no significant impacts would arise.

### 18.4.2 Construction Phase

#### *18.4.2.1 Utilities*

**18.4.2.1.1 Electricity**

Subject to discussions with ESB Networks, it is proposed that the existing MV overhead lines traversing through the northern amenity park area in a north / south direction be slightly re-routed by moving a single electricity pole and moving connecting overhead lines. This will allow for bridge assembly and erection to take place from the bridge assembly area with suitable protection measures in place. Refer to **Image 18.2**.

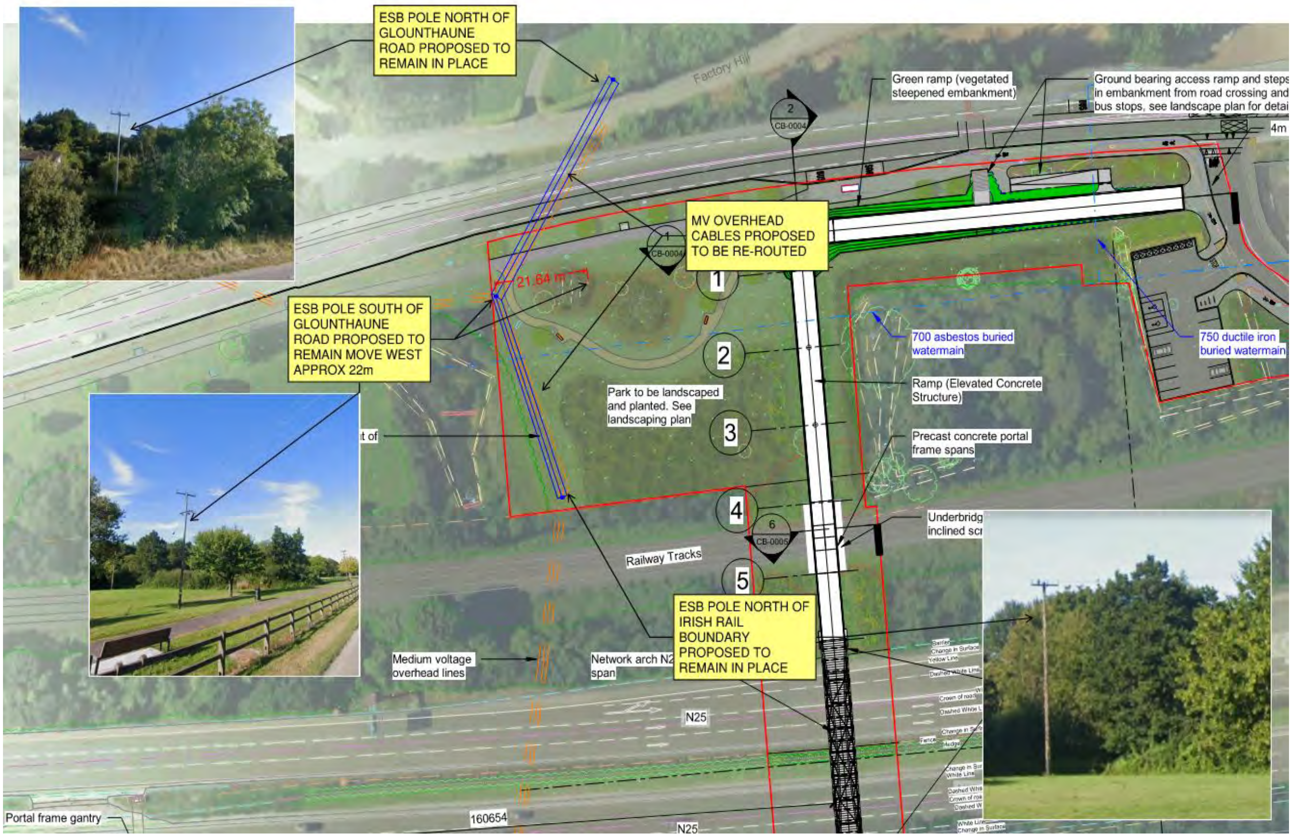


**Image 18.2: Proposed re-routing of ESM MV overhead lines**

During the Construction Phase of the Proposed Development, mains power will be used where possible, with temporary generators used in cases where mains power is not available. Lighting of the working areas will typically be provided by tower mounted 1000W metal halide floodlights that will be cowled and angled downwards to minimise spillage to surrounding properties. Lighting will be powered off during night-time hours to minimise the additional light spillage onto surrounding properties. There is sufficient capacity available to accommodate the likely increase in demand on power supply during the Construction Phase.

It is predicted that there will be an imperceptible, temporary, negative impact on electricity supply associated with the construction of the Proposed Development.

**18.4.2.1.2 Gas**

There will be no impact on gas services and no gas connections are required during the Construction Phase of the Proposed Development.

#### 18.4.2.1.3 Telecommunications

There will be no impact on telecommunication infrastructure and no telecommunication connections are required during the Construction Phase of the Proposed Development.

#### 18.4.2.1.4 Surface water and foul water

Foul water will be contained, managed and appropriately disposed of by the construction contractor using temporary tanks. Temporary site drainage will be provided to collect surface water runoff, which will be directed into the existing drainage network.

No significant negative impacts on surface water or foul water are predicted during the Construction Phase of the Proposed Development.

#### 18.4.2.1.5 Water supply

Subject to discussions with Uisce Eireann, it is proposed that the 700mm asbestos water main pipeline remains in place with suitable protection measures and easements implemented to allow piling works and bridge assembly / protection works to take place. Refer to **Image 18.33**.

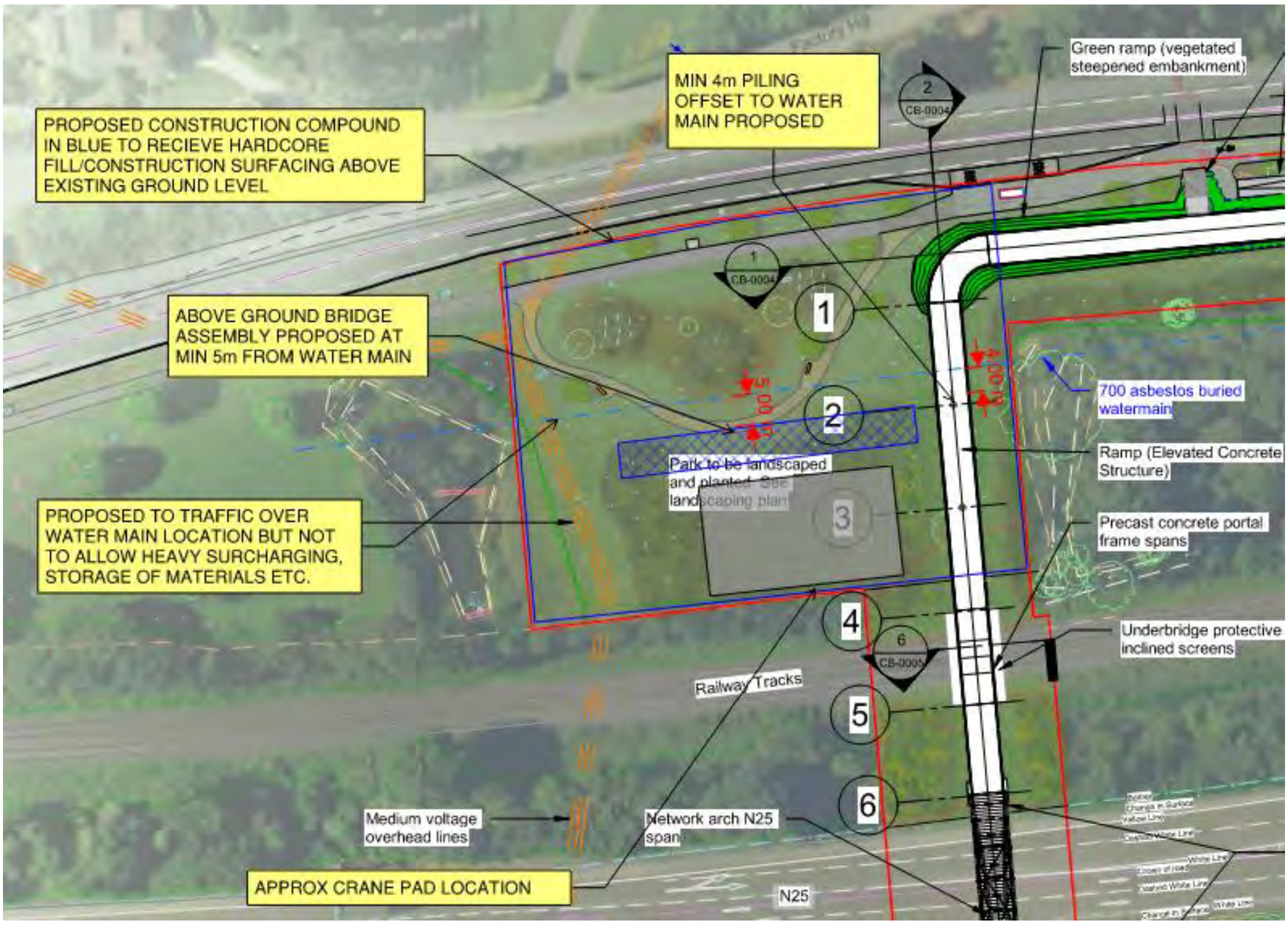


Image 18.3: Proposed easement to underground water main running through bridge assembly area

Where the 750mm water main pipeline passes under the north embankment ramp of the proposed bridge, it is proposed that it will be protected using an in-situ concrete structure. Refer to **Image 18.44**.

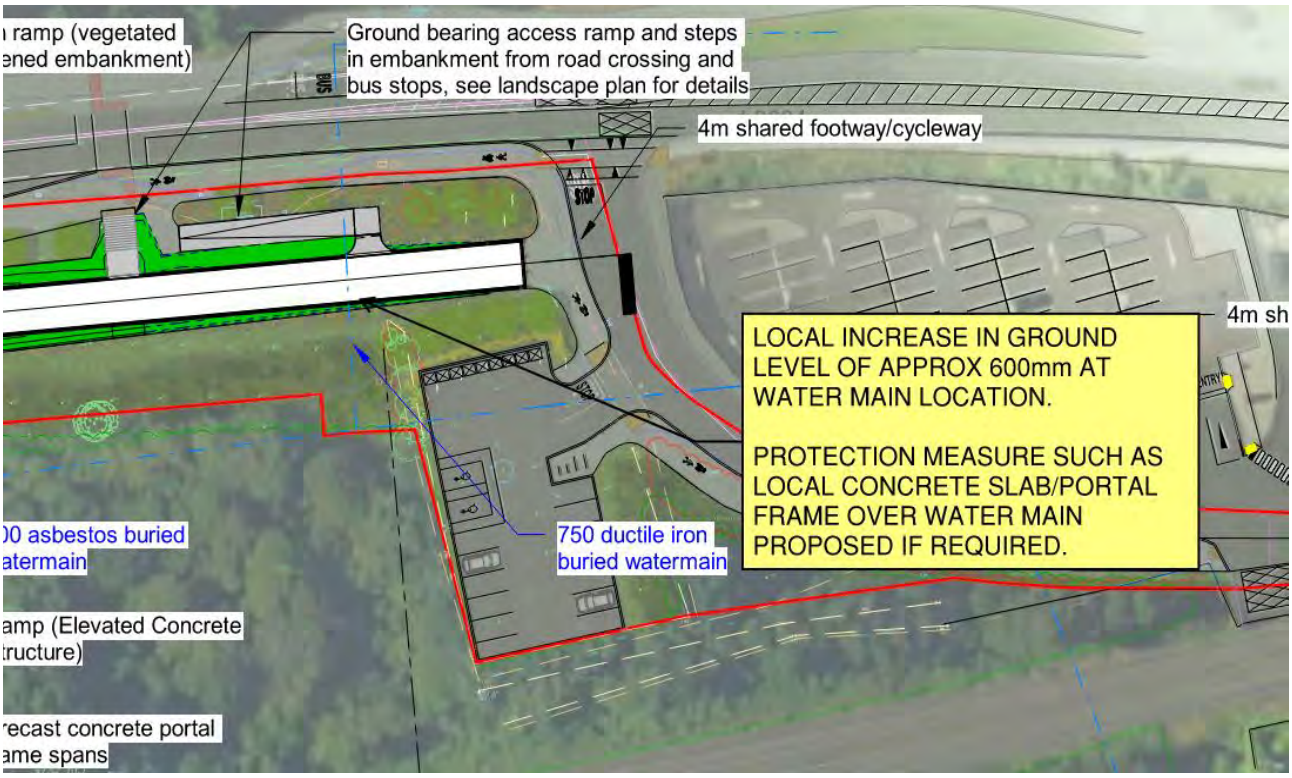


**Image 18.4: Proposed protection measure to water main under north embankment**

As a result of the protection and easement measures to be implemented above, no significant impacts on water supply are predicted as a result of the construction of the Proposed Development.

### *18.4.2.2 Land use*

The construction of the Proposed Development will require both temporary and permanent land take. **Figure 4.5** in **Volume 3** of this EIAR illustrates the areas required for temporary and permanent land take. Further details are provided below.

Temporary land take will be required during the Construction Phase to accommodate two construction compounds; one compound adjacent to the Little Island train station car park and one compound in the Radisson Blu Hotel car park area to the south of the N25. A designated area for the bridge assembly will also be required in the northern amenity park area. Refer to **Image 18.55**.

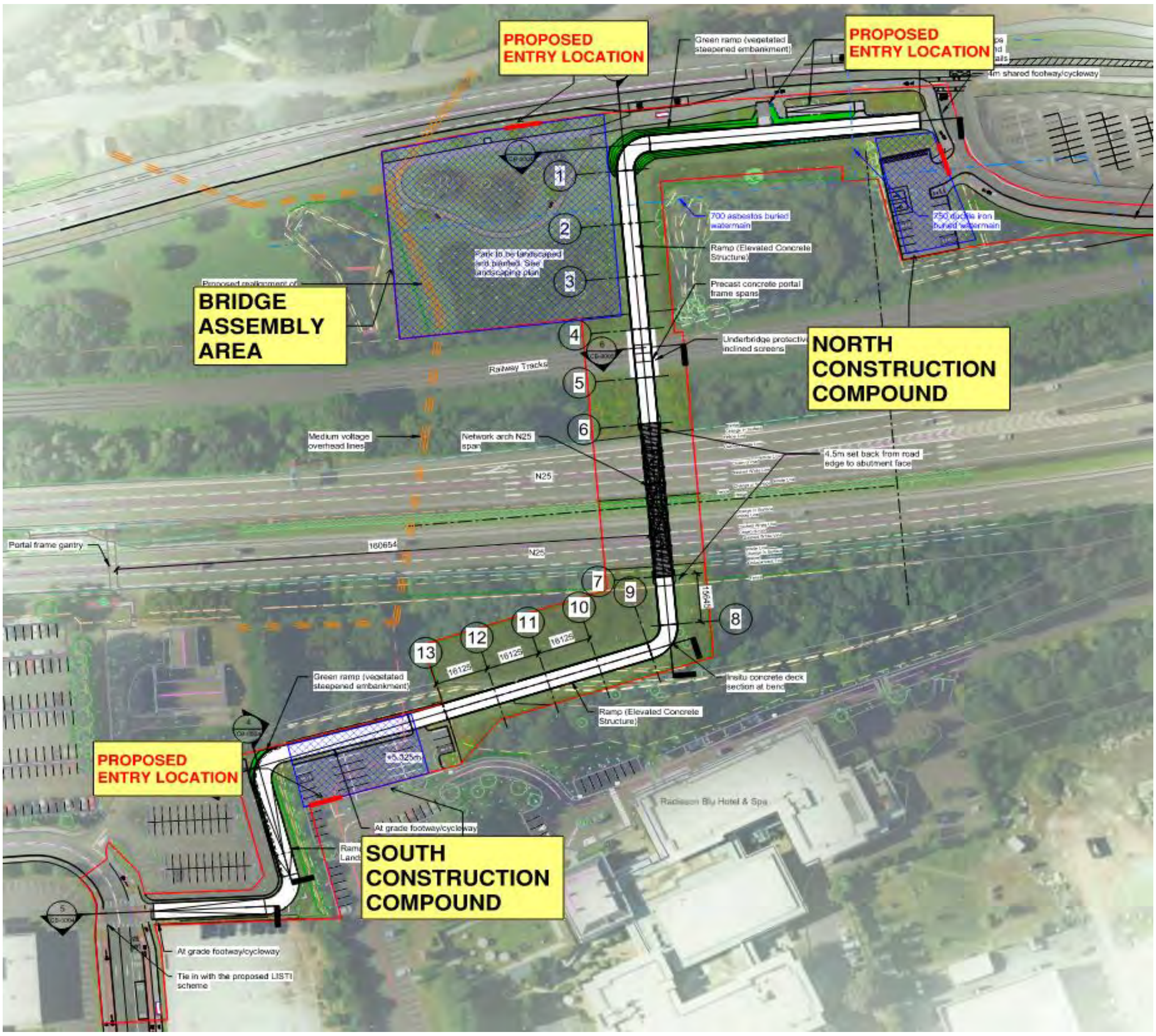


**Image 18.5: Proposed construction compounds and bridge assembly area**

Permanent land take will be required in the following areas for the construction of bridge abutments / piers and embankments:

- Little Island train station area;
- Northern amenity park area;
- Irish Rail tracks and adjacent land;
- Land adjacent to the N25 (north and south);
- Southern woodland area;
- Radisson Blu Hotel car park; and
- Eastgate Business Park car park.

The current categorisation of the Proposed Development footprint area as *'Artificial Surfaces'* as per the EPA's Corine land cover viewer (EPA, 2023) will remain unchanged as a result of the construction of the Proposed Development. However, the land use within some areas of the Proposed Development footprint will change to use as a construction site. As a result of this change in land use, a temporary, slight, negative impact on land use is predicted during the Construction Phase.

### 18.4.3 Operational Phase

#### *18.4.3.1 Utilities*

##### 18.4.3.1.1 Electricity

Lighting of the proposed structure will be integrated into the parapets with additional architectural lighting also installed for the main N25 span arch. There will be sufficient electricity capacity for the operation of the Proposed Development, and no negative impacts on electricity supply or infrastructure are predicted.

##### 18.4.3.1.2 Gas

No new gas connections are required for the operation the Proposed Development. No significant impacts on gas supply or infrastructure are predicted as a result of the operation of the Proposed Development.

##### 18.4.3.1.3 Telecommunications

No new telecommunication connections are required for the operation of the Proposed Development. No significant impacts on telecommunication infrastructure are predicted as a result of the operation of the Proposed Development.

##### 18.4.3.1.4 Surface water and foul water

Surface water runoff from the Proposed Development during the Operational Phase will be directed into the existing drainage network. Refer to **Chapter 16**, *Water* for further details of proposed Operational Phase surface water management, mitigation and controls.

No foul water will be generated as a result of the operation of the Proposed Development.

No significant impacts on surface water or foul water are predicted as a result of the operation of the Proposed Development.

##### 18.4.3.1.5 Water supply

No water supply or water pipeline connections are required for the operation of the Proposed Development. No significant impacts on water supply are predicted as a result of the operation of the Proposed Development.

#### *18.4.3.2 Land use*

The Proposed Development will result in the loss of some trees and areas of vegetation. However, a robust landscape plan, including areas of new tree planting, will be implemented which incorporates natural features into the design of the Proposed Development. Refer to **Chapter 8**, *Landscape and Visual* for further details. A long-term, slight, positive impact is predicted.

### 18.4.4 Decommissioning Phase

As outlined in **Chapter 4**, *Description of the Proposed Development*, the design life of the proposed new pedestrian and cyclist bridge is 120 years. During the potential future decommissioning works, the main bridge span and approach spans will be decommissioned by cutting the concrete decking and steel spans into a number of large sections. This will be done either *in situ* or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry.

No significant impacts on utilities are predicted as a result of the decommissioning of the Proposed Development.

Temporary land take will be required to accommodate the removal of the proposed bridge during the Decommissioning Phase. As a result, a temporary, slight, negative impact on land use is predicted during the Decommissioning Phase.

## 18.5 Mitigation and Monitoring

### 18.5.1 Mitigation

#### *18.5.1.1 Construction Phase*

Impacts during the Construction Phase will be temporary in nature and last only for the duration of the construction works.

The contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and that all services and utilities are maintained, unless this has been agreed in advance with the relevant service provider and local authority. Where connections are required, the contractor will apply to the relevant utility company for a connection permit and adhere to their requirements.

All works near existing services and utilities will be carried out with ongoing consultation with the relevant utility company or local authority and will follow any requirements or guidelines they may have.

Strict controls will be maintained and implemented at all working areas to prevent Construction Phase impacts on the existing surface water and groundwater. Refer to **Chapter 16**, *Water* and **Appendix 5.1**, *CEMP* in **Volume 4** of this EIAR for further details on the proposed Construction Phase surface water management, mitigation and controls. The measures to be implemented will prevent any silt-laden run-off, including that from temporary stockpiles, entering nearby watercourses. Silt traps and interceptor ditches will be constructed in advance of main earthworks to collect, treat and discharge all surface water run off during construction. Collection systems will be used to prevent any contaminants from entering surface water drains, watercourses or groundwater, or draining onto the land.

#### *18.5.1.2 Operational Phase*

As the Proposed Development will result in no significant impacts on material assets during the Operational Phase, no mitigation measures are required.

#### *18.5.1.3 Decommissioning Phase*

As the Proposed Development will result in no significant impacts on material assets during the Decommissioning Phase, no mitigation measures are required.

### 18.5.2 Monitoring

#### *18.5.2.1 Construction Phase*

Construction Phase mitigation measures have been proposed to ensure that significant negative impacts on material assets will be avoided, prevented or reduced during the construction of the Proposed Development.

Service providers will be consulted throughout the design and construction process. Requirements for each service will be agreed with the respective provider and a representative of the service provider will be present on site as necessary during the works for monitoring purposes.

#### *18.5.2.2 Operational Phase*

As the Proposed Development will result in no significant impacts on material assets during the Operational Phase, no monitoring measures are required.

#### *18.5.2.3 Decommissioning Phase*

As the Proposed Development will result in no significant impacts on material assets during the Decommissioning Phase, no monitoring measures are required.

## 18.6 Cumulative Impacts

A review of Cork County Council (CCC), An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been permitted or proposed within the surrounding area that may give rise to cumulative impacts in combination with the impacts of the Proposed Development. The list of projects is included in **Chapter 20,** *Cumulative and Interactive Impacts*.

There is predicted to be no cumulative effects on material assets associated with the Construction, Operation or Decommissioning of the Proposed Development in combination with the projects listed in **Chapter 20,** *Cumulative and Interactive Impacts*.

## 18.7 Residual Impacts

No significant negative residual impacts on material assets are predicted as a result of the Proposed Development.

## 18.8 References


Cork County Council (CCC) (2022). Cork County Development Plan 2022 – 2028.

EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.

EPA (2023). EPA Maps – Corine Land Cover 2018.

## Chapter 19

# Risk of Major Accidents and / or Disasters

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# 19. Risk of Major Accidents and / or Disasters

## 19.1 Introduction

This chapter describes the likely significant negative effects on the environment arising from the vulnerability of the Proposed Development to risks of major accidents and / or disasters.

The assessment of the vulnerability of the Proposed Development to major accidents and / or disasters is carried out in accordance with the EIA Directive that entered into force on 16th May 2017 which states the need to assess:

"*the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and / or disasters which are relevant to the project concerned*"

The underlying objective of this assessment is to ensure that appropriate precautionary actions are taken for any development projects which "*because of their vulnerability to major accidents and / or natural disasters, are likely to have significant adverse effects on the environment*".

Based on the requirements of the EIA Directive, this chapter seeks to determine:

- The relevant major accidents and / or disasters, if any, that the Proposed Development could be vulnerable to;
- The potential for these major accidents and / or disasters to result in likely significant adverse environmental effect(s); and
- The measures that are in place, or need to be in place, to prevent or mitigate the potential significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

A detailed description of the Proposed Development is provided in **Chapter 4**, *Description of the Proposed Development.*

## 19.2 Assessment Methodology

### 19.2.1 General

Major accidents and / or disasters are hazards that have the potential to affect and be affected by the Proposed Development. These include accidents during Construction, Operation and Decommissioning caused by operational failure and / or natural hazards.

The scope and methodology of this assessment is centred on the understanding that the Proposed Development will be designed, built and maintained in line with best current practice and in compliance with the relevant health and safety standards. As such, major accidents resulting from the Proposed Development will be very unlikely.

Notwithstanding the above, a risk analysis-based methodology that covers the identification, likelihood and consequence of major accidents and / or disasters has been used for this assessment. The scope and methodology presented in the following sections is based on the provisions of the EIA Directive, the EPA Guidelines (EPA, 2022) and guidance documents and other published risk assessment methodologies as described in Section 19.2.2.2, as well as professional judgement.

### 19.2.2 Guidance and legislation

#### *19.2.2.1 Legislation*

The following paragraphs are set out in the EIA Directive in relation to major accidents and / or disasters.

Recital 15 of the EIA Directive states that:

"*In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and / or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and / or disasters, the risk of those accidents and / or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council and Council Directive 2009/71/Euratom, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met*."

Note: Directive 2012/18/EU is the directive on the control of major-accident hazards involving dangerous substances, referred to as the COMAH or Seveso III Directive.

Article 3 of the EIA Directive provides that the EIAR shall identify, describe and assess in the appropriate manner, the direct and indirect significant effects on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape deriving from (amongst other things) the "*vulnerability of the project to risks of major accidents and / or disasters that are relevant to the project concerned*".

Specifically, the information relevant to major accidents and / or disasters to be included in the EIAR is set out in Section 8 of Annex IV of the EIA Directive as follows:

"*(8) A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and / or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies*".

#### *19.2.2.2 Guidance documents*

Several guidance documents and published plans have been reviewed and considered in order to inform this assessment, as described in the following sections.

***Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017)***

The European Commission Guidance outlines the legislative and key considerations that should be taken into account in the preparation of EIARs with respect to major accidents and / or disasters.

The Guidance lists the following issues which EIARs should address:

- What can go wrong with a Project?
- What adverse consequences might occur to human health and to the environment?
- How likely are these consequences?
- What is the Project's state of preparedness in case of an accident/disaster?
- Is there a plan for an emergency situation?

***EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (EPA, 2022)***

The EPA guidelines refer to major accidents and / or disasters in several sections including:

- Characteristics of the Project – Under Section 3.5.2, it is stated that the project characteristics should include "*a description of the Risk of Accidents – having regard to substances or technologies used*."
- Impact assessment - Under Section 3.7.1 it is stated that the impact assessment should, in accordance with Annex IV (5) of the EIA Directive, include "*the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*."
- Likelihood of Impacts - Under Section 3.7.3 it is stated that "*To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and /or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk).*
- *This may be supported by general risk assessment methods or by systematic risk assessments required under other regulations e.g., a COMAH (Control of Major Accident Hazards involving Dangerous Substances) assessment."*

***Guidance on Assessing and Costing Environmental Liabilities (EPA, 2014)***

The EPA has developed guidance that presents a systematic approach for assessing and costing environmental liabilities associated with the closure, restoration/aftercare and incidents associated with licensed facilities. This guidance is targeted at activities governed by EPA authorisations including Industrial Emissions Directive (IED), Integrated Pollution Prevention and Control (IPPC), wastewater discharge authorisations (WWDA) and dumping at sea (DaS) regimes.

Specifically, this document provides guidance on the identification and quantification of risks, focusing on unplanned, but possible and plausible events that may occur during the construction and Operational Phases of projects. Guidance is also provided on a range of risk assessment and evaluation techniques that could be employed.

***A Framework for Major Emergency Management Guidance Document 1 – A Guide to Risk Assessment in Major Emergency Management (Government of Ireland, 2010)***

The Department of the Environment, Heritage and Local Government, as it then was, published a guidance note in January 2010 on best practice in the area of risk assessment for major emergency management.

This Guidance sets out a risk assessment procedure that should be applied and documented by the principal response agencies as a basis for major emergency management. The risk assessment procedure underpins work in the later stages of the emergency management cycle. A significant benefit of the risk assessment process is that it can help establish confidence in the Major Emergency Management system, by showing it to be both realistic and logical.

This document describes the various stages of the risk assessment process and how it should be employed to inform mitigation and detailed planning during major emergency situations. Part 1 of the guidance sets out the risk assessment process and defines criteria for classifying impact and likelihood scenarios, as well as a process for recording the risk assessment.

***National Risk Assessment for Ireland 2019 (Government of Ireland, 2019)***

The most recent National Risk Assessment forms a critical subset of the strategic process ('National Risk Assessment: Overview of Strategic Risks') undertaken by the Government on an annual basis to assess national risks. The purpose of the assessment is to identify national hazards across a broad range of emergencies, to assess the likelihood and effect of these risks and to inform actions at national level aimed at mitigating such risks, including the allocation of resources.

### 19.2.3 Categorisation of the baseline environment

A desk-based study has been undertaken to establish the baseline environment relevant to the risk assessment, as this will influence both the likelihood and the effect of a major accident and / or disaster.

Establishing the local and regional context, prior to completion of the risk assessment, enables a better understanding of the vulnerability and resilience of the area to emergency situations, and of the potential for the surrounding environment to pose a risk of a major accident or disaster, which could affect the Proposed Development. Section 19.3 provides an overview of the baseline environment that has been considered for this assessment.

### 19.2.4 Impact assessment methodology

#### *19.2.4.1 General*

As discussed above, the scope and methodology of this assessment is based on the intention that the Proposed Development will be designed, built and maintained in line with best current practice and, as such, the vulnerability of the Proposed Development to risks of major accidents and / or disasters is considered to be low.

Certain potential unplanned events, such as pollution incidents to ground and watercourses and flooding events, are addressed in detail in the relevant environmental assessment chapters. These include **Chapter 16**, *Water* and **Chapter 17**, *Land, Soils, Geology and Hydrogeology.*

#### *19.2.4.2 Risk assessment methodology*

***Overview***

The site-specific risk assessment identifies and quantifies risks focusing on unplanned, plausible incidents occurring during the construction, operation and decommissioning of the Proposed Development. The following steps were undertaken as part of the site-specific risk assessment:

- Identification of potential risks;
- Risk classification - likelihood and consequence assessment; and
- Risk evaluation.

***Identification of potential risk***

In accordance with the EC Guidance, potential risks are identified in respect of:

1. Potential vulnerability to major accident or disaster; and
2. Potential to cause major accidents and / or disasters.

The identification of potential risks has focused on non-standard but plausible incidents, which could occur at the Proposed Development during construction, operation and decommissioning, and which could cause a non-trivial impact on the environment. Similarly, if an off-site event could cause the Proposed Development to have a non-trivial impact on the environment, this was also classified as a plausible risk.

***Risk classification***

*Classification of likelihood*

Once the potential risks were identified, the likelihood of the occurrence of each was assessed. The rating criteria adopted for the assessment follows that used in A Guide to Risk Assessment in Major Emergency Management (Government of Ireland, 2010). The EPA Guidelines (EPA, 2022) state that the risk assessment must be based on a 'worst-case' approach. Therefore, the consequence rating assumes that all proposed mitigation measures and safety procedures have failed to prevent the occurrence of a major accident and / or disaster. **Table 19.1** indicates the likelihood ratings that have been applied.

The approach adopted has assumed a 'risk likelihood' where one or more aspects of the likelihood description are met.

**Table 19.1: Risk classification – likelihood**

| Ranking | Likelihood | Description |
|---|---|---|
| 1 | Extremely unlikely | May occur only in exceptional circumstances; once every 500 or more years |
| 2 | Very unlikely | It is not expected to occur; and / or no recorded incidents or anecdotal evidence; and / or very few incidents in associated organisations, facilities or communities; and / or little opportunity, reason or means to occur; may occur once every 100-500 years. |
| 3 | Unlikely | May occur at some time; and / or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisation's worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years. |
| 4 | Likely | Like to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years |
| 5 | Very likely | Very likely to occur; high level of recorded incidents and / or strong anecdotal evidence. Will probably occur more than once a year. |

*Classification of Consequence*

The consequence rating assigned to each potential risk has assumed that mitigation measures and / or safety procedures have failed to prevent an effect on the environment. The consequence rating of the effect, if the incident occurs, is indicated in **Table 19.2**.

The consequence of a potential risk to the Proposed Development has been determined where one or more aspects of the consequence description are met i.e., potential risks that have no consequence have been excluded from the assessment.

**Table 19.2: Risk classification – consequence**

| Ranking | Consequence | Effect | Description |
|---|---|---|---|
| 1 | Minor | Life, Health, Welfare Environment Infrastructure Social | Small number of people affected; no fatalities and small number of minor injuries with first aid treatment.<br>No contamination, localised effects<br>Minor localised disruption to community services or infrastructure (<6 hours). |
| 2 | Limited | Life, Health, Welfare Environment Infrastructure Social | Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required.<br>Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements.<br>Simple contamination, localised effects of short duration<br>€0.5-3M<br>Normal community functioning with some inconvenience |
| 3 | Serious | Life, Health, Welfare Environment Infrastructure Social | Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation.<br>Large number of people displaced for 6 – 24 hours or possibly beyond; up to 500 evacuated.<br>External resources required for personal support.<br>Simple contamination, widespread effects or extended duration.<br>€3-10M<br>Community only partially functioning, some services available |

| Ranking | Consequence | Effect | Description |
|---|---|---|---|
| 4 | Very serious | Life, Health, Welfare Environment Infrastructure Social | 5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated<br>Heavy contamination, localised effects or extended duration<br>€10-25M<br>Community functioning poorly, minimal services available |
| 5 | Catastrophic | Life, Health, Welfare Environment Infrastructure Social | Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated.<br>Very heavy contamination, widespread effects of extended duration.<br>>€25M<br>Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support. |

## Risk evaluation

In accordance with A Guide to Risk Assessment in Major Emergency Management (Government of Ireland, 2010), once classified, the likelihood and consequence ratings have been multiplied to establish a 'risk score' to support the evaluation of risks by means of a risk matrix.

The risk matrix (as outlined in **Table 19.3**) indicates the critical nature of each risk. The risk matrix has been applied to evaluate each of the risks associated with the Proposed Development. The risk matrix is colour coded to provide a broad indication of the critical nature of each risk:

- The red zone represents 'high risks';
- The amber zone represents 'medium risks'; and
- The green zone represents 'low risks'.

**Table 19.3: Risk matrix**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Likelihood | Very likely | 5 | | | | | |
| | Likely | 4 | | | | | |
| | Unlikely | 3 | | | | | |
| | Very unlikely | 2 | | | | | |
| | Extremely unlikely | 1 | | | | | |
| | | | Minor | Limited | Serious | Very serious | Catastrophic |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | Consequence Rating | | | | |

Significant impacts resulting from major accidents and / or disasters are adverse impacts that are described as 'Significant', 'Very Significant' or 'Profound' under the EPA Guidelines (EPA, 2022). Consequently, major accidents and / or disasters risk events that fall within the Amber or Red Zones ('Medium' or 'High' risk events) are considered to present risk of significant impacts and are brought forward for further consideration and assessment for mitigation.

## 19.3 Baseline Environment

### 19.3.1 Disasters

Ireland’s geographic position means natural disasters such as earthquakes or tsunamis, which might pose a risk to developments of this nature and scale in other locations, are less likely to occur and less likely to be of significant magnitude. In recent times, there has been an increase in the number of severe weather events in Ireland, particularly those leading to flash flooding, snow, lower than usual temperatures and strong winds. Some of the more recent severe weather events include Storm Ciara, January 2020, Storm Denis, February 2020, Storm Jorge, March 2020, Storm Barra, December 2021 and Storm Eunice, February 2022. Cork County Council (CCC) has published a Flood Emergency Response Plan and a Severe Weather Plan as part of its overall Major Emergency Plan (CCC, 2021) to respond and manage to such events.

With regard to disasters, severe weather conditions pose a plausible potential risk to the Proposed Development.

### 19.3.2 Major accidents

The potential for major emergencies within the CCC administrative area and the steps to be taken to respond to and manage such events are addressed in the CCC Major Emergency Plan (CCC, 2021).

Following the completion of risk assessments by CCC, a number of risks within the functional area were identified which had various implications for the Local Authority. These risk assessments were prepared with regard to other existing emergency plans for other sites, e.g., Inter-agency Emergency Plan for the Jack Lynch Tunnel.

Examples of Major Emergencies for which the CCC Major Emergency Plan would be activated include:

- Water contamination / pollution incident;
- Fire / explosion / toxic cloud release at industrial site;
- Fire / major crowd safety incident;
- Major road / rail incident;
- Hazardous materials incident (transportation); and
- Loss of critical infrastructure.

### 19.3.3 Licenced facilities

#### *19.3.3.1 Seveso sites*

The European Communities (Control of Major Accident Hazards involving Dangerous Substances) Regulations, 2015 (SI 209 of 2015) implement the requirements of the Council Directive 2012/18/EU on the control of major accident hazards involving dangerous substances. These Regulations require operators of establishments where dangerous substances are used or stored in large quantities to take all measures necessary to prevent and mitigate the effects of major accidents to man and the environment.

Establishments which fall under the remit of the Seveso III Regulations are classified as either “lower tier” or “upper tier” sites.

There are several Seveso sites in and around Cork City, with many of these sites located within close proximity to the Proposed Development site. The closest Seveso site to the Proposed Development is Janssen Pharmaceuticals, located at Little Island Industrial Estate, Cork. This is an “upper tier” Seveso site and is situated approximately 750m south-west of the Proposed Development site. The activity on site includes medical research and production of a wide range of pharmaceutical products. There are three more Seveso sites categorised as lower tier and upper tier sites which are located within two kilometres of the Proposed Development site.

In accordance with the Regulations, operators of a lower and upper tier establishment are to develop a site-specific Major-Accident Prevention Policy (MAPP) which is implemented by site specific procedures and systems.

#### *19.3.3.2 Industrial emissions and waste licensed facilities*

The nearest site to the Proposed Development which has a waste licence issued by the EPA is Thornbush Holdings Limited Former Mitsui Denman Plant. This facility is located approximately 1.5km southwest of the Proposed Development (Licensing No. W0246-01). The closest Industrial Emissions Licenced facility is Janssen Pharmaceutical Sciences, which is reported to make medical products and pharmaceuticals, and is located approximately 750m southwest of the Proposed Development.

The only other licenced facilities within 2km of the proposed development are listed in **Table 19.4**.

**Table 19.4: Licenced facilities nearby the Proposed Development**

| Name | Licence reference no. | Approximate distance from Proposed Development |
|---|---|---|
| Janssen Pharmaceutical Sciences UC | P0016-01 | 750m |
| Upjohn Manufacturing Ireland Unlimited Company | P0136-04 | 1km |
| Cara Partners | P0017-02 | 1.1km |
| Wexport Limited | P0091-03 | 1.2km |
| Little Island BioEnergy Limited | P1018-01 | 1.5km |
| BASF Ireland Limited | P0052-02 | 1.5km |
| Architectural & Metal Systems Limited | P1117-01 | 1.5km |

## 19.4 Potential Impacts

### 19.4.1 Do-Nothing Scenario

If the Proposed Development does not proceed, there will be no increase in the likelihood of major accidents occurring, or indeed the consequences should a major accident occur. There will also be no change to the likelihood or consequences of a disaster occurring. Therefore, there would be a neutral impact on the risk of major accidents and / or disasters under the ‘Do Nothing’ scenario.

### 19.4.2 Construction Phase

12 potential risks specific to the Construction Phase of the Proposed Development have been identified. These are outlined in the Construction Phase risk register in **Table 19.5**.

**Table 19.5: Risk register – Construction Phase**

| Risk ID | Potential risk | Possible cause |
|---|---|---|
| C1 | Collapse / damage to structures during bridge assembly and / or erection | - Faulty equipment;<br>- Vehicular collision;<br>- Employee negligence. |
| C2 | Fall from height | - Faulty equipment, workmanship, or procedures;<br>- Employee negligence. |
| C3 | Contamination of groundwater and nearby surface water | - Employee negligence;<br>- Spill or leaks;<br>- Extreme weather (rain, wind);<br>- Electrical fault or faulty equipment. |

| Risk ID | Potential risk | Possible cause |
|---|---|---|
| C4 | Flooding of working areas (causing contamination to nearby water courses) | - Extreme weather events (e.g., periods of heavy rainfall, strong winds or fluvial flooding) |
| C5 | Fire / explosion with a secondary effect of fire suppressant water / foam / powder reaching nearby receptors | - Spill or leak of flammable or explosive substance;<br>- Construction vehicle or machinery collision;<br>- Electrical fault or faulty equipment. |
| C6 | Incident at nearby Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | - Equipment or power failure;<br>- Vehicle / plant machinery collision;<br>- Sabotage / arson leading to ignition of fuel and / or explosion. |
| C7 | Vehicle collision (involving construction traffic) | - Driver error;<br>- Failure of vehicle control systems;<br>- Failure of temporary traffic safety measures. |
| C8 | Electrical shock | - Faulty equipment;<br>- Contractor error during diversion of ESB MV overhead power lines that traverse the northern amenity park. |
| C9 | Gas explosion | - Interaction with unknown gas infrastructure |
| C10 | Risk of striking foul sewer mains running across southern wooded area | - Contractor error during construction of foundations in southern wooded area |
| C11 | Risk of striking watermains supply – watermain running across the northern amenity park | - Contractor error during protection of existing watermain that traverses the northern amenity park |
| C12 | Collapse of the during bridge during assembly and / or erection leading to damage to railway line | - Faulty equipment;<br>- Vehicular collision;<br>- Employee negligence. |

### 19.4.3 Operational Phase

Six potential risks specific to the Operational Phase of the Proposed Development have been identified. These are outlined in the Operational Phase risk register in **Table 19.6**.

**Table 19.6: Risk register – Operational Phase**

| Risk ID | Potential risk | Possible cause |
|---|---|---|
| O1 | Collapse of Proposed Development | - Severe weather, earthquake, unforeseen wind gusts |
| O2 | Fall from height during maintenance works | - Faulty maintenance equipment, workmanship or procedures;<br>- Employee negligence. |
| O3 | Fall from height by member of the public | - Anti-social behaviour |
| O4 | Flooding of site area (causing contamination to nearby water courses) | - Extreme weather events (e.g., periods of heavy rainfall, strong winds or fluvial flooding) |
| O5 | Incident at nearby Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | - Equipment or power failure;<br>- Vehicle / plant machinery collision;<br>- Sabotage / arson leading to ignition of fuel and / or explosion. |
| O6 | Collapse of the during bridge leading to damage to a train / the railway line | - Faulty equipment;<br>- Vehicular collision. |

### 19.4.4 Decommissioning Phase

Seven potential risks specific to the Decommissioning Phase of the Proposed Development have been identified. These are outlined in the Decommissioning Phase risk register in **Table 19.7**.

**Table 19.7: Risk register – Decommissioning Phase**

| Risk ID | Potential risk | Possible cause |
|---|---|---|
| D1 | Collapse / damage to structures during bridge decommissioning | - Faulty equipment;<br>- Vehicular collision;<br>- Employee negligence. |
| D2 | Fall from height | - Faulty equipment, workmanship, or procedures;<br>- Employee negligence. |
| D3 | Contamination of groundwater and nearby surface water | - Spill or leaks from decommissioning vehicle or machinery;<br>- Electrical fault or faulty decommissioning equipment;<br>- Extreme weather (rain, wind). |
| D4 | Flooding of site area (causing contamination to nearby water courses) | - Extreme weather events (e.g., periods of heavy rainfall, strong winds or fluvial flooding) |
| D5 | Fire / explosion with a secondary effect of fire suppressant water / foam / powder reaching nearby receptors | - Decommissioning vehicle or machinery collision;<br>- Electrical fault or faulty maintenance equipment. |
| D6 | Incident at Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | - Equipment or power failure;<br>- Vehicle / plant machinery collision;<br>- Sabotage / arson leading to ignition of fuel and / or explosion. |
| D7 | Collapse of the bridge during decommissioning leading to damage to railway line | - Faulty equipment;<br>- Vehicular collision;<br>- Employee negligence. |

### 19.4.5 Risk assessment

The potential risks identified in Sections 19.4.2, 19.4.3 and 19.4.4 have been assessed and the resulting risk analysis is presented in **Table 19.8**.

The risk register is based upon possible risks associated with the Proposed Development.

The consequence rating assigned to each potential risk assumes that the proposed mitigation measures and safety procedures have failed to prevent the effect on the environment.

**Table 19.8: Risk assessment**

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | | | |
| C1 | Collapse / damage to structures during bridge assembly and / or erection | • Faulty equipment / products;<br>• Vehicular collision;<br>• Employee negligence. | • Damage to, or depletion of habitats and species;<br>• Effects on ambient air quality;<br>• Injury / illness / loss of life;<br>• Generation of waste, as damaged structure would have to be disposed of;<br>• Possible damage to fabric of heritage features. | 2 | Method statements will be prepared for all construction activities and best practice construction measures will be implemented by the contractor during construction. Assembly and erection of the proposed bridge will be carried out by suitably qualified and trained personnel.<br>Construction Traffic will be managed in line with the procedures outline in the Construction and Environmental Management Plan (CEMP) in **Appendix 5.1** in **Volume 4** of this EIAR. As stated in the CEMP, a Construction Traffic Management Plan (CTMP) will be developed by the contractor and presented to CCC for approval prior to commencement of the construction works. The CTMP will contain detailed temporary traffic management drawings for each construction stage.<br>Taking into consideration the robust mitigation measures to be implemented prior to assembly and erection of the proposed bridge the likelihood of such an event occurring was determined to be 'very unlikely'. | 3 | In the event of a structural collapse during the erection of the proposed new pedestrian and cyclist bridge, the consequence would be 'serious' in that a *significant number of people in the area would be affected and the community only partially functioning, some services available.* | 6 |
| C2 | Fall from height | • Faulty equipment, workmanship, or procedures;<br>• Employee negligence. | • Injury / loss of life. | 2 | The risk of fall from height during the Construction Phase is considered 'very unlikely'.<br>As outlined in **Chapter 5**, *Construction Strategy*, in accordance with the Regulations, a 'Project Supervisor Design Process' has been appointed for the Proposed Development and a 'Project Supervisor Construction Stage' will be appointed prior to commencement of works.<br>The contractor will prepare a Health and Safety Plan and ensure that all staff have been trained in safe working procedures, that safe installation and environmental procedures are implemented and that all health and safety legislation and good working practices are followed. | 2 | Should a fall from height occur a 'limited' effect is predicted, potentially resulting in a single fatality. | 4 |
| C3 | Contamination of groundwater and nearby surface water | • Employee negligence;<br>• Spill or leaks;<br>• Extreme weather (rain, wind);<br>• Electrical fault or faulty equipment. | • Contamination of nearby watercourses/ groundwater resource<br>• Damage to, or depletion of | 2 | Considering the environmental controls and monitoring measures which the PSCS will implement, as set out in the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR, the likelihood of a spill or leak resulting in contamination of waterbodies or soil is 'very unlikely'. | 2 | Taking into consideration the distance between the Proposed Development and the Cork Harbour SPA and Great Island Channel SAC, in the very unlikely event of pollutants | 4 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating<br><br>(1 – 5) | Basis of likelihood | Consequence rating<br><br>(1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | | aquatic habitats and species<br>• Contamination of soils, which would have to be remediated or removed as waste | | In addition, measures will be in place, as outlined in the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR, in the event of hazardous material and or hazardous build-up of water which will be the responsibility of the PSCS. | | entering nearby watercourses, groundwater or soil, the consequence would be considered 'limited'.<br><br>Should contamination occur, the contamination would be localised and the effects of short duration, which could be remediated. | |
| C4 | Flooding of working areas (causing contamination to nearby water courses) | • Extreme weather events (e.g., periods of heavy rainfall, strong winds or fluvial flooding) | • Sedimentation of nearby watercourses;<br>• Destruction or damage to site services / infrastructure;<br>• Damage to, or depletion of aquatic habitats and species. | 2 | The Proposed Development is partially located within Flood Zone A. Measures will be in place, as outlined in the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR (e.g., the contractor will be required to monitor the weather forecasts to inform the programming of earthworks and stockpiling of material), to ensure no flooding of the working areas and to protect watercourses from pollution. | 2 | Taking into consideration the distance between the Proposed Development and the Cork Harbour SPA and Great Island Channel SAC, flooding of the working areas resulting in silt run-off would have a 'limited' consequence, causing simple contamination with localised effects of short duration, which could be remediated. | 4 |
| C5 | Fire / explosion with a secondary effect of fire suppressant water / foam / powder reaching nearby receptors | • Spill or leak of flammable or explosive substance;<br>• Construction vehicle or machinery collision;<br>• Electrical fault or faulty equipment. | • Damage to, or depletion of habitats and species (incl. aquatic habitats and species);<br>• Contamination of groundwater resource;<br>• Effects on ambient air quality;<br>• Contamination of soils, which would have to be remediated or removed as waste.<br>• Injury/illness/loss of life;<br>• Possible fire damage to heritage features and equipment as well as visual | 1 | A fire and / or explosion during the Construction Phase is considered 'extremely unlikely' as the quantities of flammable or explosive materials on site, which could ignite or spill, during the Construction Phase will be limited and will be confined to the Construction Compounds. In any areas with electrical equipment, or hydrocarbons, water will not be used for firefighting.<br><br>In addition, appropriate site personnel will be trained as first aiders and fire marshals. The contractor will be required to maintain an emergency response plan which will cover all foreseeable risks including fire. In preparing this plan the contractor will be required to liaise with the emergency response services. | 3 | Should a fire and / or explosion occur, a significant number of people in close proximity to the area could be affected, therefore the consequence would be 'serious'.<br><br>Contamination of groundwater and / or a watercourse could occur.<br><br>Should contamination of soil occur, the contamination would be localised and the effects of short duration, which could be remediated. | 3 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | | impacts of fire damage | | | | | |
| C6 | Incident at nearby Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | • Equipment or power failure;<br>• Vehicle / plant machinery collision;<br>• Sabotage / arson leading to ignition of fuel and / or explosion. | • Injury or loss of life;<br>• Destruction of property and / or infrastructure;<br>• Damage to terrestrial / aquatic life;<br>• Impact on air quality associated with emissions. | 2 | Seveso sites are regularly inspected with operators required to prepare and submit site-specific Major Accident Prevention Policy (MAPP) and Annual Environmental Reports to the relevant regulatory/ enforcement agencies (i.e., the Health and Safety Authority and Environmental Protection Agency).<br>Given the stringent environmental and safety measures associated with such licenced sites the likelihood of such an incident occurring during construction is considered 'very unlikely'. | 3 | According to the HSA website, *"major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident"*.<br>On the basis that the closest Seveso site is approximately 750m away, the consequence is deemed to be 'serious' | 6 |
| C7 | Vehicle collision (involving construction traffic) | • Driver error;<br>• Failure of temporary traffic safety measures. | • Injury / loss of life. | 2 | A major road traffic accident during the Construction Phase is considered 'very unlikely'.<br>As stated in the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR, a CTMP will be developed by the contractor and presented to CCC for approval prior to commencement of the construction works. The CTMP will contain detailed temporary traffic management drawings for each construction stage. | 2 | Should a major road traffic accident occur, a 'limited' effect is predicted in that a limited number of people would be affected.<br>Further, should this event occur, there would be normal community functioning in the surrounding areas with just some inconvenience. | 4 |
| C8 | Electrical shock | • Faulty equipment;<br>• Contractor error during diversion of ESB MV overhead power lines that traverse the northern amenity park. | • Injury / loss of life | 1 | The risk of electrical shock during the construction of the Proposed Development is considered 'extremely unlikely'.<br>The potential risk relates primarily to the diversion of overhead power lines.<br>Prior to commissioning, the contractor will be required to ensure that all the equipment and systems have been designed and installed to good industry practice.<br>The location of site utilities and infrastructure are well known and best practice construction procedures as well as mitigation measures will be implemented. | 2 | Very limited workforce exposed to the hazard.<br>The consequence is considered 'limited' due to the small number of people likely to be affected along with the potential for a few serious injuries with hospitalisation and medical treatment required. | 2 |
| C9 | Gas explosion | • Interaction with unknown gas infrastructure | • Injury / loss of life | 2 | There is an existing 600mm diameter gas transmission pipeline and 180mm nearby the Proposed Development. | 3 | The consequence would be 'serious' as there is the | 6 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | | | | However, there will be no effect on these gas services during the Construction Phase. The location of site utilities and infrastructure are well known.<br>Prior to the commencement of works, the contractor will consult with the services and utilities mapping of the site and will consult with service providers, where required. | | potential for 'multiple fatalities' with 'multiple serious or extensive injuries'. | |
| C10 | Risk of striking foul sewer mains running across southern wooded area | • Contractor error during construction of foundations in southern wooded area | • Injury;<br>• Hazards associated with exposure to untreated wastewater (diseases etc.);<br>• Displacement of local residences and businesses in the event of flooding. | 2 | There is an existing foul sewer main running across the southern wooded area of the Proposed Development. This will remain unaffected by the works. The location of site utilities and infrastructure are well known.<br>Prior to the commencement of works, the PSCS will consult with the services and utilities mapping of the site and will consult with service providers, where required. | 2 | The consequence is considered 'limited' due to the small number of people likely to be affected. | 4 |
| C11 | Risk of striking watermains supply – watermain running across the northern amenity park | • Contractor error during protection of existing watermain that traverses the northern amenity park | • Injury;<br>• Disruption to water supply;<br>• Displacement of local residences and businesses in the event of flooding. | 2 | There is an existing Uisce Eireann watermain running across the northern amenity park area of the Proposed Development which will be protected as part of the works. The location of site utilities and infrastructure are well known.<br>Prior to the commencement of works, the PSCS will consult with the services and utilities mapping of the site and will consult with service providers, where required. | 2 | The consequence is considered 'limited' due to the small number of people likely to be affected. | 4 |
| C12 | Collapse of the during bridge during assembly and / or erection leading to damage to railway line | • Faulty equipment / products;<br>• Vehicular collision;<br>• Employee negligence. | • Injury / loss of life;<br>• Damage to infrastructure. | 2 | Method statements will be prepared for all construction activities and best practice construction measures will be implemented by the contractor during construction. Assembly and erection of the proposed bridge will be carried out by suitably qualified and trained personnel.<br>The train line service will remain unaffected by the works, with safe working areas and appropriate protection, in line with Irish Rail requirements, being set up along the track zone.<br>Access for the construction of the span crossing the railway line will take place during a temporary track closure. This is anticipated to be a weekend closure during the Christmas or Easter downtime periods and may take place overnight, in agreement with Irish Rail and Cork County Council. | 3 | The consequence is considered 'serious' due to the small number of people likely to be affected. | 6 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | | | | As such, the chances of a collapse leading to damage to the railway line is considered 'very unlikely'. | | | |
| **Operational Phase** | | | | | | | | |
| O1 | Collapse of Proposed Development | • Severe weather, earthquake, unforeseen wind gusts | • Injury / loss of life. | 1 | According to the Irish National Seismic Network (INSN), earthquakes measuring ~2 on the Richter Scale are 'normal' in terms of seismicity in Ireland. These are known as microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. With events of this magnitude buildings in Ireland are extremely unlikely to be damaged or collapse due to seismic activity.<br>It is considered 'extremely unlikely' that severe weather would cause significant damage or collapse of the bridge, even allowing for climate change scenario. The design and build of the Proposed Development have taken into consideration such extreme weather events. | 4 | In the event the proposed bridge collapses during the Operational Phase, the consequence could be considered 'very serious' with 5 to 50 fatalities and up to 100 serious injuries. | 4 |
| O2 | Fall from height during maintenance works | • Faulty equipment, workmanship or procedures;<br>• Employee negligence. | • Injury / loss of life. | 1 | The risk of a fall from height while carrying out maintenance works during the operation of the Proposed Development is considered 'extremely unlikely' as all maintenance works can be carried out either from the decking of the proposed bridge which will have harness points in place or from safe mobile elevated work platforms (MEWPs). Additionally, parapets / handrailing of appropriate height will be in place for both pedestrians and cyclists.<br>In addition, the design of the Proposed Development and the protective coating on the steel structures ensures that limited maintenance works will be required. Where works are necessary, only fully trained and qualified staff will carry out such maintenance works. | 2 | A limited workforce will be involved in carrying out maintenance works which will be carried out from the deck of the proposed new pedestrian and cyclist bridge.<br>Should a fall from height occur a 'limited' effect is predicted resulting in single fatality. | 2 |
| O3 | Fall from height by member of the public | • Anti-social behaviour | • Injury / loss of life. | 1 | The risk of a fall from height by a member of the public when using the proposed bridge is considered 'extremely unlikely' as the Proposed Development have been designed in accordance best practice. The design has also been reviewed by the project PSDP in line with Safety, Health and Welfare at Work (Construction) Regulations 2013. As mentioned in **Chapter 4**, *Description of Proposed Development*, parapets and handrailing of appropriate height will be in place for both pedestrians and cyclists, | 2 | Should a fall from height occur a 'limited' effect is predicted resulting in single fatality. | 2 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | | | | low level LED safety lighting will be fitted into the handrailing and along the decking, and the walkways will have an anti-slip surface to ensure safety of the users. | | | |
| O4 | Flooding of site area (causing contamination to nearby water courses) | • Extreme weather events (e.g., periods of heavy rainfall, strong winds or fluvial flooding) | • Sedimentation of nearby watercourses;<br>• Destruction or damage to site services / infrastructure;<br>• Damage to, or depletion of aquatic habitats and species. | 2 | The Proposed Development is partially located within Flood Zone A. Taking a conservative approach, the maximum flood level on site will be 3.66m OD. The lowest point on the northern side of the access ramp is at 3.40m OD and hence a short section of it will be flooded. This was considered acceptable as the bridge structure is 'less vulnerable' development considering the embankment at the access ramp will be vegetated to make it flood resilient.<br>Therefore, the likelihood of flooding of the Proposed Development area is deemed 'very unlikely'. | 2 | Taking into consideration the distance between the Proposed Development and the Cork Harbour SPA and Great Island Channel SAC, flooding of the working areas resulting in silt run-off would have a 'limited' consequence, causing simple contamination with localised effects of short duration, which could be remediated. | 4 |
| O5 | Incident at nearby Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | • Equipment or power failure;<br>• Vehicle / plant machinery collision;<br>• Sabotage / arson leading to ignition of fuel and / or explosion. | • Injury or loss of life;<br>• Destruction of property and / or infrastructure;<br>• Damage to terrestrial / aquatic life;<br>• Impact on air quality associated with emissions. | 2 | Seveso sites are regularly inspected with operators required to prepare and submit site-specific Major Accident Prevention Policy (MAPP) and Annual Environmental Reports to the relevant regulatory/ enforcement agencies (i.e., the Health and Safety Authority and Environmental Protection Agency).<br>Given the stringent environmental and safety measures associated with such sites the likelihood of such an incident occurring during the Operational Phase is considered 'very unlikely'. | 3 | According to the HSA website, *"major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident*<br>On the basis that the closest Seveso site is approximately 750m away, the consequence is deemed to be 'serious' | 6 |
| 06 | Collapse of the Proposed Development resulting in damage to a train / the railway line | • Faulty equipment / products;<br>• Vehicular collision. | • Injury / loss of life;<br>• Damage to infrastructure. | 2 | The design and manufacture of the equipment follows industry best practice to and complies with relevant standards. The products used will also meet relevant industry standards, with their use demonstrating a long, safe history. As such, it is considered 'very unlikely' that the bridge would collapse due to faulty equipment or a vehicular collision. | 3 | The consequence is considered 'serious' due to the small number of people likely to be affected. | 6 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| **Decommissioning Phase** | | | | | | | | |
| D1 | Collapse / damage to structures during bridge decommissioning | • Faulty equipment / products;<br>• Vehicular collision.<br>• Employee negligence. | • Damage to, or depletion of habitats and species;<br>• Effects on ambient air quality;<br>• Injury / loss of life;<br>• Generation of waste, as damaged structure would have to be disposed of;<br>• Possible damage to fabric of heritage features. | 2 | Prior to the decommissioning of the pedestrian and cyclist bridge, detailed method statements and risk assessments will be prepared by the decommissioning contractor. The concrete decking and steel spans will be cut into a number of large sections. This will be done either *in situ* or at ground level, with the decking and spans being lifted out by a mobile crane and moveable gantry. Cutting and subsequent removal of the decking and spans will be carried out by suitably qualified and trained personnel.<br>Prior to the commencement of decommissioning works the contractor will prepare a Traffic Management Plan which will designate traffic routes and timings of works to ensure separation of the works area from members of the public and protected structures.<br>Taking into consideration the robust mitigation measures to be implemented the likelihood of such an event occurring was determined to be 'very unlikely'. | 3 | In the event of a structural collapse during the decommissioning of the proposed new pedestrian and cyclist bridge, the consequence would be 'serious' in that a *significant number of people in the area would be affected and the community only partially functioning, some services available.* | 6 |
| D2 | Fall from height | • Faulty equipment, workmanship or procedures;<br>• Employee negligence. | • Injury / loss of life. | 2 | The risk of fall from height during Decommissioning Phase is considered 'very unlikely'.<br>The decommissioning contractor will be required to ensure that all staff have been trained in safe working procedures, that safe environmental procedures are implemented and that all health and safety legislation and good working practices are followed. Appropriate site personnel will be trained as first aiders. | 2 | Should a fall from height occur a 'limited' effect is predicted resulting in single fatality. | 4 |
| D3 | Contamination of groundwater and nearby surface water | • Spill or leaks from decommissioning vehicle or machinery;<br>• Electrical fault or faulty decommissioning equipment;<br>• Extreme weather (rain, wind). | • Contamination of nearby watercourses / groundwater resource;<br>• Damage to, or depletion of aquatic habitats and species;<br>• Contamination of soils, which would have to be remediated or removed as waste. | 2 | Environmental controls will be implemented by the decommissioning contractor to ensure that the likelihood of a spill or leak resulting in contamination of waterbodies or soil is 'very unlikely'.<br>In addition, measures will be in place in the event of hazardous material and or hazardous build-up of water which will be the responsibility of the decommissioning contractor. | 2 | Taking into consideration the distance between the Proposed Development and the Cork Harbour SPA and Great Island Channel SAC, in the very unlikely event of pollutants entering nearby watercourses, groundwater or soil, the consequence would be considered 'limited'.<br>Should contamination occur, the contamination would be localised and the effects of | 4 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | short duration, which could be remediated. | |
| D4 | Flooding of site area (causing contamination to nearby water courses) | • Extreme weather events (e.g., periods of heavy rainfall, strong winds or fluvial flooding) | • Sedimentation of nearby watercourses;<br>• Destruction or damage to site services / infrastructure;<br>• Damage to, or depletion of aquatic habitats and species. | 2 | The Proposed Development is partially located within Flood Zone A. Measures will be in place during the decommissioning phase to ensure no flooding of the working areas and to protect watercourses from pollution. | 2 | Taking into consideration the distance between the Proposed Development and the Cork Harbour SPA and Great Island Channel SAC, flooding of the working areas resulting in silt run-off would have a 'limited' consequence, causing simple contamination with localised effects of short duration, which could be remediated. | 4 |
| D5 | Fire / explosion with a secondary effect of fire suppressant water / foam / powder reaching nearby receptors | • Decommissioning vehicle or machinery collision;<br>• Electrical fault or faulty maintenance equipment. | • Damage to, or depletion of habitats and species (incl. aquatic habitats and species);<br>• Contamination of groundwater resource;<br>• Effects on ambient air quality;<br>• Contamination of soils, which would have to be remediated or removed as waste.<br>• Injury/illness/loss of life;<br>• Possible fire damage to heritage features and equipment as well as visual impacts of fire damage | 1 | A fire and / or explosion during the Decommissioning Phase is considered 'extremely unlikely' as the quantities of flammable or explosive materials on site, which could ignite or spill, during the Decommissioning Phase will be limited. In any areas with electrical equipment, or hydrocarbons, water will not be used for firefighting.<br><br>In addition, appropriate site personnel will be trained as first aiders and fire marshals. The contractor will be required to maintain an emergency response plan which will cover all foreseeable risks including fire. In preparing this plan the contractor will be required to liaise with the emergency response services. | 3 | Should a fire and / or explosion occur, a significant number of people in close proximity to the area could be affected, therefore the consequence would be 'serious'.<br><br>Contamination of groundwater and / or a watercourse could occur.<br><br>Should contamination of soil occur, the contamination would be localised and the effects of short duration, which could be remediated. | 3 |
| D6 | Incident at Seveso site leading to fire / explosion or pollution of | • Equipment or power failure;<br>• Vehicle / plant machinery collision; | • Injury or loss of life;<br>• Destruction of property and / or infrastructure; | 2 | Seveso sites are regularly inspected with operators required to prepare and submit site-specific Major Accident Prevention Policy (MAPP) and Annual Environmental Reports to the relevant regulatory/ enforcement agencies | 3 | According to the HSA website, *"major industrial accidents involving dangerous substances pose a significant threat to humans and the* | 6 |

| Risk ID | Potential risk | Possible cause | Environmental effect | Likelihood rating (1 – 5) | Basis of likelihood | Consequence rating (1 – 5) | Basis of consequence | Risk score (consequence x likelihood) |
|---|---|---|---|---|---|---|---|---|
| | water courses and / or release of harmful substances into the atmosphere | • Sabotage / arson leading to ignition of fuel and / or explosion. | • Damage to terrestrial / aquatic life.<br>• Impact on air quality associated with emissions | | (i.e., the Health and Safety Authority and Environmental Protection Agency).<br>Given the stringent environmental and safety measures associated with such licenced sites the likelihood of such an incident occurring during decommissioning is considered 'very unlikely'. | | *environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident".*<br>On the basis that the closest Seveso site is approximately 750m away, the consequence is deemed to be 'serious' | |
| D7 | Collapse of the during bridge during decommissioning leading to damage to the railway line | • Faulty equipment / products;<br>• Vehicular collision;<br>• Employee negligence. | • Injury / loss of life;<br>• Damage to infrastructure. | 2 | The design and manufacture of the equipment follows industry best practice to and complies with relevant standards. The products used will also meet relevant industry standards, with their use demonstrating a long, safe history.<br>Method statements will be prepared for all decommissioning activities and best practice measures will be implemented by the decommissioning contractor. Decommissioning of the proposed bridge will be carried out by suitably qualified and trained personnel.<br>The train line service will remain unaffected by the works, with safe working areas and appropriate protection in line with Irish Rail requirements being set up along the track zone.<br>Decommissioning will take place during a temporary track closure.<br>As such, the chances of a collapse leading to damage to a train/railway line is considered 'very unlikely'. | 3 | The consequence is considered 'serious' due to the small number of people likely to be affected. | 6 |

### 19.4.6 Risk scores and risk matrix

The risk assessment in **Table 19.9** categorises each of the potential risks by their 'risk score'.

**Table 19.9: Risk scores**

| Risk ID | Potential risk | Likelihood rating (1 – 5) | Consequence rating (1 – 5) | Risk score (consequence x likelihood) |
|---|---|---|---|---|
| **Construction Phase** | | | | |
| C1 | Collapse / damage to structures during bridge assembly and / or erection | 2 | 3 | 6 |
| C2 | Fall from height | 2 | 2 | 4 |
| C3 | Contamination of groundwater and nearby surface water | 2 | 2 | 4 |
| C4 | Flooding of working areas (causing contamination to nearby water courses) | 2 | 2 | 4 |
| C5 | Fire / explosion with a secondary effect of fire suppressant water / foam / powder reaching nearby receptors | 1 | 3 | 3 |
| C6 | Incident at nearby Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | 2 | 3 | 6 |
| C7 | Vehicle collision (involving construction traffic) | 2 | 2 | 4 |
| C8 | Electrical shock | 1 | 2 | 2 |
| C9 | Gas explosion | 2 | 3 | 6 |
| C10 | Risk of striking foul sewer mains running across southern wooded area | 2 | 2 | 4 |
| C11 | Risk of striking watermains supply – watermain running across the northern amenity park | 2 | 2 | 4 |
| C12 | Collapse of the during bridge during assembly and / or erection leading to damage to railway line | 2 | 3 | 6 |
| **Operational Phase** | | | | |
| O1 | Collapse of Proposed Development | 1 | 4 | 4 |
| O2 | Fall from height during maintenance works | 1 | 2 | 2 |
| O3 | Fall from height by member of the public | 1 | 2 | 2 |
| O4 | Flooding of site area (causing contamination to nearby water courses) | 2 | 2 | 4 |
| O5 | Incident at nearby Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | 2 | 3 | 6 |
| O6 | Collapse of the Proposed Development resulting in damage to a train / the railway line | 2 | 3 | 6 |
| **Decommissioning Phase** | | | | |
| D1 | Collapse / damage to structures during bridge decommissioning | 2 | 3 | 6 |

| Risk ID | Potential risk | Likelihood rating (1 – 5) | Consequence rating (1 – 5) | Risk score (consequence x likelihood) |
|---|---|---|---|---|
| D2 | Fall from height | 2 | 2 | 4 |
| D3 | Contamination of groundwater and nearby surface water | 2 | 2 | 4 |
| D4 | Flooding of site area (causing contamination to nearby water courses) | 2 | 2 | 4 |
| D5 | Fire / explosion with a secondary effect of fire suppressant water / foam / powder reaching nearby receptors | 1 | 3 | 3 |
| D6 | Incident at Seveso site leading to fire / explosion or pollution of water courses and / or release of harmful substances into the atmosphere | 2 | 3 | 6 |
| D7 | Collapse of the during bridge during decommissioning leading to damage to the railway line | 2 | 3 | 6 |

A corresponding risk matrix is provided in **Table 19.10** which is colour coded to provide an indication of the critical nature of each risk. The red zone represents high risks, the amber zone represents medium risks and the green zone represents low risks.

**Table 19.10: Risk matrix**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Likelihood | Very likely | 5 | | | | | |
| | Likely | 4 | | | | | |
| | Unlikely | 3 | | | | | |
| | Very unlikely | 2 | | C2, C3, C4, C7, O4, C10, C11, D2, D3, D4 | C1, C6, C9, C12, O5, O6, D1, D6, D7 | | |
| | Extremely unlikely | 1 | | C8, O2, O3 | C5, D5 | O1 | |
| | | | Minor | Limited | Serious | Very serious | Catastrophic |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | Consequence Rating | | | | |

As is evident in **Table 19.10**, each of the potential risks identified during the construction, operation and decommissioning of the Proposed Development can be classified as a low risk.

No plausible major accident or disaster hazards were identified to which the Proposed Development will be particularly vulnerable. No plausible potential risks were identified which would result in the Proposed Development causing a major accident or disaster on or outside of the Proposed Development.

## 19.5 Mitigation and Monitoring

### 19.5.1 Construction Phase

Aside from the mitigation and monitoring measures to be carried out by the contractor as outlined in the CEMP in **Appendix 5.1** in **Volume 4** of this EIAR (e.g., site inspections and audits), and the measures outlined throughout the remainder of the EIAR, no additional mitigation or monitoring is considered necessary during the Construction Phase of the Proposed Development.

### 19.5.2 Operational Phase

No additional mitigation or monitoring measures are considered necessary during the Operational Phase of the Proposed Development.

### 19.5.3 Decommissioning Phase

Should some or all of the proposed development be decommissioned, planning consent and environmental assessments would be required to ensure that adverse effects on the environment would be minimised.

## 19.6 Cumulative Impacts

A review of CCC, An Bord Pleanála (ABP) and Department of Housing, Local Government and Heritage (DHLGH) online planning records has indicated that other projects have been proposed within the surrounding area that may give rise to cumulative impacts (refer to **Chapter 20**, *Cumulative and Interactive Impacts*).

While unlikely, there is potential for overlap between the Construction Phases of the projects listed in **Chapter 20**, *Cumulative and Interactive Impacts* and the Proposed Development, which could result in a cumulative effect on water quality and / or traffic and transportation (in the form of a vehicle collision). However, with the implementation of the mitigation measures outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) and the implementation of a CTMP for the Proposed Development, no significant negative cumulative effects are predicted.

No operational or decommissioning cumulative effects associated with the projects listed in **Chapter 20**, *Cumulative and Interactive Impacts* have been identified.

## 19.7 Residual Impacts

No plausible major accidents and / or disasters were identified, to which the Proposed Development will be particularly vulnerable during the Construction, Operational or Decommissioning Phase.

No plausible potential risks were identified which would result in the Proposed Development causing a major accident and / or disaster on or outside the site during the Construction, Operational or Decommissioning Phase.

## 19.8 References

Cork County Council (CCC) (2021). Major Emergency Plan.

Council Directive 2012/18/EU of the European Parliament and of the council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directing 96/82/EC.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

EPA (2014). Guidance on Assessing and Costing Environmental Liabilities.

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

EPA (2023). Search for a Licence / Permit. Available at: Search for a Licence/Permit | Environmental Protection Agency (epa.ie) [Accessed: March 2023]

European Commission (2017). Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report.

Government of Ireland (2010). A Framework for Major Emergency Management Guidance Document 1- A Guide to Risk Assessment in Major Emergency Management.

Government of Ireland (2019). National Risk Assessment for Ireland 2019.

Health and Safety Authority (2023). Notified Seveso Establishments. Available at: List of Establishments - Health and Safety Authority (hsa.ie) [Accessed: March 2023]

SI No. 209/2015 – Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015

# Chapter 20

# Cumulative and Interactive Impacts

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# 20. Cumulative and Interactive Impacts

## 20.1 Introduction

This chapter presents an assessment of the cumulative and interactive effects between the various environmental factors as a result of the Proposed Development.

Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from:

- The interaction between the various effects within the Proposed Development; and
- The interaction between the other existing and / or permitted projects with this Proposed Development.

Interactive effects will consider the interaction between the various environmental aspects, for example the interaction between noise and biodiversity.

## 20.2 Assessment Methodology

### 20.2.1 Guidance

This chapter has been prepared in accordance with the following guidance:

- Department of Housing, Planning and Local Government (2018). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, August 2018;
- EPA (2022). Guidelines on the Information to be contained in Environmental Impact Assessment Reports, May 2022;
- European Commission (EC) (2017). Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report. (Office for Official Publications of the European Communities 2017); and
- European Commission (EC) (1999). Guidelines for the Assessment of Indirect and Cumulative Effects as well as Impact Interactions, (Office for Official Publications of the European Communities 1999).

### 20.2.2 Definitions

The following definitions are generally used in the description of cumulative effects or interaction of effects.

It is noted that the terms "*effects*" and "*impacts*" are used interchangeably in this chapter.

In the EC guidance (EC, 2017), cumulative effects are defined as:

*"Changes to the environment that are caused by activities/projects in combination with other activities/projects".*

EC guidance (EC, 2017) also states that:

*"It is important to consider effects not in isolation, but together, that is cumulatively. [….] Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from:*

- *The interaction between all of the different projects in the same area;*
- *The interaction between various impacts within a single Project (while not expressly required by the EIA Directive this has been clarified by the CJEU [Court of Justice of the European Union] […]".*

Under the EPA guidance (EPA, 2022), cumulative effects are defined as*:*

*"The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects".*

The EC guidelines (EC, 1999) use slightly different definitions as follows:

*"Cumulative Impacts: Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".*

The EC guidelines (EC, 1999) use definitions as follows:

*"Impact Interactions: The reactions between impacts whether between the impacts of just one project or between the impacts of other projects in the area".*

The term *'impact interactions'* is equivalent to the term *'inter-relationship of effects'*. The EC guidelines (EC, 1999) accept that their definitions overlap to a certain extent. The EC guidelines also refer to '*Cross-Media Impacts'*, in which the impact in one environmental medium may also have an indirect impact on another medium.

### 20.2.3 Cumulative effects assessment methodology

Annex IV (5)(e) of the EIA Directive as amended by Directive 2014/52/EU provides that the EIAR contain:

*"A description of the likely significant effects of the project on the environment resulting from, inter alia:*

*(e) the* ***cumulation of effects*** *with other* ***existing and/or approved projects****, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; Furthermore, Annex IV (5) states that the EIAR shall contain:*

*"The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary,* ***cumulative****, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project".*

At the initial stage of preparing the EIAR for the Proposed Development, the potential for significant cumulative impacts were examined and any potential effects were identified. These potential effects were included in the scope and addressed in the baseline and impact assessment studies for each of the relevant environmental factors.

Potential significant cumulative effects of the Proposed Development in-combination with other existing and / or approved projects for each of the environmental factors were initially identified, considered and assessed in respective chapters of the EIAR.

Section 20.3 of this chapter presents a summary of the potential cumulative effects between the Proposed Development and relevant plans and projects. Mitigation measures relative to those effects are addressed in the individual assessment chapters.

Table 20.1 and

**Table** 20.2 detail the potential cumulative effects during both construction and operation.

### 20.2.4 Interactive effects assessment methodology

Article 3 (1) of the EIA Directive as amended by Directive 2014/52/EU provides:

*"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors: (a) population and human health; (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC; (c) land, soil, water, air and climate; (d) material assets, cultural heritage and the landscape;* ***(e) the interaction between the factors referred to in points (a) to (d)".***

The consideration of interactive effects was an integrated process which commenced at the very outset of the project. At the initial stage of preparing the EIAR for the Proposed Development, the potential for significant interactions between environmental factors were examined and any potential effects were identified. These potential effects were included in the scope and addressed in the baseline and impact assessment studies for each of the relevant environmental factors.

There were numerous discussions and communications between the environmental specialists and the design team throughout the design process which helped to identify and minimise the potential for significant interactions of effects arising in the first instance.

The interaction of effects within the Proposed Development in respect of each of the environmental factors, listed in Article 3(1) of the EIA Directive, have been identified and addressed in detail in the respective chapters in this EIAR. Thus, no additional mitigation is proposed in this chapter.

Section 20.4 of this chapter presents a summary of each assessment of the interaction (inter-relationship) of effects (from the Proposed Development) between the various environmental factors. Mitigation measures relative to those interactions are addressed in individual chapters.

Refer to **Table 20.3** for the matrix of potential interactions.

## 20.3 Cumulative Impacts

### 20.3.1 Overview

This section presents an assessment of the potential impacts of the Proposed Development on the environment resulting from the cumulation of impacts with other existing and / or approved projects. The first stage was to identify the 'other existing and / or approved projects' both within and surrounding the Proposed Development site, to be included in the assessment. In addition, planned projects which have not yet been granted planning have also been considered where necessary. This process is described in Section 20.3.2.

### 20.3.2 Identification of plans and projects

A review was initially carried out to identify other existing and / or approved projects, taking into account any existing environmental concerns relating to areas of particular importance likely to be affected or the use of natural resources. A review was carried out on the planning files for:

- Cork County Council (CCC);
- An Bord Pleanála (ABP); and
- Department of Housing, Local Government and Heritage (DHLGH) EIA Portal.

As mentioned above, planned projects which have not yet been granted planning have also been considered where necessary.

Arising from this review, two nearby projects were identified which could have the potential for cumulative impacts. The assessment in this chapter considers and assesses whether any of these projects will likely have significant cumulative impacts in combination with the Proposed Development.

- **Project 1: Extension to existing Radisson Blu Hotel & Spa**

  The Proposed Development is located approximately 50m north of the Radisson Blu Hotel & Spa at its closest point. Planning permission has been granted by CCC for the construction of a 30 no. bedroom, three storey extension to the existing hotel. This planning permission was granted in June 2022. Construction works on this project are expected to commence in 2024 or 2025.

- **Project 2: Construction of light industrial building, Euro Business Park**

  The Proposed Development is located approximately 400m west of the Euro Business Park at its closest point. Planning permission has been granted by CCC for the construction of a light industrial building divided into four separate units in the Euro Business Park. This planning permission was granted in April 2023.

### 20.3.3 Overall cumulative effects assessments

**Table 20.1: Potential cumulative effects during the Construction Phase**

| Construction Phase | | |
|---|---|---|
| **Plan / project** | **Potential cumulative effects on environmental factors** | **Any residual significant negative cumulative effects?** |
| **Project 1: Extension to existing Radisson Blu Hotel & Spa** | **Traffic and Transportation:** At the time of writing, limited information was available regarding crucial factors such as the estimated traffic volumes generated by the different stages of this project and its construction timelines. While these circumstances hindered the possibility of conducting an accurate quantitative assessment of the cumulative impact of this project on the operation of the road network and traffic volumes around the Proposed Development, a negative, short term cumulative impact is nonetheless expected during the Construction Phase should the Construction Phase of this project overlap with that of the Proposed Development.<br><br>In order to minimise this impact, it is crucial that the mitigation measures proposed in this EIAR and, where required, in the planning documents for the other permitted / Proposed Developments in the vicinity, are implemented during the Construction Phase. | None |
| | **Landscape and Visual:** This project is likely to give rise to moderate, negative and short-term cumulative landscape and visual effects during the Construction Phase. | |
| | **Biodiversity:** In the event that the Construction Phase of the Proposed Development was to overlap with this project, potential localised cumulative impacts could arise.<br><br>Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in the CEMP which is included as **Appendix 5.1** in **Volume 4** of this EIAR. These measures will ensure that no significant cumulative noise / disturbance effects or habitat loss for local fauna will occur during construction works.<br><br>Following mitigation, no significant adverse impacts from changes in local water quality were identified during the Construction Phase of the Proposed Development. Therefore, no cumulative impacts for water have been identified.<br><br>It is noted that tree removal has been minimised in this project, which will remove 7 semi-mature trees. No significant cumulative impacts from habitat loss have been identified.<br><br>Following the implementation of mitigation measures, no significant cumulative effects have been identified. | |
| | **Noise and Vibration:** Due to the proximity of this project to the Proposed Development, there is potential for cumulative noise and vibration impacts should its Construction Phase overlap with the Construction Phase of the Proposed Development.<br><br>In the event of any concurrent noisy construction activity being carried out on the site of the Proposed Development and the adjacent Radisson Blue Hotel & Spa site, the Project Supervisor Construction Stage (PSCS) will ensure that controls | |

| Construction Phase | | |
|---|---|---|
| **Plan / project** | **Potential cumulative effects on environmental factors** | **Any residual significant negative cumulative effects?** |
| | and mitigation measures are implemented to ensure that no significant cumulative impacts will arise at nearby sensitive receptors. | |
| | **Air Quality:** Taking this project in combination with the Proposed Development, it is considered that there is a potential for short-term cumulative effects to air quality due to construction dust, should the Construction Phases overlap. However, given the implementation of the mitigation measures and low volumes of construction traffic associated with the Proposed Development, no significant cumulative air quality effects are predicted during the Construction Phase. | |
| | **Climate:** No potential cumulative effects identified. | |
| | **Archaeology, Architectural and Cultural Heritage:** No potential cumulative effects identified. | |
| | **Population and Human Health:** Refer to Landscape and Visual, Noise and Vibration, Air Quality and Major Accidents and / or Disasters. | |
| | **Resources and Waste:** Taking this project in combination with the Proposed Development, it is considered that they could give rise to short term, slight, negative resource and waste management impacts on the capacity of waste management facilities and waste industry trends in Ireland during the Construction Phase due to an increased demand on waste recovery and / or disposal sites.<br>Appropriate mitigation measures have been proposed in this EIAR – and, where required, in the planning documents for this project – such that significant negative cumulative impacts are not predicted to occur. | |
| | **Water:** No potential cumulative effects identified. | |
| | **Land, Soils, Geology and Hydrogeology:** The nature and scale of this project are such that the development of the project in combination with the Proposed Development would not give rise to significant impacts on Land, Soils, Geology and Hydrogeology. | |
| | **Material Assets:** No potential cumulative effects identified. | |
| | **Major Accidents and / or Disasters:** There is potential for overlap between the Construction Phases of this project and the Proposed Development, which could result in a cumulative effect on water quality and / or traffic and transportation (in the form of a vehicle collision). However, with the implementation of the mitigation measures outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) and the implementation of a CTMP for the Proposed Development, no significant negative cumulative effects are predicted. | |

| Construction Phase | | |
|---|---|---|
| **Plan / project** | **Potential cumulative effects on environmental factors** | **Any residual significant negative cumulative effects?** |
| **Project 2: Construction of light industrial building, Euro Business Park** | **Traffic and Transportation:** At the time of writing, limited information was available regarding crucial factors such as the estimated traffic volumes generated by the different stages of this project and its construction timelines. While these circumstances hindered the possibility of conducting an accurate quantitative assessment of the cumulative impact of this project on the operation of the road network and traffic volumes around the Proposed Development, a negative, short term cumulative impact is nonetheless expected during the Construction Phase should the Construction Phase of this project overlap with that of the Proposed Development.<br><br>In order to minimise this impact, it is crucial that the mitigation measures proposed in this EIAR and, where required, in the planning documents for the other permitted / Proposed Developments in the vicinity, are implemented during the Construction Phase. | None |
| | **Landscape and Visual:** No potential cumulative effects identified. | |
| | **Biodiversity:** In the event that the Construction Phase of the Proposed Development was to overlap with this project, potential localised cumulative impacts could arise.<br><br>Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in the CEMP which is included as **Appendix 5.1** in **Volume 4** of this EIAR. These measures will ensure that no significant cumulative noise / disturbance effects or habitat loss for local fauna will occur during construction works.<br><br>Following mitigation, no significant adverse impacts from changes in local water quality were identified during the Construction Phase of the Proposed Development. Therefore, no cumulative impacts for water have been identified.<br><br>While no detail on tree removal / habitat loss was included with this application, the site is located within an existing industrial setting and no significant impacts from cumulative habitat loss have been identified.<br><br>Following the implementation of mitigation measures, no significant cumulative effects have been identified. | |
| | **Noise and Vibration:** No potential cumulative effects identified. | |
| | **Air Quality:** Taking this project in combination with the Proposed Development, it is considered that there is a potential for short-term cumulative effects to air quality due to construction dust, should the Construction Phases overlap. However, given the implementation of the mitigation measures and low volumes of construction traffic associated with the Proposed Development, no significant cumulative air quality effects are predicted during the Construction Phase. | |
| | **Climate:** No potential cumulative effects identified. | |
| | **Archaeology, Architectural and Cultural Heritage:** No potential cumulative effects identified. | |

| Construction Phase | | |
|---|---|---|
| **Plan / project** | **Potential cumulative effects on environmental factors** | **Any residual significant negative cumulative effects?** |
| | **Population and Human Health:** Refer to Landscape and Visual, Noise and Vibration, Air Quality and Major Accidents and / or Disasters. | |
| | **Resources and Waste:** Taking this project in combination with the Proposed Development, it is considered that they could give rise to short term, slight, negative resource and waste management impacts on the capacity of waste management facilities and waste industry trends in Ireland during the Construction Phase due to an increased demand on waste recovery and / or disposal sites.<br>Appropriate mitigation measures have been proposed in this EIAR – and, where required, in the planning documents for this project – such that significant negative cumulative impacts are not predicted to occur. | |
| | **Water:** No potential cumulative effects identified. | |
| | **Land, Soils, Geology and Hydrogeology:** The nature and scale of this project are such that the development of the project in combination with the Proposed Development would not give rise to significant impacts on Land, Soils, Geology and Hydrogeology. | |
| | **Material Assets:** No potential cumulative effects identified. | |
| | **Major Accidents and / or Disasters:** There is potential for overlap between the Construction Phases of this project and the Proposed Development, which could result in a cumulative effect on water quality and / or traffic and transportation (in the form of a vehicle collision). However, with the implementation of the mitigation measures outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) and the implementation of a CTMP for the Proposed Development, no significant negative cumulative effects are predicted. | |

**Table 20.2: Potential cumulative effects during the Operational Phase**

| Operational Phase | | |
|---|---|---|
| **Plan / project** | **Potential cumulative effects on environmental factors** | **Any residual significant negative cumulative effects?** |
| **Project 1: Extension to existing Radisson Blu Hotel & Spa** | **Traffic and Transportation:** No potential cumulative effects identified. | None |
| | **Landscape and Visual:** The location of the proposed extension to the hotel is separated from the Proposed Development by the existing hotel building and would be screened from view by the built form and established woodland to the north and east. Intervisibility between the Proposed Development and this project is likely to be very low and would be | |

| Operational Phase | | |
|---|---|---|
| **Plan / project** | **Potential cumulative effects on environmental factors** | **Any residual significant negative cumulative effects?** |
| | perceived as consistent with the peri-urban context of Little Island leading to slight, negative and permanent cumulative effects. | |
| | **Biodiversity:** No potential cumulative operational impacts from noise and disturbance have been identified.<br>Following mitigation, no significant adverse impacts from changes in local water quality were identified during the Operational Phase of the Proposed Development. Therefore, no cumulative impacts for water have been identified.<br>It is noted that tree removal has been minimised in this project, which will remove 7 semi-mature trees. No significant cumulative impacts from habitat loss have been identified.<br>Following the implementation of mitigation measures, no significant cumulative effects have been identified. | |
| | **Noise and Vibration:** No potential cumulative effects identified. | |
| | **Air Quality:** No potential cumulative effects identified. | |
| | **Climate:** No potential cumulative effects identified. | |
| | **Archaeology, Architectural and Cultural Heritage:** No potential cumulative effects identified. | |
| | **Population and Human Health:** Refer to Landscape and Visual, Noise and Vibration, Air Quality and Major Accidents and / or Disasters. | |
| | **Resources and Waste:** No potential cumulative effects identified. | |
| | **Water:** No potential cumulative effects identified. | |
| | **Land, Soils, Geology and Hydrogeology:** No potential cumulative effects identified. | |
| | **Material Assets:** No potential cumulative effects identified. | |
| | **Major Accidents and / or Disasters:** No potential cumulative effects identified. | |
| **Project 2: Construction of light industrial building, Euro Business Park** | **Traffic and Transportation:** No potential cumulative effects identified. | None |
| | **Landscape and Visual:** No potential cumulative effects identified. | |
| | **Biodiversity:** No potential cumulative operational impacts from noise and disturbance have been identified. | |

| Operational Phase | | |
| --- | --- | --- |
| **Plan / project** | **Potential cumulative effects on environmental factors** | **Any residual significant negative cumulative effects?** |
| | Following mitigation, no significant adverse impacts from changes in local water quality were identified during the Operational Phase of the Proposed Development. Therefore, no cumulative impacts for water have been identified.<br>While no detail on tree removal / habitat loss was included with this application, the site is located within an existing industrial setting and no significant impacts from cumulative habitat loss have been identified.<br>Following the implementation of mitigation measures, no significant cumulative effects have been identified. | |
| | **Noise and Vibration:** No potential cumulative effects identified. | |
| | **Air Quality:** No potential cumulative effects identified. | |
| | **Climate:** No potential cumulative effects identified. | |
| | **Archaeology, Architectural and Cultural Heritage:** No potential cumulative effects identified. | |
| | **Population and Human Health:** Refer to Landscape and Visual, Noise and Vibration, Air Quality and Major Accidents and / or Disasters. | |
| | **Resources and Waste:** No potential cumulative effects identified. | |
| | **Water:** No potential cumulative effects identified. | |
| | **Land, Soils, Geology and Hydrogeology:** No potential cumulative effects identified. | |
| | **Material Assets:** No potential cumulative effects identified. | |
| | **Major Accidents and / or Disasters:** No potential cumulative effects identified. | |

## 20.4 Interactive Impacts

### 20.4.1 Overview

All environmental factors are inter-related to some extent and the relationships can range from tenuous to inextricable. The potential interactions of environmental impacts were identified throughout the design process and measures addressing these impacts have already been included within the individual chapters of this EIAR. This assessment is based on information contained within this EIAR and the outcome of discussions and interactions between the environmental specialists and the design team.

The assessment of interactive effects has considered likely significant effects that may arise during construction and operation of the proposed development based on best scientific knowledge. A summary of these effects is presented in the matrix in **Table 20.3.** This is in line with the approach set out in the EPA EIAR Guidelines (EPA, 2022). Mitigation measures relevant to those interactions are addressed within the individual chapters of this EIAR.

**Table 20.3: Interactive effects summary matrix**

| Typical inter relationship matrix – environmental elements | Traffic and Transportation | | Landscape and Visual | | Biodiversity | | Noise and Vibration | | Air Quality | | Climate | | Archaeology, Architectural and Cultural Heritage | | Population and Human Health | | Resources and Waste | | Water | | Land, Soils, Geology and Hydrogeology | | Material Assets | | Major Accidents and / or Disasters | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. | Con. | Op. |
| Traffic and Transportation | | | | | | | | | | | | | | | ✓ | | ✓ | | | | ✓ | | | | ✓ | |
| Landscape and Visual | | | | | ✓ | ✓ | | | | | | | | | | | | | | | ✓ | | | | ✓ | |
| Biodiversity | | | ✓ | | | | ✓ | ✓ | ✓ | | | | | | | | | | ✓ | ✓ | ✓ | | | | ✓ | |
| Noise and Vibration | ✓ | | | | | | | | | | | | | | | | | | | | ✓ | | | | | |
| Air Quality | ✓ | | | | | | | | | | | | | | | | | | | | ✓ | | | | ✓ | |
| Climate | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | |
| Archaeology, Architectural and Cultural Heritage | | | | | | | | | | | | | | | | | | | | | ✓ | | | | | |
| Population and Human Health | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | | | | | | | | | | | | | | ✓ | |
| Resources and Waste | | | | | | | | | | | | | | | | | | | | | ✓ | | | | | |
| Water | ✓ | ✓ | | | | | | | | | | | | | | | | | | | ✓ | | | | ✓ | |
| Land, Soils, Geology and Hydrogeology | | | | | | | | | | | | | | | | | | | | | | | ✓ | | | |
| Material Assets | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Major Accidents and / or Disasters | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Notes: This matrix should be read down, starting with each topic identified across the top header row. ✓ = imperceptible interaction. ✓ = not significant interaction. ✓ = slight interaction. ✓ = moderate interaction. Note: Blank cells indicate no interactive impact. Significant, very significant and profound interactive impacts were not identified. Con. = Construction Phase. Op. = Operational Phase.**

### 20.4.2 Potential interactions

#### *20.4.2.1 Traffic and Transportation*

**Noise and Vibration**

There is a potential interaction between Noise and Vibration and Traffic and Transportation during the Construction Phase. This is likely to result from construction vehicles entering and moving around the site. Potential interactive impacts are predicted to be not significant during the Construction Phase.

Refer to **Chapter 10**, *Noise and Vibration* for further details.

**Air Quality**

There is a potential interaction between Traffic and Transportation and Air Quality during the Construction Phase due to emissions from the use of heavy goods vehicles and construction workers commuting to the site. However, this interactive impact will not be significant.

Refer to **Chapter 11**, *Air Quality* for further details.

**Climate**

Similar to Air Quality, there is a potential interaction between Traffic and Transportation and Climate during the Construction Phase due to emissions from the use of heavy goods vehicles and construction workers commuting to the site. Potential interactive impacts are predicted to be not significant during the Construction Phase.

Refer to **Chapter 12**, *Climate* for further details.

**Population and Human Health**

There is a potential interaction between Traffic and Transportation and Population and Human Health through an increase in air and noise emissions during the Construction and Operational Phases. However, as the increase in construction traffic is not expected to be significant when compared to existing road traffic volumes, no significant negative impacts on air quality and noise and vibration are predicted.

Potential interactive impacts are predicted to be not significant during both the Construction and Operational Phase.

Refer to **Chapter 14**, *Population and Human Health* for further details.

**Water**

There is a potential interaction between Traffic and Transportation and Water through leaks from vehicles during the Construction and Operational Phases. Potential interactive impacts are predicted to be not significant during both the Construction and Operational Phase.

Refer to **Chapter 16**, *Water* for further details.

**Conclusion**

Given the moderate scale of the construction activities, the minor impact of construction traffic and the implementation of the mitigation measures as described in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), no significant adverse residual negative interactive impacts are predicted.

#### *20.4.2.2 Landscape and Visual*

**Biodiversity**

The proposed landscaping works, including the planting of trees, to be completed as part of the Proposed Development will result in a slight, long term, positive impact on local biodiversity during the operation of the Proposed Development.

Refer to **Chapter 9**, *Biodiversity* for further details.

**Population and Human Health**

During construction, there will be a slight, temporary, negative interactive impact on the general amenity of the local population as a result of the change in landscape due to the presence of temporary hoarding / fencing, parking, deliveries, lighting, cranes etc.

Once operational, there is the potential for a permanent visual impact on the local community as a result of the Proposed Development. However, the design of the Proposed Development is sympathetic to the surrounding environment to ensure it will be successfully absorbed into the local area. Potential interactive impacts are predicted to be not significant during the Operational Phase.

Refer to **Chapter 14**, *Population and Human Health* for further details.

#### *20.4.2.3 Biodiversity*

**Landscape and Visual**

During the Construction Phase of the Proposed Development, the removal of existing trees and vegetation will result in moderate, negative and short-term landscape and visual impacts.

Once operational, the planting and local enhancement of public green space proposed as part of the Proposed Development, will have a moderate, positive and permanent impact on the site and its context.

Refer to **Chapter 8**, *Landscape and Visual* for further details.

**Population and Human Health**

Once operational, the planting and local enhancement of public green space proposed as part of the Proposed Development, will have a moderate, positive and permanent impact on Population and Human Health.

Refer to **Chapter 14**, *Population and Human Health* for further details.

#### *20.4.2.4 Noise and Vibration*

**Biodiversity**

Increased noise emissions have the potential directly affect biodiversity.

During the Construction Phase, noise emissions will occur as a result of construction works and construction traffic. Potential interactive impacts are predicted to be slight, negative and short term at a local geographic level during the Construction Phase.

During the Operational Phase, there will be increased noise along the new bridge and walkways. However, as the site is located in a highly disturbed setting adjacent to the N25, potential interactive impacts are predicted to be not significant during the Operational Phase.

Refer to **Chapter 9**, *Biodiversity* for further details.

**Population and Human Health**

Construction of the Proposed Development has the potential to create noise and vibration which could have an impact on Population and Human Health. Potential interactive impacts are predicted to neutral to slight and short term during the Construction Phase.

Refer to **Chapter 14**, *Population and Human Health* and **Chapter 10**, *Noise and Vibration* for further details.

#### *20.4.2.5 Air Quality*

**Biodiversity**

Increased air emissions due to dust arising during the Construction Phase have the potential to have an interactive impact on Biodiversity. However, potential interactive impacts are predicted to be not significant during the Construction Phase.

Refer to **Chapter 9**, *Biodiversity* for further details.

**Population and Human Health**

Dust and air emissions generated during the Construction Phase have the potential to have an interactive impact on Population and Human Health. However, potential interactive impacts are predicted to be not significant during the Construction Phase.

Refer to **Chapter 14**, *Population and Human Health* for further details.

#### *20.4.2.6 Climate*

No interactive impact is expected to occur as a result of Climate during either the Construction Phase or the Operational Phase.

#### *20.4.2.7 Archaeology, Architectural and Cultural Heritage*

No interactive impact is expected to occur as a result of Archaeology, Architectural and Cultural Heritage during either the Construction Phase or the Operational Phase.

#### *20.4.2.8 Population and Human Health*

**Traffic and Transportation**

The increase in construction personnel on site during the Construction Phase has the potential to increase traffic in the vicinity of the site. However, as the increase in construction traffic is not expected to be significant when compared to existing road traffic volumes, potential interactive impacts are predicted to be not significant during the Construction Phase.

Refer to **Chapter 7**, *Traffic and Transportation* for further details.

#### *20.4.2.9 Resources and Waste*

**Traffic and Transportation**

Excavated material that is to be removed off-site along with any material required to be imported for the construction of the Proposed Development will increase traffic in the vicinity of the site. However, as the increase in construction traffic is not expected to be significant when compared to existing road traffic volumes, potential interactive impacts are predicted to be not significant during the Construction Phase.

Refer to **Chapter 7**, *Traffic and Transportation* for further details.

#### *20.4.2.10 Water*

**Biodiversity**

The potential for adjacent watercourses to become impacted through spillages such as hydrocarbon leaks (fuels / oils / lubricants) from construction machinery or by siltation as a result of run-off during construction, which could have a slight, negative and temporary term interactive impact on aquatic species / fisheries in downstream watercourses at a local level during the Construction Phase. However, this effect will be managed by appropriate mitigation measures outlined in **Chapter 9**, *Biodiversity*, **Chapter 16**, *Water* and the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR).

Given the operational design measures which will be implemented for the Operational Phase, potential interactive impacts on aquatic species / fisheries in downstream watercourses at a level during the Operational Phase are predicted to be imperceptible and long term.

Refer to **Chapter 9**, *Biodiversity* for further details.

#### *20.4.2.11 Land, Soils, Geology and Hydrogeology*

**Traffic and Transportation**

Excavated material will be required to be removed off-site during the Construction Phase, resulting in an increase in construction traffic. However, as the increase in construction traffic is not expected to be significant when compared to existing road traffic volumes, potential interactive impacts are predicted to be not significant during the Construction Phase.

Refer to **Chapter 7**, *Traffic and Transportation* for further details.

**Landscape and Visual**

There is a potential interaction between Land, Soils, Geology and Hydrogeology on Landscape and Visual during the Construction Phase as a result of stockpiles of excavated materials being stored on site. However, with the implementation of hoarding / fencing and other mitigation measures, as outlined in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), this interactive impact is predicted to be not significant.

Refer to **Chapter 8**, *Landscape and Visual* for further details.

**Biodiversity**

The construction of the Proposed Development will include the removal of some habitats to facilitate the construction works. However, this interactive impact is predicted to be not significant following the implementation of the mitigation measures, as outlined in **Chapter 9**, *Biodiversity*.

Refer to **Chapter 9**, *Biodiversity* for further details.

**Noise and Vibration**

In addition to Air Quality, Noise and Vibration has the potential to be affected as a result of excavation works during Construction Phase. This interactive impact is predicted to be neutral to slight and short term during the Construction Phase, given the implementation of mitigation measures outlined in **Chapter 10**, *Noise and Vibration*.

Refer to **Chapter 10**, *Noise and Vibration* for further details.

**Air Quality**

Considering that the excavation of land and soils will generate dust emissions, there is potential for an interactive impact from soiling, $PM_{10}$ and vegetation effects arising from construction activities. However, this interactive impact is predicted to be not significant following the implementation of the mitigation measures, as outlined in **Chapter 11**, *Air Quality*.

Refer to **Chapter 11**, *Air Quality* for further details.

**Archaeology, Architectural and Cultural Heritage**

It is possible that ground disturbances associated with the Proposed Development may result in direct negative impacts on any potential archaeological sites which may survive below the ground surface.

However, licenced archaeological monitoring of all ground works will be undertaken during construction. If features of archaeological significance are identified, further mitigation will be required following consultation with the County Archaeologist and National Monument Service. Such features will be fully resolved to professional standards of archaeological practice either by preservation in situ or preservation by record. Potential interactive impacts are therefore predicted to be not significant during the Construction Phase.

Refer to **Chapter 13**, *Archaeology, Architectural and Cultural Heritage* for further details.

**Resources and Waste**

There is a potential interaction between Land, Soils, Geology and Hydrogeology and Resources and Waste during construction due to waste arising from the proposed excavation works. The estimated quantity of excavated materials that will be generated is approximately 3,000 tonnes. However, re use / recycling / recovery activities will be employed where possible to reduce any potential impacts from the generation of this material. This interactive impact is predicted to be slight, negative and short term during the Construction Phase.

Refer to **Chapter 15**, *Resources and Waste* for further details.

**Water**

Excavation works during construction have the potential to cause a direct impact on water quality through siltation as a result of runoff and erosion from site earthworks and stockpiles. However, with the implementation of suitable mitigation measures as detailed in **Chapter 17**, *Land, Soils, Geology and Hydrogeology,* **Chapter 16**, *Water* and the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), this interactive impact is predicted to be not significant.

Refer to **Chapter 16**, *Water*, **Chapter 17**, *Land, Soils, Geology and Hydrogeology* and the CEMP for further details.

### *20.4.2.12 Material Assets*

**Land, Soils, Geology and Hydrogeology**

Minor excavations will be required for both the re-routing of the existing MV overhead line traversing through the northern park area and the proposed protection measures and easements to be implemented for the existing water main pipelines that traverse the site. Excavation works during these works have the potential to cause a direct impact on water quality through siltation as a result of runoff.

However, due to the minor nature of these works and the implementation of suitable mitigation measures as detailed in **Chapter 16**, *Water*, **Chapter 17**, *Land, Soils, Geology and Hydrogeology* and the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), this interactive impact is predicted to be imperceptible during the Construction Phase.

### *20.4.2.13 Major Accidents and / or Disasters*

**Traffic and Transportation**

There is potential for an interaction between Major Accidents and / or Disasters and Traffic and Transportation in the event of a vehicle collision involving construction traffic during the Construction Phase. This interactive impact is predicted to be imperceptible.

**Landscape and Visual**

During both the Construction Phase and the Operational Phase, there is potential for an interaction between Major Accidents and / or Disasters and Landscape and Visual in the event of the collapse / damage to structures / the bridge. This has been accounted for in the Proposed Development through the use of design guidance and standards. This interactive impact is predicted to be imperceptible.

**Biodiversity**

The occurrence of a Major Accident and / or Disaster during either the Construction Phase or the Operational Phase has the potential to affect the surrounding Biodiversity. This interactive impact is predicted to be imperceptible.

**Air Quality**

There is potential for an interaction between Major Accidents and / or Disasters and Air Quality in the event of a fire / explosion occurring during the Construction Phase. This interactive impact is predicted to be imperceptible.

**Population and Human Health**

The occurrence of a Major Accident and / or Disaster during either the Construction Phase or the Operational Phase has the potential to affect Population and Human Health. This interactive impact is predicted to be imperceptible.

**Water**

Major Accidents and / or Disasters have the potential to contaminate watercourses adjacent to the site during the Construction Phase and the Operational Phase. The risk of striking the water mains supply pipeline traversing the site is also present during the excavation works during the Construction Phase. These interactive impacts are predicted to be imperceptible.

## 20.5 References


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# Chapter 21

# Summary of Mitigation and Monitoring

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# 21. Summary of Mitigation and Monitoring Measures

## 21.1 Introduction

This chapter provides a summary of the proposed mitigation and monitoring measures associated with the Proposed Development during the Construction, Operational and Decommissioning Phases (as identified in **Chapters 7** to **20**).

The mitigation measures that have been established to minimise any likely significant negative effects arising from the Proposed Development during the Construction, Operational and Decommissioning Phases are summarised in **Section 21.2**, along with any planned monitoring measures, where required.

## 21.2 Summary of Mitigation and Monitoring Measures

Mitigation and monitoring measures have been identified as environmental commitments and overarching requirements which shall avoid, reduce or offset potential impacts.

A number of safeguards and management measures have been identified in order to mitigate negative environmental effects during the Construction, Operational and Decommissioning Phases as described in detail in **Chapters 7** to **20**. It should be noted that these generally exclude any inherent measures and elements that have been incorporated in the design as these design measures have been documented as part of **Chapter 4**, *Description of the Proposed Development*.

The following tables summarise the Construction, Operational and Decommissioning Phase mitigation outlined in the relevant EIAR technical assessments but should be read in conjunction with the mitigation outlined in the specific chapter and also with the Construction Environmental Management Plan (CEMP) which is included as **Appendix 5.1** in **Volume 4** of this EIAR (note that the CEMP summarises the Construction Phase mitigation only).

Where appropriate, the location to which the mitigation relates to is identified and where the mitigation measure is relevant to the entirety of the Proposed Development, the location is given as 'throughout (as required)'.

## 21.3 General Mitigation Requirements

**Table 21.1: General mitigation measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| GEN1 | 5.11 | Throughout (as required) | The mitigation measures appropriate to the construction contract summarised in this chapter have been included in the Construction Environmental Management Plan (CEMP) (refer to **Appendix 5.1** in **Volume 4** of this EIAR). | **Construction** |

## 21.4 Traffic and Transportation

**Table 21.2: Traffic and Transportation mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| TT1 | 7.5.1 | N25 junction 2 eastbound | Overnight traffic management on N25 junction 2 eastbound off ramp slip lane to allow site clearance. | **Construction** |
| TT2 | 7.5.1 | N25 junction 2 eastbound | Blocking a small area of only one land on the eastbound off ramp for access for construction of the N25 span northern abutment for 6-10 weeks. | **Construction** |
| TT3 | 7.5.1 | N25 junction 2 eastbound | Overnight land closures and traffic management on N25 junction 2 eastbound off ramp slip lanes and adjacent traffic lanes to facilitate erection of south span of the precast concrete portal frame structure over Irish Rail land. It is expected a single eastbound lane can remain open. | **Construction** |
| TT4 | 7.5.1 | N25 | Overnight / weekend closure of the N25 to allow for steelwork erection of the N25 span. | **Construction** |
| TT5 | 7.5.1 | Irish Rail track | Weekend closure of Irish Rail track in agreement with Irish Rail to allow for construction of precast concrete portal frame structures. | **Construction** |
| TT6 | 7.5.1 | N25 | Providing a temporary bus service covering the same route and stops, in order to reduce the impact of closure of Irish Rail Track on a weekend, in consultation with Irish Rail and Bus Eireann. | **Construction** |
| TT7 | 7.5.1 | L3004 | A temporary road widening and right turn pocket will be provided along the L3004 Glounthaune Road for right turning construction traffic to / from Construction Compound 1 | **Construction** |
| TT8 | 7.5.1 | N25 | Overnight partial closure of N25 for maintenance repainting of bridge soffit in a sequential fashion for 6-10 nights. | **Construction** |
| TT9 | 7.5.1 | Construction compounds | Provision of adequate parking spaces during the Construction Phase in the construction compounds should be ensured. | **Construction** |
| TT10 | 7.5.1 | Throughout (as required) | Parking restrictions and management measures at the Radisson Blu Hotel and Eastgate Business Park car parks will be reviewed and implemented as necessary in agreement with the local businesses and | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | Cork County Council to ensure that the functioning of the car parks is maintained and to avoid any site parking overspill issues. | |
| TT11 | 7.5.1 | Throughout (as required) | A Construction Traffic Management Plan (CTMP) will be developed by the contractor when updating the Construction Environmental Management Plan (CEMP) (refer to **Appendix 5.1** in **Volume 4** of this EIAR) and presented to Cork County Council for approval prior to commencement of the construction works | **Construction** |
| TT12 | 7.5.4.1 | Throughout (as required) | The effectiveness of the CTMP will be continually monitored to ensure that impacts on traffic flows and road users on the surrounding public road network are minimised and additional mitigation measures are introduced, as required. The monitoring regime will consider all modes of traffic, including pedestrians, cyclists and public transport. | **Construction** |

## 21.5 Landscape and Visual

**Table 21.3: Landscape and Visual mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| LV1 | 8.5.1 | Throughout (as required) | Temporary site hoarding will be erected around areas that adjoin public or private land that may be impacted by the works. This includes the:<br>• North, east and western site boundary with the L3004 Glounthaune Road, access road to Little Island train station and public green space, respectively; and<br>• Boundaries with the existing public car park at East Gate Road and The Radisson Blu Hotel car park. | **Construction** |
| LV2 | 8.5.1 | Throughout (as required) | Additional protective fencing that will be erected at the boundary of proposed works areas to protect retained landscape, planting, features etc. The trees remaining trees along the railway line embankments, N25 road corridor and the woodland block between the N25 and Radisson Blue Hotel will be protected with fencing in accordance with BS5837:2012: Trees in relation to in relation to design, demolition and construction – recommendations (BSI, 2012) and TII's Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes (TII, 2006). All necessary measures will be taken to avoid non-native, invasive species establishing in the area. | **Construction** |
| LV3 | 8.5.1 | Throughout (as required) | Site machinery will only operate within the Proposed Development area. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| LV4 | 8.5.1 | Throughout (as required) | Storage of materials and temporary stockpiling will only be permitted at the bridge assembly area and construction compounds located at the northern and southern ends of the Proposed Development site. | **Construction** |
| LV5 | 8.5.1 | Throughout (as required) | Proposed construction which uses the optimum number and arrangement of pile foundations, support columns and bridge abutments to minimise Construction Phase impacts on the landscape, particularly existing trees and woodland blocks. | **Construction** |
| LV6 | 8.5.1 | Throughout (as required) | Location, arrangement and design of construction and assembly zones so that they use existing hard standing areas and / or minimise construction within existing landscape areas which will require removal and subsequent reinstatement as landscape. | **Construction** |
| LV7 | 8.5.1 | Throughout (as required) | Design and construction that minimises the requirement for future access under the structure and within woodland / landscape areas, thereby minimising potential disturbance to reinstated landscape areas. | **Construction** |
| LV8 | 8.5.1.2 | Throughout (as required) | During the construction works, a professionally qualified Arboriculturist is recommended to be retained by the principal contractor or site manager to monitor and advice on any works within the root protection area (RPA) of retained trees to ensure successful retention and planning compliance. | **Construction** |
| LV9 | 8.5.1.2 | Throughout (as required) | Copies of the tree clearance and tree constraints plans and BS 5837:2012: Trees in Relation to Design, Demolition and Construction (BSI, 2012) should be kept available on-site during the construction works. All works are to be in accordance with these documents. | **Construction** |
| LV10 | 8.5.1.2 | Throughout (as required) | On the completion of the construction works, all trees vegetation retained is to be reviewed by the project Arboriculturist and any necessary remedial tree surgery works required to promote health and safety are to be implemented. | **Construction** |
| LV11 | 8.5.2 | Throughout (as required) | Selection of a route corridor for the proposed bridge and access ramps that minimises the impact on the existing landscape whilst achieving universal access. | **Operation** |
| LV12 | 8.5.2 | Throughout (as required) | High quality architectural design of the bridge with a shallow deck and a single span double arch with lattice supports to minimise apparent mass in views towards the structure from east and west. | **Operation** |
| LV13 | 8.5.2 | Throughout (as required) | Enhancement of existing landscape within and adjacent the works area to include new tree planting, amenity paths and linkages to active travel and public transport and grassland diversification to enhance the local landscape for nature and amenity for people. | **Operation** |

## 21.6 Biodiversity

**Table 21.4: Biodiversity mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| BD1 | 9.5.1.1 | Throughout (as required) | All construction staff, including all sub-contracted workers, will be notified of the sensitive nature of onsite habitats, the Kilcoolishal Stream and nearby designated sites and will be made aware that no construction waste of any kind (rubble, soil, etc.) is to be deposited in these protected areas and that care must be taken with liquids or other materials to avoid spillage. | **Construction** |
| BD2 | 9.5.1.1 | Throughout (as required) | All personnel involved with the Proposed Development will receive an onsite induction relating to construction and operations and the environmentally sensitive nature of habitats on and adjacent to the Proposed Development site and to re-emphasise the precautions that are required as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures. | **Construction** |
| BD3 | 9.5.1.1 | Throughout (as required) | All staff and subcontractors have the responsibility to:<br>• Understand the importance of mitigating pollution onsite, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;<br>• Respond in the event of an incident to avoid or limit environmental impact;<br>• Report all incidents immediately to the project manager;<br>• Monitor the workplace for potential environmental risks and alert the site manager if any are observed; and<br>• Co-operate as required, with site inspections. | **Construction** |
| BD4 | 9.5.1.2 | Throughout (as required) | **<u>Water quality</u>**<br>A Surface Water Management Plan will be incorporated into the CEMP by the contractor. Specific controls / mitigation measures will be put in place to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase. | **Construction** |
| BD5 | 9.5.1.2 | Kilcoolishal Stream | **<u>Water quality</u>**<br>• Works in the vicinity of the stream will be carried out in the summer months, when water levels and flows within the stream are minimal. In the eventually that the stream is not dry, construction works to the section of the Kilcoolishal stream crossing the construction boundary (approximately 28m) will be bunded on either side with earthen bunds and silt screens. Water would be over pumped in the flow direction. Environmental control measures will be implemented during construction in line with standard guidelines (i.e., 'The Control of Water Pollution from Construction Sites' (CIRAI, 2001) and "The Control of Water Pollution from Linear Construction Projects' (CIRIA, 2006)) for best practice measures for controlling water pollution. The Report for Screening for AA submitted as part of the planning application concluded that the proposed project, in the absence of mitigation, and either alone or in - combination with other plans and/or | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | projects, does not have the potential to significantly affect any European Site, in light of their conservation objectives. The environmental control measures which will be implemented relate to the minimisation of localised potential impacts;<br>• Apart from the area of the Kilcoolishal Stream directly affected by the bridge construction (i.e., Irish Rail portal frame), a buffer strip of 10m will be implemented around the stream with no works taking place in this area. Where this is not possible, in particular for the construction of the Irish Rail portal frame, the streambed and stream banks of the Kilcoolishal Stream in this location will be reprofiled and reinstated following construction and the bunds and silt traps removed;<br>• No plant or tools will be washed in the stream, should it contain water; and<br>• Spill kits will be permanently on hand and kept close to the works areas. Staff will be trained in how to use the spill kits correctly. | |
| BD6 | 9.5.1.3 | Throughout (as required) | **Noise and vibration**<br>The employment of good construction management practice, as described in the CEMP and in **Chapter 10**, *Noise and Vibration*, will minimize the risk of adverse impacts from the noise and vibration. | **Construction** |
| BD7 | 9.5.1.3 | Throughout (as required) | **Noise and vibration**<br>Mitigation measures will be employed to ensure that potential noise and vibration impacts at nearby sensitive receptors due to construction activities are minimized. The preferred approach for controlling construction noise is to reduce source levels where possible. | **Construction** |
| BD8 | 9.5.1.4 | Throughout (as required) | **Lighting**<br>Lighting mitigation measures will follow Bats & Lighting Guidance notes for: Planners, engineers, architects, and developers (Bat Conservation Ireland, 2010). | **Construction** |
| BD9 | 9.5.1.4 | Throughout (as required) | **Lighting**<br>Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:<br>• Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;<br>• Where possible, construction lights will be switched off when not in use; and<br>• Lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on woodland on the southern and northern boundary of the | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | N25. There will be no directional lighting focused on these sensitive habitats and cowling and focusing lights downwards will minimise light spillage. | |
| BD10 | 9.5.1.4 | Throughout (as required) | **Lighting**<br><br>Core construction works will take place during hours of daylight to minimise disturbance to any nocturnal mammal species. | **Construction** |
| BD11 | 9.5.1.5 | Throughout (as required) | **Protection of habitats**<br><br>Site clearance including demolition and vegetation clearance will be undertaken within the Proposed Development boundary and in accordance with the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR). | **Construction** |
| BD12 | 9.5.1.5 | Throughout (as required) | **Protection of habitats**<br><br>Trees and vegetation will not be removed between 1st March and 31st August, to avoid direct impacts on nesting birds. Tree removal will be carried out in accordance with the Arboricultural Impact Assessment Report (refer to **Appendix 8.1** in **Volume 4** of this EIAR). Trees to be retained will be identified and protected to avoid accidental damage during construction works. | **Construction** |
| BD13 | 9.5.1.5 | Construction compounds | **Protection of habitats**<br><br>Site drainage will be provided at the construction compounds to collect surface water runoff, which will be directed into the existing local drainage network. | **Construction** |
| BD14 | 9.5.1.5 | Construction compounds | **Protection of habitats**<br><br>Surface water or contaminants within the site compounds will not be released from the site to any waters or the bed and banks of any waters (including ground water). | **Construction** |
| BD15 | 9.5.1.5 | Throughout (as required) | **Protection of habitats**<br><br>To prevent incidental damage by machinery or by the deposition of spoil during site works, woodland, hedgerow, tree and scrub vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. Tree protection measures are included in the Arboricultural Impact Assessment Report (refer to **Appendix 8.1** in **Volume 4** of this EIAR). The project ecologist will specify appropriate protective fencing where required. | **Construction** |
| BD16 | 9.5.1.5 | Kilcoolishal Stream | **Protection of habitats**<br><br>The streambed and banks of the Kilcoolishal Stream will be reprofiled / reinstated once the construction works are complete. | **Construction** |
| BD17 | 9.5.1.5 | Throughout (as required) | **Protection of habitats** | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete. | |
| BD18 | 9.5.1.6 | Throughout (as required) | **Invasive species**<br><br>Prior to the commencement of construction works an invasive species survey will be undertaken within the Proposed Development boundary by a competent expert to determine if invasive species listed under Part 1 of the Third Schedule of S.I No. 477 of 2011 have established in the area in the period between pre-planning and post consent. In the event that invasive species are identified within the works area, a site-specific Invasive Species Management Plan (ISMP) will be developed and implemented by a competent specialist on behalf of the contractor. | **Construction** |
| BD19 | 9.5.1.6 | Throughout (as required) | **Invasive species**<br><br>In addition, in order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011), biosecurity measures will be implemented throughout the Construction Phase to ensure that the introduction and translocation of invasive species is prevented. The appointed project ecologist will carry out a toolbox talk which will identify invasive species and will also implement biosecurity measures such as the visual inspection of vehicles for evidence of attached plant or animal material prior to entering and leaving the works area. Stringent biosecurity measures will be implemented throughout the works. The best practice principles of Check-Clean-Dry guidance of the Non-Native Species Secretariat (NNSS, 2017), IFI biosecurity protocols (IFI, 2010) and Waterways Ireland Marine Notice No. 39/2017 shall be followed during these works to ensure that invasive non-native species are not introduced into the Proposed Development site. | **Construction** |
| BD20 | 9.5.1.6 | Throughout (as required) | **Invasive species**<br><br>Japanese knotweed<br><br>The following site hygiene measures will be implemented for the contaminated area:<br><br>• Understand the potential extent of the rhizome (root) system underground – up to seven metres horizontally and three metres vertically;<br>• Where possible, the contaminated area will be avoided and fenced off, or the extent of the rhizomes clearly marked;<br>• If possible, the use of machinery with tracks will avoid contaminated areas. Movement of machinery between contaminated and non-contaminated areas must be controlled and adequate power washing measures implemented;<br>• Areas where contaminated soil is to be stockpiled on site will be clearly identified and marked out;<br>• Designated entry and exit points will be identified for personnel on foot and for small mobile equipment. A delineated access track, to be maintained free of Japanese Knotweed, will be | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | established through the site to minimise the spread of Knotweed species by permitted vehicles accessing the site;<br>• Vehicles, including footwear and tools, leaving the site will be inspected for any plant material and washed down (using a pressure washer) in a dedicated vehicular wheel wash down facility, which will drain into a contained area within the site. Particular care is required with tracked machines;<br>• Vehicles used in the transport of contaminated material will be visually checked and washed down into a contained area before being used for any other work, either in the same area or on a different site;<br>• Only vehicles required for essential works, including site investigation works, will be brought on site and the number of visits minimised as much as practicable;<br>• Material gathered in the dedicated wash down contained areas will be appropriately disposed of off-site;<br>• For any subsoil or topsoil entering the site, the supplier will be required to provide an assurance that it is free of Japanese Knotweed;<br>• All site personnel will be made aware of measures to be taken and will be informed of the requirements of the ISMP; and<br>• Site hygiene signage, in relation to the management of invasive species, will be erected. | |
| BD21 | 9.5.1.6 | Throughout (as required) | **Invasive species**<br>All staff involved in the application of herbicides / pesticides will have received appropriate training, which may include achieving competency certification in the safe use of herbicides / pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area. | **Construction** |
| BD22 | 9.5.1.6 | Throughout (as required) | **Invasive species**<br>The contractor will follow the detailed recommendations of the following documents for the control of invasive species and noxious weeds:<br>• Chapter 7 and Appendix 3 of the TII Publication: The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010); | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | • Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2015); and<br>• Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges (NPWS, 2008). | |
| BD23 | 9.5.1.6 | Throughout (as required) | **Invasive species**<br>Refer to Section 9.5.1.6 of **Chapter 9**, *Biodiversity* for detailed management options for invasive species. | **Construction** |
| BD24 | 9.5.1.7 | Throughout (as required) | **Bats**<br>During the site works, general mitigation measures for bats will follow Marnell *et al.* (2022), Kelleher and Marnell (2006) and NRA (2005c). All mitigation measures including detailed method statements will be agreed with the National Parks and Wildlife Service (NPWS) prior to commencement of works, which could affect any bat populations on site. | **Construction** |
| BD25 | 9.5.1.7 | Throughout (as required) | **Bats**<br>Mature and immature trees will be removed prior to construction. Although mature trees with the potential to be of significant value as bat roosts are absent from the site, the following precautionary measures will be implemented during the removal of semi-mature and mature trees:<br>• The project ecologist will work with the contractor to ensure that trees earmarked for retention are adequately protected;<br>• Tree-felling will ideally be undertaken in the period September to late October / early November. During this period, bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken;<br>• Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted;<br>• Tree will be retained where possible and no ‘tidying up’ of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety;<br>• Treelines outside the Proposed Development area but adjacent to it, and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage; | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | • During construction, directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused on watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage; and<br>• If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS. | |
| BD26 | 9.5.1.8 | Throughout (as required) | **Birds**<br>Where practicable, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. If works are carried out during the breeding season, a pre-construction survey will be carried out by the project ecologist and if birds are detected appropriate mitigation measures will be implemented. | **Construction** |
| BD27 | 9.5.1.9 | Drainage ditches and Kilcoolishal Steam | **Common frog**<br>As a precautionary measure, a visual search of the drainage ditches and the Kilcoolishal Stream will be carried out in the days prior to commencement of construction works and any frogs will be removed to alternative habitats elsewhere within the landholding. This will be carried out under licence from the NPWS and under supervision of the project ecologist. | **Construction** |
| BD28 | 9.5.2.1 | Throughout (as required) | **Lighting**<br>• LED type lanterns, of the warm white type, have been specified, with a Colour Temperature of 3000 kelvin, as these are considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations;<br>• LED luminaires have been specified due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;<br>• Lanterns are of the fully cut off type with no light output above the horizontal plane; and<br>• Screening by existing trees and newly planted trees will limit light spillage onto boundary habitats. | **Operation** |
| BD29 | 9.5.2.2 | Throughout (as required) | **Biodiversity enhancement**<br>Disturbed areas will be planted using appropriate native woodland and hedgerow mixes. | **Operation** |
| BD30 | 9.5.2.2 | Throughout (as required) | **Biodiversity enhancement**<br>It is proposed that four bat boxes will be installed at the Proposed Development site i.e., bat box pro or similar. These bat boxes will be located along mature woodland at the south of the site and within the wet willow woodland at the north of the site. | **Operation** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| BD31 | 9.5.2.2 | Throughout (as required) | **Biodiversity enhancement**<br><br>It is proposed that six bird nesting boxes (various types including open fronted, entrance hole and kestrel nest boxes) will be installed at the Proposed Development site. These will be located on mature and suitable semi-mature trees within the Proposed Development site boundary. | **Operation** |
| BD32 | 9.5.2.2 | Throughout (as required) | **Biodiversity enhancement**<br><br>Log piles are suitable for invertebrates, small mammals and birds, and can be easily installed in wooded areas of parks or open spaces. These stacks of logs are piled up and allowed to rot down. Left undisturbed, they will support a good range of biodiversity. These will be positioned within newly landscapes areas within the Proposed Development site. | **Operation** |
| BD33 | 9.5.2.2 | Throughout (as required) | **Biodiversity enhancement**<br><br>Natural recolonisation should also be allowed to proceed outside of the planted areas. | **Operation** |

## 21.7 Noise and Vibration

**Table 21.5: Noise and Vibration mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| NV1 | 10.5.1 | Throughout (as required) | Vehicles and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers, maintained in good and efficient working order and operated in such a manner as to minimise noise emissions. The contractor will ensure that all plant complies with the relevant statutory requirements. | **Construction** |
| NV2 | 10.5.1 | Throughout (as required) | Machines in intermittent use will be idling or throttled down to a minimum when not in use. | **Construction** |
| NV3 | 10.5.1 | Throughout (as required) | Compressors will be fitted with properly lined and sealed acoustic covers which will be kept closed whenever in use. Pneumatic percussive tools will be fitted with mufflers or silencers. | **Construction** |
| NV4 | 10.5.1 | Throughout (as required) | Equipment which breaks concrete, brickwork, or masonry by bending, bursting, or “nibbling” will be used in preference to percussive tools. Where possible, the use of impact tools will be avoided where the site is close to occupied premises. | **Construction** |
| NV5 | 10.5.1 | Throughout (as required) | Rotary drills and bursters activated by hydraulic, chemical, or electrical power will be used for excavating hard or extrusive material. | **Construction** |
| NV6 | 10.5.1 | Throughout (as required) | Wherever possible, equipment powered by mains electricity will be used in preference to equipment powered by internal combustion engine or locally generated electricity. | **Construction** |
| NV7 | 10.5.1 | Throughout (as required) | No part of the works nor any maintenance of plant will be carried out in such a manner as to cause unnecessary noise except in the case of an emergency when the work is absolutely necessary for the saving of life or property or the safety of the works. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| NV8 | 10.5.1 | Throughout (as required) | Plant will be maintained in good working order so that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum. | **Construction** |
| NV9 | 10.5.1 | Throughout (as required) | Noise emitting machinery which is required to run continuously will be housed in a suitable acoustically lined enclosure. | **Construction** |
| NV10 | 10.5.1 | Throughout (as required) | During the Construction Phase, the appointed contractor will carry out noise and vibration monitoring at representative noise and vibration sensitive receptors to evaluate and inform the requirement and / or implementation of noise and vibration management issues. Noise monitoring will be conducted in accordance with ISO 1996-1 (ISO, 2016) and ISO 1996-2 (ISO, 2017). The selection of monitoring locations will be based on the nearest representative noise and vibration sensitive receptors to the working area. | **Construction** |
| NV11 | 10.5.1 | Throughout (as required) | It is recommended that an acoustic barrier be installed as mitigation for all working areas, which will reduce noise levels overall by 10 dB. | **Construction** |

## 21.8 Air Quality

**Table 21.6: Air Quality mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| AQ1 | 11.5.1.1 | Throughout (as required) | During very dry periods when dust generation is likely, construction areas will be sprayed with water. | **Construction** |
| AQ2 | 11.5.1.1 | Throughout (as required) | Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators and other plant equipment, will be controlled by the contractor through regular servicing of machinery. | **Construction** |
| AQ3 | 11.5.1.1 | Throughout (as required) | Vehicle speeds will be limited in the construction site. | **Construction** |
| AQ4 | 11.5.1.1 | Throughout (as required) | Wheel-wash facilities may be provided, if required. Wheel-wash facilities will have rumble grids to remove excess mud from wheels. These facilities will be located at the exit from the construction compounds and away from sensitive receptors, where possible. | **Construction** |
| AQ5 | 11.5.1.1 | Throughout (as required) | Surrounding roads used by trucks to access to and egress from the site will be cleaned regularly using an approved mechanical road sweeper. Roads will be cleaned on a daily basis, or more regularly, as required. | **Construction** |
| AQ6 | 11.5.1.1 | Throughout (as required) | Areas where materials will be handled and stockpiled will be designed to minimise their exposure to wind – all temporary stockpiles shall be kept to the minimum practicable height with gentle slopes. | **Construction** |
| AQ7 | 11.5.1.1 | Throughout (as required) | Material drop heights from plant to plant or from plant to stockpile will be minimised. | **Construction** |
| AQ8 | 11.5.1.1 | Throughout (as required) | Where practicable, truck loads will be covered when carrying material likely to generate dust. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| AQ9 | 11.5.1.1 | Throughout (as required) | The following measures shall also be implemented to minimise off-site dust impacts:<br>• Provision of hoarding around the site;<br>• Locating plant likely to generate emissions away from sensitive receptors; and<br>• Any stockpiled material will be covered / dampened during periods of dry weather to prevent the spreading of dust | **Construction** |
| AQ10 | 11.5.1.1 | Throughout (as required) | In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations. | **Construction** |
| AQ11 | 11.5.2.1 | Throughout (as required) | The contractor will undertake on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to Cork County Council on request. The frequency of the inspections will be increased during site activities which have a high potential to generate dust. | **Construction** |

## 21.9 Climate

**Table 21.7: Climate mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| CL1 | 12.5.1.1 | Throughout (as required) | The Proposed Development will use low carbon construction materials, such as recycled aggregate, where practicable. | **Construction** |
| CL2 | 12.5.1.1 | Throughout (as required) | Where practicable, opportunities for materials reuse will be incorporated within the extent of the Proposed Development. | **Construction** |
| CL3 | 12.5.1.1 | Throughout (as required) | Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport. | **Construction** |
| CL4 | 12.5.1.1 | Throughout (as required) | The Proposed Development will minimise wastage of materials due to poor timing or over ordering on site thus helping to minimise the embodied carbon footprint of the Proposed Development. | **Construction** |

## 21.10 Archaeology, Architectural and Cultural Heritage

**Table 21.8: Archaeology, Architectural and Cultural Heritage mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| AACH1 | 13.5.1 | Throughout (as required) | Licenced archaeological monitoring of all ground works will be undertaken during construction. If features of archaeological significance are identified further mitigation will be required following consultation with the County Archaeologist and National Monuments Service. Such features will be fully resolved to professional standards of archaeological practice either by preservation *in situ* or preservation by record, as outlined in the Policy and Guidelines on Archaeological Excavation (Department of Arts, Heritage, Gaeltacht and the Islands, 1999). | **Construction** |

## 21.11 Population and Human Health

**Table 21.9: Population and Human Health mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| PHH1 | - | Throughout (as required) | It should be noted that Construction and Operational Phase mitigation measures relating to those factors under which population and human health impacts may occur have been addressed elsewhere in this EIAR, under the environmental factors for traffic and transportation, landscape and visual, noise and vibration, air quality, climate and water. Other than the mitigation measures outlined separately in this EIAR for these environmental factors, no further mitigation measures are proposed with respect to population and human health | **Construction / Operation** |

## 21.12 Resources and Waste

**Table 21.10: Resources and Waste mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| RW1 | 15.5.1 | Throughout (as required) | A Construction Resource and Waste Management Plan (CRWMP) has been prepared and this will be implemented (and updated as necessary) by the appointed contractor - refer to **Appendix 5.1** in **Volume 4** of this EIAR. | **Construction** |
| RW2 | 15.5.1 | Throughout (as required) | Where waste generation cannot be avoided, waste disposal will be minimized. | **Construction** |
| RW3 | 15.5.1 | Throughout (as required) | Opportunities for reuse of materials, by-products and wastes will be sought throughout the Construction Phase of the Proposed Development. | **Construction** |
| RW4 | 15.5.1 | Throughout (as required) | Possibilities for reuse of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| RW5 | 15.5.1 | Throughout (as required) | Where non-hazardous excavation material cannot be reused within the Proposed Development works, material will be sent for recycling or recovery, where practicable. | **Construction** |
| RW6 | 15.5.1 | Throughout (as required) | Excavations of made ground will be monitored by an appropriately qualified person to ensure that any hotspots of possible contamination are properly identified, with the contaminated material segregated and disposed of appropriately. Any potential contaminated material identified 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 that the hotspot does not cross contaminate clean soils elsewhere throughout the site. | **Construction** |
| RW7 | 15.5.1 | Throughout (as required) | If encountered, any potential asbestos during the Construction Phase will be managed using standard health and safety measures as outlined in 'Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement' (HSA, 2013). This document states that *"removal of asbestos from contaminated soil will require a specialist asbestos contractor for any friable asbestos to be removed"* and *"a risk assessment by an independent competent person should determine the most appropriate control measures and remediation strategies"* (HSA, 2013). | **Construction** |
| RW8 | 15.5.1 | Throughout (as required) | Only a suitably experienced contractor shall be used to carry out the excavation works. During construction, they shall employ standard practices to manage risk from contaminated soils. These will be determined by the contractor depending on their construction practices but are likely to include the use of gloves, dust masks and potentially disposable overalls. These and other appropriate measures will minimise the exposure of site workers and members of the public. | **Construction** |
| RW9 | 15.5.1 | Throughout (as required) | The site will be maintained to prevent litter and regular litter picking will take place throughout the site. | **Construction** |
| RW10 | 15.5.1 | Throughout (as required) | 'Just-in-time' delivery will be used, where practicable, to minimise material wastage. | **Construction** |
| RW11 | 15.5.1 | Throughout (as required) | Paints, sealants and hazardous chemicals will be stored in secure, bunded locations. | **Construction** |
| RW12 | 15.5.1 | Throughout (as required) | All staff on-site will be trained on how to minimise waste (i.e., training, induction, inspections and meetings). | **Construction** |
| RW13 | 15.5.1 | Throughout (as required) | Materials on-site will be correctly and securely stored. | **Construction** |
| RW14 | 15.5.1 | Throughout (as required) | Where possible, recyclable material will be segregated and removed off site to a permitted / licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation. | **Construction** |
| RW15 | 15.5.1 | Throughout (as required) | On-site municipal waste arising swill be source separated at least into dry mixed recyclables, biodegradable and residual wastes. | **Construction** |
| RW16 | 15.5.1 | Throughout (as required) | Waste bins, containers, skip containers and storage areas will be clearly labelled with waste types which they should contain, including photographs as appropriate. | **Construction** |
| RW17 | 15.5.1 | Throughout (as required) | Segregated skips will be used within a designated waste segregation area to be located in the on-site construction compound (particularly for hazardous, inert waste and general waste). | **Construction** |
| RW18 | 15.5.1 | Throughout (as required) | The appointed contractor will record the quantity in tonnes and types of waste and materials leaving the site during the Construction Phase. The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered, which is recycled and which is disposed of. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| RW19 | 15.5.1 | Throughout (as required) | Waste generated on-site will be removed as soon as practicable following generation for delivery to an authorised waste facility. | **Construction** |
| RW20 | 15.5.1 | Throughout (as required) | The appointed contractor will ensure that any off-site interim storage facilities for excavation material have the appropriate waste licences or waste facility permits in place. | **Construction** |
| RW21 | 15.5.1 | Throughout (as required) | Where Article 27 notifications are required in relation to the Proposed Development, the appointed contractor will complete and submit these Article 27 notifications to the EPA for by-product reuse. | **Construction** |
| RW22 | 15.5.1 | Throughout (as required) | The relevant appropriate waste authorisation will be in place for all facilities that wastes are delivered to (i.e., EPA Licence, Waste Facility Permit or Certificate of Registration). | **Construction** |
| RW23 | 15.5.2 | Throughout (as required) | All project related C&D waste generated from the maintenance works during the Operational Phase will be transferred from site by a waste collection permit holder and delivered to an authorised waste facility (i.e., a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence) for the specific waste types it receives. | **Operation** |
| RW24 | 15.5.3 | Throughout (as required) | All project related C&D waste generated during the Decommissioning Phase will be transferred from site by a waste collection permit holder and delivered to an authorised waste facility (i.e., a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence) for the specific waste types it receives. | **Decommissioning** |

## 21.13 Water

**Table 21.11: Water mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| WT1 | 16.5.1.1 | Throughout (as required) | Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding. | **Construction** |
| WT2 | 16.5.1.1 | Throughout (as required) | Run-off will be controlled to minimise the water effects in outfall areas. | **Construction** |
| WT3 | 16.5.1.1 | Throughout (as required) | All concrete mixing and batching activities will be in areas away from watercourses and drains. | **Construction** |
| WT4 | 16.5.1.1 | Throughout (as required) | Collection systems will be used to prevent any contaminated drainage entering surface water drains, watercourses or groundwater, or draining onto the land. | **Construction** |
| WT5 | 16.5.1.1 | Throughout (as required) | The use of cleaning chemicals will be minimized. | **Construction** |
| WT6 | 16.5.1.1 | Throughout (as required) | Good housekeeping (site clean-ups, use of disposal bins, etc.) will be implemented on the site. | **Construction** |
| WT7 | 16.5.1.1 | Throughout (as required) | Careful consideration will be given to the location of any fuel storage facilities. All vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site. | **Construction** |
| WT8 | 16.5.1.1 | Throughout (as required) | Where dewatering may be required, it will be overseen and approved by a qualified hydrogeologist and treated appropriately in a site water treatment facility before being discharged to the local drainage network. No outfall will be permitted into existing watercourses. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| WT9 | 16.5.1.1 | Throughout (as required) | Where practicable, soil excavation will be completed during dry periods. | **Construction** |
| WT10 | 16.5.1.1 | Throughout (as required) | No materials will be stored in floodplains or in areas which would impede flood flow paths (northern side of the Proposed Development site). | **Construction** |
| WT11 | 16.5.1.1 | Throughout (as required) | To prevent the accidental release of hazardous materials (fuels, cleaning agents, etc.), all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil / diesel storage tanks will be used on the site during the Construction Phase of the project. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the Proposed Development. | **Construction** |
| WT12 | 16.5.1.1 | Kilcoolishal Stream | • Works in the vicinity of the stream will be carried out in the summer months, when water levels and flows within the stream are minimal. In the eventually that the stream is not dry, construction works to the section of the Kilcoolishal stream crossing the construction boundary (approximately 28m) will be bunded on either side with earthen bunds and silt screens. Water would be over pumped in the flow direction. Environmental control measures will be implemented during construction in line with standard guidelines (i.e., 'The Control of Water Pollution from Construction Sites' (CIRAI, 2001) and "The Control of Water Pollution from Linear Construction Projects' (CIRIA, 2006)) for best practice measures for controlling water pollution. The Report for Screening for AA submitted as part of the planning application concluded that the proposed project, in the absence of mitigation, and either alone or in - combination with other plans and/or projects, does not have the potential to significantly affect any European Site, in light of their conservation objectives. The environmental control measures which will be implemented relate to the minimisation of localised potential impacts;<br>• Apart from the area of the Kilcoolishal Stream directly affected by the bridge construction (i.e., Irish Rail portal frame), a buffer strip of 10m will be implemented around the stream with no works taking place in this area. Where this is not possible, in particular for the construction of the Irish Rail portal frame, the streambed and stream banks of the Kilcoolishal Stream in this location will be reprofiled and reinstated following construction and the bunds and silt traps removed;<br>• No plant or tools will be washed in the stream, should it contain water; and<br>• Spill kits will be permanently on hand and kept close to the works areas. Staff will be trained in how to use the spill kits correctly. | **Construction** |
| WT13 | 16.5.2.1 | Throughout (as required) | Visual monitoring will be undertaken as part of the regular site audits during the construction of the Proposed Development to ensure existing surface water runoff is draining from the site and is not exposed to any contaminants. | **Construction** |
| WT14 | 16.5.2.1 | Throughout (as required) | The contractor will be required to ensure that the sanitary facilities for the site personnel are maintained as per the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) and that effluent storage is regularly emptied and disposed of appropriately. | **Construction** |
| WT15 | 16.5.2.1 | Throughout (as required) | The contractor will be required to ensure that the water supply to the site is maintained as per the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR) and that it is free of contaminants. | **Construction** |
| WT16 | 16.5.2.1 | Throughout (as required) | The contractor is required to monitor the weather forecasts to inform the programming of earthworks and stockpiling of materials so as to minimise the risk of flooding. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| WT17 | 16.5.1.2 | Throughout (as required) | The Proposed Development will incorporate appropriate surface water drainage features which will appropriately collect and discharge surface water, thereby reducing the risk of flooding from surface water. Surface water drainage from the main span of the bridge will be captured in drainage channels and discharged into the N25 or railway line drainage system, as appropriate. | **Operation** |
| WT18 | 16.5.1.3 | Throughout (as required) | Should decommissioning activities occur, the proposed works will be undertaken in a safe and manner by minimising interaction with the nearby watercourse. As such, mitigation measures will be limited to ensuring no temporary works are placed in nearby watercourses during the Decommissioning Phase. No materials will be deposited in nearby watercourses during the Decommissioning Phase. | **Decommissioning** |

## 21.14 Land, Soils, Geology and Hydrogeology

**Table 21.12: Land, Soils Geology and Hydrogeology mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| LSGH1 | 17.8.1.1 | Throughout (as required) | **Earthworks management**<br><br>Excavated topsoil will be stockpiled using appropriate methods to minimise the effects of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff. Any surplus suitable material excavated that is not required elsewhere for the Proposed Development, will be reused for other projects where possible, subject to appropriate approvals / notifications or removed off site to a suitable licensed facility | **Construction** |
| LSGH2 | 17.8.1.1 | Throughout (as required) | **Earthworks management**<br><br>In order to reduce the compaction and erosion of topsoil outside the areas of direct construction, haul routes will be along predetermined routes within the Proposed Development and deliveries will be along predetermined routes outside the Proposed Development. 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. Where practical, compaction of any soil or subsoil which is not part of the works or to remain *in situ* within the Proposed Development will be avoided. | **Construction** |
| LSGH3 | 17.8.1.1 | Throughout (as required) | **Earthworks management**<br><br>The contractor will ensure that any topsoil or subsoil is assessed for re-use within the Proposed Development, ensuring the appropriate handling, processing and segregation of the material. Where practical the removal of soil from the Proposed Development will be avoided. All earthworks will be undertaken in accordance with TII Specification for Road Works (SPW) Series 600 Earthworks (TII, 2013) and project specific earthworks specifications ensuring that all excavated material and imported material is classified using the same methodology so as to allow maximum opportunity for the reuse of materials on site. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| LSGH4 | 17.8.1.1 | Throughout (as required) | **<u>Contaminated land management</u>**<br><br>Excavations in made ground will be monitored by an appropriately qualified person to ensure that any potential hotspots of encountered contamination are properly identified, segregated and disposed of appropriately. Any identified hotspots 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 that the hotspot does not cross contaminate clean soils elsewhere throughout the site. | **Construction** |
| LSGH5 | 17.8.1.2 | Throughout (as required) | **<u>Contaminated land management</u>**<br><br>In areas with the potential to encounter asbestos containing materials the following measures will apply:<br><br>• During construction, the potential risk to site users and member of the public from contaminated dust will be managed using standard health and safety measures as outlined in the Health and Safety Authority (HSA) guidance document, Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement (HSA, 2013). This document states that *"Removal of asbestos from contaminated soil will require a specialist asbestos contractor for any friable asbestos to be removed"* and *"A risk assessment by an independent competent person should determine the most appropriate control measures and remediation strategies."*;<br><br>• Control measures for the Construction Phase will be devised based on a risk assessment carried out by the contractor prior to the commencement of the construction works and will be specific to the construction methods. Such methods could include the prompt removal of excavated soils to avoid stockpiling on site of material or dampening down of soil to prevent dust generation. In the rare instances where stockpiles are required, they will not be allowed in the areas which are identified as public interfaces; and<br><br>• Only suitably experienced contractors shall be used to carry out the excavation work. During construction, they shall employ standard practices to manage risk from contaminated soils. These will be designed by the contractor dependent on his construction practices and are likely to include the use of gloves, dust masks and potentially disposable overalls. These and other appropriate measures will minimise the exposure of the site workers and member of the public. | **Construction** |
| LSGH6 | 17.8.1.2 | Throughout (as required) | **<u>Contaminated land management</u>**<br><br>If a potential soil and water pollution are identified, this will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel wash and dust suppression on site roads, and regular plant maintenance. | **Construction** |
| LSGH7 | 17.8.1.2 | Throughout (as required) | **<u>Contaminated land management</u>**<br><br>Any dewatering in areas of contaminated ground will be designed to minimise the mobilisation of contaminants into the surrounding environment. Where dewatering in such areas is unavoidable, the water will be adequately treated prior to discharge. Good construction management practices will be employed to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| LSGH8 | 17.8.1.3 | Throughout (as required) | **<u>Spills from temporary storage of hazardous substances</u>**<br><br>Measures to be implemented to minimise the risk of spills and contamination of soils and waters include:<br><br>• Employing only a competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;<br>• Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access;<br>• The location of any fuel storage facilities shall be considered in the design of the construction compounds and bridge assembly area. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded;<br>• Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire Construction Phase;<br>• All concrete mixing and batching activities will be located in areas away from watercourses and drains;<br>• Potential pollutants to be adequately secured against vandalism;<br>• Provision of proper containment of potential pollutants according to codes of best practice.<br>• Thorough control during the entire Construction Phase to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and<br>• Spill kit to be provided and to be kept close to the storage area. Staff to be trained on how to use spill kits correctly. | **Construction** |
| LSGH9 | 17.8.1.3 | Throughout (as required) | **<u>Spills from temporary storage of hazardous substances</u>**<br><br>An Emergency Incident Response Plan will be implemented by the appointed contractor, which will identify the actions to be taken in the event of a pollution incident. It will address such aspects as containment measures, emergency discharge routes, a list of appropriate equipment and clean-up materials and notification procedures to inform the relevant environmental protection authority. Refer to the CEMP included as **Appendix 5.1** in **Volume 4** of this EIAR. | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| LSGH10 | 17.8.1.3 | Throughout (as required) | **Spills from temporary storage of hazardous substances**<br><br>Sediment control methods will be outlined in the Surface Water Management Plan to be prepared by the contractor and included in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), and these will be implemented by the appointed contractor. | **Construction** |
| LSGH11 | 17.8.1.4 | Throughout (as required) | **Management of concrete during piling**<br><br>During the Construction Phase, concrete levels and volumes used will be monitored and compared against theoretical estimates to understand potential losses. | **Construction** |
| LSGH12 | 17.8.1.4 | Throughout (as required) | **Management of concrete during piling**<br><br>Before and during piling, it is proposed to monitor groundwater pH at the available groundwater monitoring points (trial wells and boreholes with standpipe installations). This will highlight any potential impacts on groundwater and surface water quality during piling. Where a change from baseline pH is identified, appropriate measures can then be adopted which may include an alternative grout / cement mix to limit migration or the use of temporary casing. The groundwater monitoring will utilise monitoring locations installed during the project specific ground investigation that are located outside the footprint of the Proposed Development. These monitoring locations will be maintained during the Construction Phase of the Proposed Development. | **Construction** |
| LSGH13 | 17.8.1.4 | Throughout (as required) | **Management of concrete during piling**<br><br>Where ground bearing foundations are being constructed, the formation will be inspected for potential features that may result in concrete losses. Appropriate earthwork details, developed during detailed design phases, will be applied to limit losses. | **Construction** |
| LSGH14 | 17.8.1.5 | Throughout (as required) | **Monitoring**<br><br>Soil, groundwater and surface water verification testing shall be carried out by the contractor during the Construction Phase to confirm the findings of the risk assessment | **Construction** |

## 21.15 Material Assets

**Table 21.13: Material Assets mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| MA1 | 18.5.1.1 | Throughout (as required) | The contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and that all services and utilities are maintained, unless this has been agreed in advance with the relevant service provider and local authority. Where connections are required, the | **Construction** |

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| | | | contractor will apply to the relevant utility company for a connection permit and adhere to their requirements. | |
| MA2 | 18.5.1.1 | Throughout (as required) | All works near existing services and utilities will be carried out with ongoing consultation with the relevant utility company or local authority and will follow any requirements or guidelines they may have. | **Construction** |
| MA3 | 18.5.1.1 | Throughout (as required) | Surface water management measures, as detailed in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR), will be implemented at all working areas. These measures will prevent any silt-laden run-off, including that from temporary stockpiles, entering nearby watercourses. Silt traps and interceptor ditches will be constructed in advance of main earthworks to collect, treat and discharge all surface water run off during construction. Collection systems will be used to prevent any contaminants from entering surface water drains, watercourses or groundwater, or draining onto the land. | **Construction** |

## 21.16 Major Accidents and Natural Disasters

**Table 21.14: Major Accidents and Natural Disasters mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| n/a | n/a | n/a | No additional mitigation or monitoring measures are considered necessary beyond those already identified in other environmental assessments and in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR). | **n/a** |

## 21.17 Cumulative and Interactive Impacts

**Table 21.15: Cumulative and Interactive Impacts mitigation and monitoring measures**

| Mitigation / monitoring number | EIAR section reference | Location | Description of mitigation and / or monitoring measure / environmental commitment | Implementation stage |
|---|---|---|---|---|
| n/a | n/a | n/a | No additional mitigation or monitoring measures are considered necessary beyond those already identified in other environmental assessments and in the CEMP (refer to **Appendix 5.1** in **Volume 4** of this EIAR). | **n/a** |

## 21.18 References

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

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N25 Little Island Pedestrian and Cyclist Bridge
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# Chapter 22

# Summary of Residual Impacts

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# 22. Summary of Residual Impacts

## 22.1 Introduction

This chapter summarises the potential residual impacts which may result from the Construction, Operational and Decommissioning Phases of the N25 Little Island Pedestrian and Cyclist Bridge (hereafter referred to as the Proposed Development). Please refer to **Chapter 7** to **Chapter 20** of this EIAR for the full impact assessments.

Residual impacts are the final or intended impacts which occur after the proposed mitigation measures have been implemented. They refer to the degree of change that will occur after the proposed mitigation measures have taken effect.

The terminology used in this chapter to describe the residual impact significance reflects the assessment terminology and guidelines used within **Chapter 7** to **Chapter 20** of the EIAR. The terminology used is as per the Environmental Protection Agency's (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022).

## 22.2 Residual Impacts

### 22.2.1 Traffic and Transportation

#### *22.2.1.1 Construction Phase*

Following the adoption of the mitigation measures for the Construction Phase, the additional traffic associated with the construction of the Proposed Development is anticipated to have a short-term, negative and not significant impact on the public road network and its users for the duration of the construction works.

#### *22.2.1.2 Operational Phase*

No significant negative residual impacts on traffic and transportation are envisaged during the Operational Phase. The overall impact of the Proposed Development during the Operational Phase is assessed as permanent, positive and significant.

#### *22.2.1.3 Decommissioning*

Following the adoption of the mitigation measures for the Decommissioning Phase, the additional traffic associated with the decommissioning of the Proposed Development is anticipated to have a temporary, negative and not significant impact on the public road network and its users for the duration of the decommissioning works.

### 22.2.2 Landscape and Visual

The Proposed Development requires the removal of 103 no. individual trees, 5 no. part-groups (i.e., sections of a tree group) and 13 no. tree groups along the route of the proposed bridge and access ramps, primarily within the woodland situated between the N25 and the Radisson Blu Hotel. The estimated total number of trees to be removed on site is 277. This will result in significant, negative and short to medium-term residual landscape and visual effects at construction, which will recede to moderate, neutral and long-term residual effects as the new landscape planting establishes and matures.

Once complete and operational, the Proposed Development will have an overall moderate, positive and permanent residual effect on the site and its context. Direct benefits will arise from the improved accessibility and connectivity for people to take active forms of travel and public transport, along with the local enhancement of public green space.

There will also be wider indirect benefits to people arising from the Proposed Development through its support of modal shift to sustainable forms of travel, thereby reducing vehicle movements to / from Little Island and the improvement in the local environment for people that flows from this.

### 22.2.3 Biodiversity

#### *22.2.3.1 Designated sites*

Potential impacts on designated Natura 2000 sites (SAC / cSAC / SPA) are specifically addressed in the Report for Screening for Appropriate Assessment (AA) This report concluded the following:

*"The Proposed N25 Pedestrian and Cycle Bridge, Little Island, Cork, either alone or in-combination with other plans and / or projects, does not have the potential to significantly affect any European Site, in light of their conservation objectives.*

*Therefore, a Stage 2 Appropriate Assessment is deemed not to be required."*

Similarly, no significant effects on NHAs / pNHAs will occur.

#### *22.2.3.2 Habitats*

The removal of areas of mature and semi-mature trees within the mixed-broadleaved woodland and treeline habitats at the Proposed Development site will have a negative, moderate and short to medium-term impact at a local level. Some areas of the site will be replanted with native species and as these trees mature, they will provide high value habitat. Wet willow woodland habitat on the north of the site will be largely avoided by construction works and retained. Temporary impacts will occur within the Kilcoolishal Stream and drainage ditches. However, these areas will be reinstated following construction works.

The removal of low value habitats such as low value hedgerow, amenity grassland and small areas of dry meadows and grassy verge will have a negative, not significant and short-term impact. However, these lower value habitats will be largely replaced by landscape planting as outlined in the landscape masterplan, included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR.

The residual effects from habitat loss are predicted to be negative, moderate and short to medium-term at a local level.

#### *22.2.3.3 Invasive species*

No residual impacts have been identified.

#### *22.2.3.4 Otter*

The Proposed Development site is of low value for Otter. Given the limited Otter use of this area and the lack of direct impacts on aquatic habitats, following water quality mitigation the impacts during construction are predicted to be negative, imperceptible and short-term.

Otters are generally nocturnal in habit and in many circumstances can tolerate high levels of human presence and disturbance. Otters which use this area are also habituated to comparable levels of disturbance and no significant disturbance impacts are predicted to occur during operation of the Proposed Development.

No significant residual impacts on Otters have been identified.

#### *22.2.3.5 Bats*

Overall, the loss of semi-natural woodland habitats, particularly on the southern boundary of the N25, will reduce the foraging / commuting habitats available for bats. While replanting in this area with native woodland will partially replace the habitat which has been removed, light spillage will continue to impact on this woodland area in the long-term. This is likely to reduce the value of this woodland habitat for foraging bats. Light trespass onto the retained woodland habitats could potentially prevent Brown Long-eared Bat from foraging in this area during operation. Common bat species, which are more tolerant of light spillage i.e., Common and Soprano Pipistrelle and Leisler's Bat are likely to continue to forage with retained and newly planted habitats.

Newly planted areas along the northern side of the N25 will provide new foraging areas for bats within the Proposed Development site as these habitats mature. However, given the levels of disturbance, lighting and the smaller numbers of bats foraging to the north of the N25, this is likely to provide low value foraging habitat for bats. The provision of bat boxes will provide potential roosting sites for bats within the Proposed Development site.

The residual impacts on bats will be negative, slight to moderate and long term.

#### *22.2.3.6 Other mammals*

The habitats to be affected are common and there is no evidence to indicate that the Proposed Development areas are of particular value for these species in the context of the surrounding countryside. During the Construction Phase, disturbance and site clearance works are predicted to have a negative, slight and short-term impact on other mammal species.

Mammals are generally nocturnal in habit and in many circumstances can tolerate high levels of human presence and disturbance. Mammals which use this area are also habituated to comparable levels of disturbance and no significant disturbance impacts are predicted to occur during operation of the Proposed Development.

Newly landscaped areas within the Proposed Development site will provide alternative foraging and areas of cover for small mammals as the planting matures. Log piles will provide refuges for small mammals in newly landscape areas.

The residual impact on small mammals is predicted to be negative, not significant and long-term.

#### *22.2.3.7 Breeding birds*

In the short to medium term, the loss of common habitats associated with site clearance works and disturbance will have a slight, negative impact on breeding birds. However, as newly planted and enhanced habitats within the Proposed Development site mature, this impact will be reduced. Bird boxes will also provide nesting habitat for a range of common bird species.

The residual impact on birds is predicted to be negative, not significant and long-term at a local level.

#### *22.2.3.8 Wintering birds*

No significant residual impacts on wintering birds have been identified.

#### *22.2.3.9 Reptiles and amphibians*

Although unlikely, given the overgrown nature of the site and low biodiversity value of watercourse / drainage ditches, short-term disturbance of the drainage ditches and Kilcoolishal Stream at the site could potentially have a temporary, negative impact on amphibian species. As a precaution, mitigation measures have been specified to prevent direct impacts on amphibians.

Residual effects on amphibians are predicted to be neutral, imperceptible and long-term.

No residual effects on reptiles have been identified.

#### *22.2.3.10 Other species*

The Kilcoolishal Stream provides limited potential for fish, due to significant culverting and sluggish flows. Mitigation measures will ensure that the stream and drainage ditches at the site are reprofiled following construction. There will be no significant residual effects on this watercourse as a result of the Proposed Development.

Construction mitigation measures and operational design measures will ensure that the residual effects on fish and aquatic invertebrate species in downstream receptors is neutral, imperceptible and long-term at a local level.

The loss of semi-nature habitats at the site will reduce habitats for terrestrial invertebrates in the short-term. However, the landscape plan, included as Drawing No. LIPB-BSM-ZZ-XX-DR-L-0001 in **Volume 3** of this EIAR, which includes use of native trees and pollinator species, will provide new and enhanced habitats for invertebrate species.

The residual effect on terrestrial invertebrates is predicted to be neutral, imperceptible and long-term.

### 22.2.4 Noise and Vibration

#### *22.2.4.1 Construction Phase*

A summary of the residual impacts of construction noise for the worst-case construction stage (i.e., site clearance and preparation) considered is presented in **Table 22.1**.

It is assumed that an acoustic barrier will be installed as mitigation for all working areas which will reduce noise levels by approximately 10dB.

**Table 22.1: Summary of residual noise impacts from construction noise**

| Noise sensitive receptor | Existing noise level (dB) | Predicted noise level (pre-mitigation), $L_{Aeq}$ [dB] | Potential impact (pre-mitigation) | Predicted noise level (post mitigation), $L_{Aeq}$ [dB] | Predicted impact (post mitigation) |
|---|---|---|---|---|---|
| Radisson Blu Hotel (at 50m) | 65 | 72 | Moderate to major, negative impact. Short-term. | 62 | Neutral to slight impact. Short-term. |
| Residential properties to the north of the Proposed Development (at 80m) | 62 | 68 | Moderate to major, negative impact. Short-term. | 58 | Neutral to slight impact. Short-term. |
| Residential properties to the north and northwest of the Proposed Development (at 300m) | 55 | 56 | Neutral to slight, negative impact. Short-term. | 46 | Neutral to slight impact. Short-term. |

A neutral to slight, short-term residual impact is predicted at the Radisson Blu Hotel, the residential properties to the north of the Proposed Development and the residential properties to the northwest of the Proposed Development, once mitigation measures have been implemented.

Predicted noise levels in this report are worst case, with all construction plant operating simultaneously during the worst-case stage – i.e., site clearance and preparation. It is unlikely that the predicted noise level will occur over the full construction period.

**Table 22.2** outlines the residual impacts for the worst-case scenario if night time piling is required and if rotary bored piling is used as the chosen piling method.

**Table 22.2: Summary of residual noise impacts from night time piling works**

| Assessment topic / receptor | Existing noise level (dB) | Predicted noise level (pre-mitigation), $L_{Aeq}$ [dB] | Potential impact (pre-mitigation) | Predicted noise level (post mitigation), $L_{Aeq}$ [dB] | Predicted impact (post mitigation) |
|---|---|---|---|---|---|
| 50m | 55 | 70 | Significant negative impact. Temporary. | 60 | Slight to moderate impact. Temporary. |
| 100m | 50 | 64 | Significant negative impact. Temporary. | 54 | Slight to moderate impact. Temporary. |
| 200m | 50 | 58 | Moderate to major negative impact. Temporary. | 48 | Neutral to slight impact. Temporary. |
| 300m | 45 | 54 | Moderate to major negative impact. Temporary. | 44 | Neutral to slight impact. Temporary. |

A negative, slight to moderate, short-term residual impact is predicted at noise sensitive receptors located less than 100m from the Proposed Development, while a neutral to slight negative, short-term residual impact is predicted at noise sensitive receptors located 200m or greater from the Proposed Development, once mitigation measures have been implemented.

##### *22.2.4.2 Operational Phase*

The Operational Phase of the Proposed Development has the potential to generate a positive residual impact on noise and vibration due to a modal shift from private car to more sustainable modes, resulting in a possible decrease in traffic noise and vibration. No negative residual Operational Phase impacts are likely to occur.

##### *22.2.4.3 Decommissioning Phase*

No significant negative residual noise and vibration impacts are expected as a result of the decommissioning of the Proposed Development.

#### 22.2.5 Air Quality

##### *22.2.5.1 Construction Phase*

With the implementation of mitigation measures, no significant negative residual effects on air quality are envisaged during the Construction Phase.

##### *22.2.5.2 Operational Phase*

There are no significant negative residual air quality effects expected as a result of the operation of the Proposed Development.

##### *22.2.5.3 Decommissioning Phase*

There are no significant negative residual air quality effects expected as a result of the decommissioning of the Proposed Development.

#### 22.2.6 Climate

Any potential negative impacts generated during the Construction Phase of the development will be offset by the potential carbon reductions during the Operational Phase. Over the lifespan of the Proposed Development, a beneficial and long-term impact on climate is expected as the Proposed Development will result in a modal shift to walking, cycling and public transport.

There are no significant negative residual effects associated with climate change vulnerability predicted for the Proposed Development.

#### 22.2.7 Archaeology, Architectural and Cultural Heritage

Following the implementation of mitigation measures, no significant negative residual archaeological, architectural or cultural heritage effects are predicted.

#### 22.2.8 Population and Human Health

##### *22.2.8.1 Construction Phase*

There are no significant negative residual impacts on population and human health expected as a result of the construction of the Proposed Development.

A slight, positive, temporary impact on the population of County Cork, particularly those in the Caherlag electoral division, will arise through employment generation during the Construction Phase.

##### *22.2.8.2 Operational Phase*

There are no significant negative residual impacts on population and human health expected as a result of the operation of the Proposed Development.

A moderate, positive, long-term impact on the population of County Cork, particularly those in Caherlag electoral division, will arise as a result of the Proposed Development promoting a modal shift to walking, cycling and public transport.

#### *22.2.8.3 Decommissioning Phase*

There are no significant negative residual impacts on population and human health expected as a result of the decommissioning of the Proposed Development.

### 22.2.9 Resources and Waste

#### *22.2.9.1 Construction Phase*

The Construction Phase of the Proposed Development is not predicted to give rise to any significant residual impacts with the adoption of the waste management principles and with the implementation of the identified mitigation measures. A summary of the predicted residual impacts during the Construction Phase, following the implementation of the appropriate mitigation measures, is set out in **Table 22.3**.

**Table 22.3: Summary of residual resources and waste impacts during the Construction Phase**

| Assessment topic | Residual impact |
|---|---|
| Site clearance waste | Negative, not significant and short-term |
| Excavation waste | Negative, not significant and short-term |
| Imported material | Negative, slight and long-term |
| Construction waste | Negative, not significant and short-term |
| Municipal waste | Negative, imperceptible and short-term |

#### *22.2.9.2 Operational Phase*

The Operational Phase of the Proposed Development is not predicted to give rise to any significant residual impacts with the adoption of the waste management principles and with the implementation of the identified mitigation measures. The predicted residual impact during the Operational Phase will be negative, not significant and long-term.

#### *22.2.9.3 Decommissioning Phase*

The Decommissioning Phase of the Proposed Development is not predicted to give rise to any significant residual impacts with the adoption of the waste management principles and with the implementation of the identified mitigation measures. The predicted residual impact during the Decommissioning Phase will be negative, not significant and short-term.

### 22.2.10 Water

#### *22.2.10.1 Construction Phase*

Following the implementation of mitigation measures, there will be no significant residual impacts on water quality, the hydrological regime and onsite drainage infrastructure, including both surface water and foul drainage, during construction.

#### *22.2.10.2 Operational Phase*

The Proposed Development is predicted to have an overall imperceptible, long-term residual impact on water quality, the hydrological regime and onsite drainage infrastructure, including both surface water and foul drainage, within the study area during operation.

A small section of the approach ramp on the northern side of the bridge will be at risk of flooding during the Operational Phase. However, the flood extent is small and the volume of flood displaced will also be small.

Furthermore, a development management Justification Test has been completed which concluded that the Proposed Development would be appropriate at the proposed location and would not interfere with the floodplain area. Therefore, there will be no significant residual impact on flood risk caused by the operation of the Proposed Development.

#### *22.2.10.3 Decommissioning Phase*

It is not anticipated that there will be any significant residual impacts arising from the Decommissioning Phase of the Proposed Development.

### 22.2.11 Land, Soils, Geology and Hydrogeology

#### *22.2.11.1 Construction Phase*

With the effective implementation of mitigation measures, there will be no significant residual impacts on land, soils, geology or hydrogeology as a result of the construction of the Proposed Development. Refer to **Table 22.4**.

#### *22.2.11.2 Operational Phase*

It is expected that there will be no significant residual impacts on land, soils, geology and hydrogeology as a result of the operation of the Proposed Development. Refer to **Table 22.5**.

#### *22.2.11.3 Decommissioning Phase*

It is not anticipated there will be any significant residual impacts on land, soils, geology and hydrogeology arising from the Decommissioning Phase of the Proposed Development.

**Table 22.4: Summary of residual land, soils, geology and hydrogeology impacts during the Construction Phase**

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| **Loss or damage of topsoil** | | | | | | | | | |
| Topsoil | AlluvMIN | Northwest boundary of the Proposed Development site | Medium | Loss or damage of topsoil | Negative | Permanent | Local | Negligible | Imperceptible |
| | AminDW | Northern boundary and southern section of the Proposed Development site | High | Loss or damage of topsoil | Negative | Permanent | Local | Negligible | Imperceptible |
| | BminSW | Central section of the Proposed Development site | Medium | Loss or damage of topsoil | Negative | Permanent | Local | Negligible | Imperceptible |
| **Loss of solid geology** | | | | | | | | | |
| Bedrock | Cuskinny Member (KNcu) | North and west of the Proposed Development | Low | Loss of solid geology | Negative | Permanent | Local | Negligible | Imperceptible |
| | Gyleen (GY) | South of the Proposed Development. | Low | Loss of solid geology | Negative | Permanent | Local | Negligible | Imperceptible |
| **Earthworks haulage** | | | | | | | | | |
| Topsoil | Made Ground | Site construction areas | Low | Loss or damage of topsoil | Negative | Temporary | Local | Negligible | Imperceptible |
| | AminDW | Site construction areas | High | Loss or damage of topsoil | Negative | Temporary | Local | Negligible | Imperceptible |
| | AlluvMIN | Site construction areas | Medium | Loss or damage of topsoil | Negative | Temporary | Local | Negligible | Imperceptible |
| **Impact on the surrounding ground** | | | | | | | | | |
| Topsoil | Made Ground | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| | AminDW | Site construction areas | High | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| | AlluvMIN | Site construction areas | Medium | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| Subsoil | A | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| | GDSs | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| | TDSs | Site construction areas | Low | Soil movement or settlement | Negative | Temporary | Local | Negligible | Imperceptible |
| **Excavation of potentially contaminated land** | | | | | | | | | |
| Contaminated Ground | Made Ground | Throughout the Proposed Development | Medium | Soil contamination | Negative | Permanent | Local | Small adverse | Slight |
| **Mobilisation of contamination into aquifers** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Permanent | Local | Small adverse | Slight |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Permanent | Local | Small adverse | Slight |
| **Mobilisation of contamination into environmentally sensitive sites** | | | | | | | | | |
| Environmentally sensitive sites | Cork Harbour SPA | Less than 1km to the east of the Proposed Development | Extremely High | Contamination of the site | Negative | Permanent | Local | Negligible | Imperceptible |
| | Great Island Channel SAC and pNHA | Less than 1km to the east of the Proposed Development (SAC) and less than 500m to the east of the Proposed Development (pNHA) | Extremely High | Contamination of the site | Negative | Permanent | Local | Negligible | Imperceptible |

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| | Dunkettle Shore pNHA | Between 1-2km west of the Proposed Development. | Very High | Contamination of the site | Negative | Permanent | Local | Negligible | Imperceptible |
| **Dewatering** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |

**Table 22.5: Summary of residual land, soils, geology and hydrogeology impacts during the Operational Phase**

| Feature | Description | Location | Importance | Impact | Quality | Duration | Scale | Magnitude | Post mitigation residual significance |
|---|---|---|---|---|---|---|---|---|---|
| **Mobilisation of contamination into aquifers** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Permanent | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Permanent | Local | Negligible | Imperceptible |
| **Mobilisation of contamination into environmentally sensitive sites** | | | | | | | | | |
| Environmentally sensitive sites | Cork Harbour SPA | Less than 1km to the east of the Proposed Development | Extremely High | Contamination of the site | Negative | Permanent | Local | Negligible | Imperceptible |
| | Great Island Channel SAC and pNHA | Less than 1km to the east of the Proposed Development (SAC) and less than 500m to the east of the Proposed Development (pNHA) | Extremely High | Contamination of the site | Negative | Permanent | Local | Negligible | Imperceptible |
| | Dunkettle Shore pNHA | Between 1-2km west of the Proposed Development. | Extremely High | Contamination of the site | Negative | Permanent | Local | Negligible | Imperceptible |
| **Loss of recharge to aquifer** | | | | | | | | | |
| Aquifer | Locally Important Gravel Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |
| | Bedrock – Locally Important Aquifer | Throughout | Medium | Contamination of the aquifer | Negative | Temporary | Local | Negligible | Imperceptible |

### 22.2.12 Material Assets

No significant negative residual impacts on material assets are predicted as a result of the Proposed Development.

### 22.2.13 Risk of Major Accidents and / or Disasters

No plausible major accidents and / or disasters were identified, to which the Proposed Development will be particularly vulnerable during the Construction, Operational or Decommissioning Phase.

No plausible potential risks were identified which would result in the Proposed Development causing a major accident and / or disaster on or outside the site during the Construction, Operational or Decommissioning Phase.

### 22.2.14 Cumulative and Interactive Impacts

No significant negative residual cumulative or interactive impacts are predicted as a result of the Proposed Development.

## 22.3 References


Chartered Institute of Ecology and Environmental Management (CIEEM) (2016). Guidelines on Ecological Impact Assessment in the UK and Ireland, 2nd edition.

CIEEM (2019). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1.

Environmental Protection Agency (EPA) (2022). Guidelines of the Information to be contained in Environmental Impact Assessment Reports.

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