



Enviroguide
CONSULTING

Volume 2

Environmental Impact Assessment Report

FOR

STRATEGIC HOUSING DEVELOPMENT

AT


KILMONEY ROAD, CARRIGALINE, CO. CORK


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ON BEHALF OF

Reside Investments Limited

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Appendix I Engineering Services Report

1 INTRODUCTION AND METHODOLOGY

1.2 Introduction

This Environmental Impact Assessment Report (EIAR) has been commissioned by the Applicant, Reside Investments Limited, in respect of a Proposed Development at a Site located at Kilmoney Road, Carrigaline, Co. Cork for a Strategic Housing Development.

This EIAR has been compiled in accordance with all current legislation and best practice guidance. This Chapter describes the methodology by which the Environmental Impact Assessment (EIA) was carried out and the EIAR was completed. The methodology used is broadly consistent across all Chapters in order to ensure the EIAR is clear and easy to navigate.

1.2.1 Quality Assurance and Competence

Synergy Environmental Ltd., T/A Enviroguide Consulting, is a wholly Irish Owned multi-disciplinary consultancy specialising in the areas of the Environment, Waste Management and Planning. All of our consultants carry scientific or engineering qualifications and have a wealth of experience working within the Environmental Consultancy sectors, having undergone extensive training and continued professional development.

Enviroguide Consulting as a company remains fully briefed in European and Irish environmental policy and legislation. Professional memberships include the Institute of Geologists of Ireland (IGI), Chartered Institution of Wastes Management (CIWM), the Irish Environmental Law Association and Chartered Institute of Ecology and Environmental Management (CIEEM).

This Chapter was prepared by Louise Hewitt, Environmental Consultant, Enviroguide Consulting. Louise has a Master of Science (Hons) in Environmental Resource Management from University College Dublin and a Bachelor of Science (Hons) in Biology from Maynooth University. Louise has experience preparing Environmental Impact Assessment (EIA) Screening Reports, Introduction and Archaeology and Cultural Heritage Chapters of EIARs.

1.2.2 Description of the Proposed Development

The Proposed Development (as detailed in Chapter 2) comprises of:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units
- A 184 m² creche/childcare facility
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about area, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas

- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level, and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

1.3 Definition of EIA and EIAR

EIA is a systematic examination of the potential impacts of a Proposed Development on the environment. In assessing the environmental impacts this EIAR will evaluate the existing situation and assess any potential impacts of the Proposed Development. Where potential impacts are identified, proposed mitigation measures will be identified. In addition, the in-combination effects of any other known plans or projects will be identified and assessed.

Under Schedule 5 of the Planning and Development Regulations 2001, as amended (the Planning Regulations), an EIAR (formerly an EIS) is required to accompany certain planning applications for specified projects as part of the EIA process.

The EIAR describes the outcomes of the iterative EIA process which was progressed in parallel with the project design process. In doing so, it forms the first part of the EIA process that will be completed by An Bord Pleanála, as the competent authority, which in turn will be required to examine, analyse, and evaluate the direct and indirect effects of the development on the various factors listed in Directive 2011/92/EU, as amended by 2014/52/EU (the EIA Directive).

"The EIAR should be prepared at a stage in the design process where changes can still be made to avoid adverse effects. This often results in the modification of the project to avoid or reduce effects through redesign" (EPA, 2017)

Where significant and likely environmental effects are identified that are unacceptable, the EIA process aims to quantify and minimise the effects of the impact that the specified development has on the environment through appropriate mitigation measures and where necessary, subsequent monitoring.

This process is illustrated in Figure 1-1.

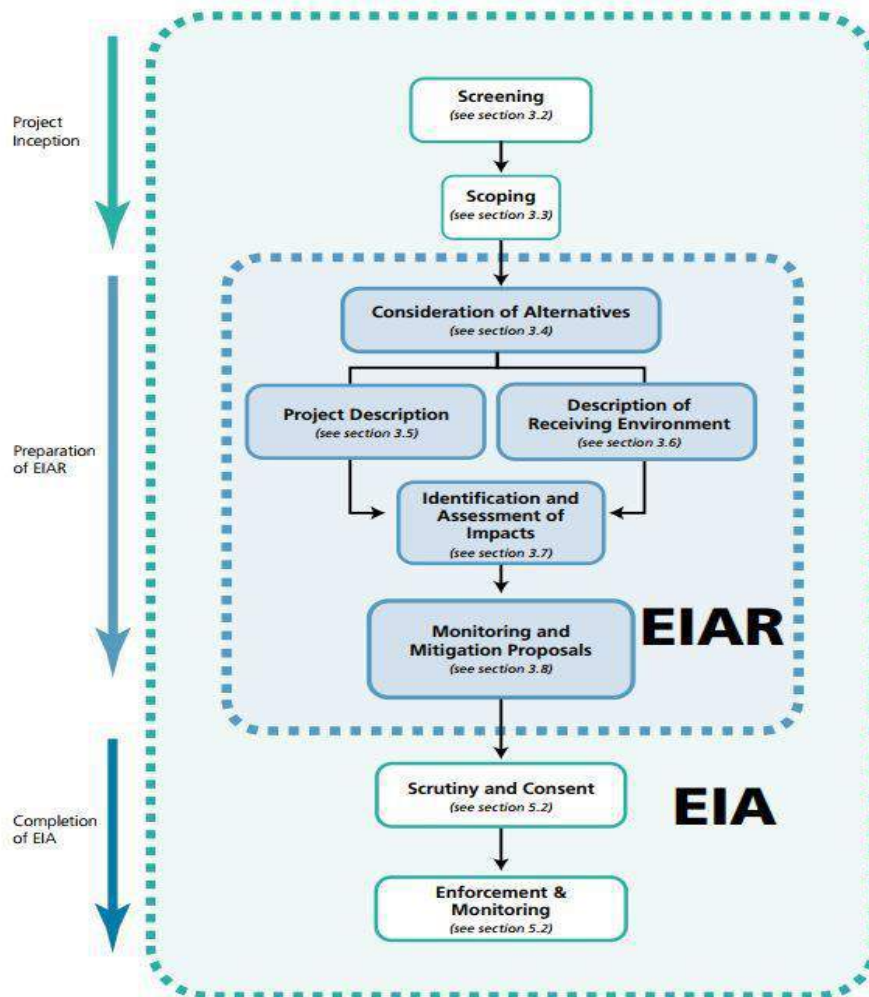


Figure 1-1: EIA Process

The purpose of the EIAR is to provide the Planning Authority with information on the likely and significant effects on the environment by the Proposed Development. This EIAR was prepared in parallel with the project design process and reflects the potential cumulative impact of other developments.

1.4 EIA Legislation

The EIA Directive requires EIA to be carried out for certain projects as listed in Annex I of the Directive. The EIA Directive is transposed into Irish law through the Planning and Development Act 2000 (as amended) (the **Planning Act**) and the Planning Regulations.

1.5 EIA Guidelines

This EIAR has been prepared in accordance with all relevant guidance. The documents listed below are common to all Chapters. Additional specific guidelines will be referred to in each specific Chapter.

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2002);

- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA 2003);
- Draft Advice Notes for Preparing Environmental Impact Statements (EPA draft September 2015a);
- Draft Revised Guidelines on the Information to be Contained in Environmental Impact Statements (EPA draft September 2015b);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA May 2022);
- Environmental Assessments of Plans, Programmes and Projects – Rulings of the Court of Justice of the European Union (European Union 2017);
- Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (European Union 2017);
- Guidance of Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Union 2013);
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Union 2017);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government 2013);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Government of Ireland 2018);
- 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 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 and Local Government 2018);
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Communities 1999); and
- Implementation of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (European Communities 2003).
- Office of the Planning Regulator (OPR) Environmental Impact Assessment Screening Practice Note (2021).

The EIA Directive defines EIA as a process. Article 1(2)(g) states that EIA means:

“(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, taking into account 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”.

The EIA Directive requires the EIAR to identify, describe and assess, in an appropriate manner and in light of each individual case, the direct, indirect and cumulative significant effects of the Proposed Development on factors of the environment including:

- 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 (respectively, the Habitats Directive and the Birds Directive)
- C) Land, soil, water, air, and climate
- D) Material assets, cultural heritage, and the landscape
- The interaction between the factors referred to in points (a) to (d)

1.6 Screening for EIA

'Screening' is the term used to describe the process for determining whether a Proposed Development requires an EIA by reference to mandatory legislative threshold requirements or in the case of sub threshold development, by reference to the type and scale of the Proposed Development and the significance or the environmental sensitivity of the receiving baseline environment.

Annex 1 of the EIA Directive requires as mandatory an EIA for all development projects listed therein.

Schedule 5, Part 1, of the Planning Regulations transposes Annex 1 of the EIA Directive directly into Irish planning legislation. An EIAR is required to accompany a planning application for development of a class set out in Schedule 5, Part 1 of the Planning Regulations which exceeds a limit, quantity or threshold set for that class of development.

Schedule 5, Part 2 of the Planning Regulations defines projects that are assessed on the basis of set mandatory thresholds for each of the project classes including:

10. Infrastructure projects

(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere.

(In this paragraph, “business district” means a district within a city or town in which the predominant land use is retail or commercial use.)

The total Site area comprises 3.7 hectares. There is a net developable area of 1.9 hectares which is just under the threshold of 2 hectares for a business district. It was on this basis that the Applicant prepared an EIAR.

1.7 Scope of the EIAR

‘Scoping’ is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. It is defined in EC Guidance on EIA Scoping 2001¹ as:

‘Determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR’

The content of this EIAR was informed by a scoping process carried out by the Applicant, design team and EIAR consultants to identify the core issues likely to be most important during the EIA process.

The EIAR prepared for the Proposed Development has endeavoured to be as thorough as possible and therefore all of the issues listed in Schedule 6, Sections 1 and 2 of the Planning Regulations have been addressed in the EIAR.

The scope of this EIAR has had regard to the documents listed in Section 1.4, together with:

- The requirements of Part X of the Planning Act and also Part 10 of the Planning Regulations;
- The requirements of the Cork County Development Plan 2022 – 2028;
- Relevant Regional and National Planning Policy Documents;

¹ Guidance on EIA Scoping European Commission June 2001

- The receiving environment and any vulnerable or sensitive local features and current uses;
- Previous relevant planning history and applications that have been submitted on the Proposed Development Site and adjoining lands;
- The likely and significant impacts of the Proposed Development on the environment; and
- Available mitigation measures for reducing or eliminating any potentially significant undesirable impacts.

In addition, the individual Chapters of this EIAR should be referred to for further information on the documents consulted by each individual consultant.

1.8 Purpose and Objectives of the EIAR

The purpose of this EIAR is to assist in the EIA process, by identifying likely significant environmental impacts resulting from the Proposed Development, to describe the means and extent by which they can be reduced or mitigated, to interpret and communicate information about the likely impacts and to provide an input into the decision making and planning process.

The fundamental principles to be followed when preparing an EIAR are:

- Anticipating, avoiding, and reducing significant effects;
- Assessing and pursuing preventative action;
- Maintaining objectivity;
- Ensuring clarity and quality;
- Providing relevant information to decision makers; and
- Facilitating public and stakeholder consultation.

EIA is an iterative process. The EIAR captures this assessment process and describes its outcomes. The EIAR documents the consideration of environmental effects and provides transparent, objective and replicable documentary evidence of the EIA evaluation and decision-making processes.

The EIAR provides information on any identified effects arising as a consequence of the Proposed Development and which:

- Are environmentally based;
- Are likely to occur; and
- Have significant and adverse effects on the environment.

It also documents how the design of the Proposed Development incorporates measures for the purposes of impact avoidance, reduction or amelioration; as well as to explain how significant adverse effects will be avoided.

The key objective of this EIAR is to inform the Planning Authority on the acceptability of the Proposed Development, in carrying out an EIA, in order to reach a decision in the full knowledge of the Proposed Development's likely significant impacts on the environment, if any.

1.9 Format and Structure of this EIAR

The formation of an EIAR necessitates the co-ordination and collation of associated, yet diverse specialised areas of assessment. The EIA approach involves the examination of each environmental factor, describing the existing baseline environment, the Proposed Development, its likely impacts and direct and indirect significant effects pertaining to that environmental factor and mitigation measures, where appropriate.

The topics examined in this EIAR are categorised under the environmental factors prescribed under the EIA Directive:

- Population and Human Health
- Biodiversity
- Land & Soils
- Water
- Air
- Climate
- Material Assets
- Cultural Heritage
- Landscape

The expected effects deriving from the vulnerability of the Proposed Development to risks of major accidents and/or disasters must also be examined.

The structure of the EIAR is set out in Table 1-1.

Table 1-1: Structure of the EIAR

Chapter	Title	Content
1	Introduction and Methodology	Chapter 1 sets out the purpose, methodology and scope of the document.
2	Description of the Proposed Development & Assessment of Alternatives	As required under Article 5(1)(a) of the EIA Directive 2014/52/EU (subsequently referred to as the Directive), Chapter 2 provides a description of the site, design and scale of the Proposed Development, and, as required under Article 5(d), an evaluation of the reasonable alternative design approaches.
3	Planning and Development Context	Chapter 3 sets the national, regional and local policy framework for the Proposed Development.
4	Population and Human Health	Chapter 4 covers the requirement for assessment on potentially significant effects to population and human health as required under Article 3(1)(a) of the Directive.
5	Biodiversity	Chapter 5 covers the requirement of Article 3(1)(b) of the Directive to assess potentially significant effects on biodiversity (which previously referred only to 'fauna and flora'), having particular attention to species and habitats protected under the Habitats Directive and the Birds Directive.
6	Land and Soils	Chapter 6 covers the requirement under Article 3(1)(c) of the Directive on Land and Soil to assess the type of soil and geology in the area of the Proposed Development and identifies any potentially significant effects.
7	Hydrology and Hydrogeology	Chapter 7 covers the requirement under Article 3(1)(c) of the Directive to assess potentially significant effects to water quality arising from the Proposed Development. This Chapter will assess any potential effects from pollution and discharges to surface water.
8	Air Quality and Climate	Chapter 8 covers the requirement under Article 3(1)(c) of the Directive on Air and Climate to assess potentially significant effects to air quality in the surrounding environment.
9	Noise and Vibration	Chapter 9 covers the requirement to assess potentially significant effects from airborne noise and vibration as required under Article 3(1)(a) of the Directive on Human Health.
10	Landscape and Visual Amenity	Chapter 10 covers the requirement under Article 3(1)(d) of the Directive to assess potentially significant effects on the landscape. This Chapter will assess any potential visual impacts to landscape caused by the Proposed Development.
11	Archaeology and Cultural Heritage.	Chapter 11 covers the requirement under Article 3(1)(d) of the Directive to assess potentially significant effects on cultural heritage.
12	Material Assets _Traffic, Utilities and Waste Management	Chapter 12 covers the requirement under Article 3(1)(d) of the Directive to assess potentially significant effects on material assets. This Chapter will identify impacts to existing utilities and

		<p>infrastructure from the development of the Proposed Development.</p> <p>Article 5(1), Annex IV, point 1(d) of the Directive requires estimates of quantities and types of waste produced during construction and operation phase. Chapter 12 will also present an assessment of how resources and waste will be managed for the Proposed Development.</p>
13	Risk Management	Chapter 13 covers the requirement under Article 3(2) of the Directive to include the expected effects deriving from the vulnerability of the Proposed Development to risks of major accidents and/or disasters.
14	Interactions	As required under Article 3(1)(e) of the Directive, Chapter 14 provides an assessment of the interaction between all of the environmental aspects referred to in this EIAR.
15	Mitigation and Monitoring	Chapter 15 describes mitigation and monitoring as required under Article 5(1) of the Directive in order to avoid, prevent, reduce, or if possible, offset any identified significant adverse effects on the environment and, where appropriate, describes any proposed monitoring arrangements.

This approach employs standard descriptive methods, replicable prediction techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration.

1.10 Methodology Used to Produce this EIAR

The methodology employed to produce this EIAR is detailed in Table 1-2. The objective is to evaluate each environmental topic, both individually and collectively, in a systematic and objective manner.

The methodology will outline the methods used to describe the baseline environmental conditions as well as predict the likely impacts on the environment of the Proposed Development. The data and survey requirements for each Chapter will vary depending on the environmental topic and will be chosen by the particular specialist based on relevant legislation, best practice guidance, policy requirements, and professional judgement. Similarly, the study area is also defined for each environmental topic based on professional judgement and experience.

All environmental topics require desktop reviews of all relevant data at a minimum. These desktop studies are then supplemented by field studies and consultations with relevant stakeholders, for example interested parties, statutory bodies and local authorities, as required for each environmental topic.

An outline of the methodology employed consistently in each chapter of the EIAR to examine each environmental topic is provided in Table 1-2:

Table 1-2: Methodology Employed to Produce each EIAR Chapter

Introduction	Provides an overview of the specialist area and specifies the specialist who prepared the assessment.
Study Methodology	This subsection outlines the method by which the relevant impact assessment has been conducted within that Chapter.
The Existing Receiving Environment (Baseline Situation)	This section will describe and assess the receiving environment, the context, character, significance and sensitivity of the baseline receiving environment into which the Proposed Development will fit. This analysis also takes account of any other Proposed Developments that are likely to proceed in the immediate surroundings.
Characteristics of the Proposed Development	<p>Consideration of the '<i>Characteristics of the Proposed Development</i>' allows for a projection of the '<i>level of impact</i>' on any particular aspect of the environment that could arise.</p> <p>For each Chapter those characteristics of the Proposed Development which are relevant to the area of study are described; for example, the Chapter on landscape and visual impact addresses issues such as height, design and impact on the surrounding landscape.</p>
Potential Impact of the Proposed Development	<p>This section provides a description of the specific, direct and indirect, effects that the Proposed Development may have. This analysis is provided with reference to both the Existing Receiving Environment and Characteristics of the Proposed Development sections, while also referring to the: (i) magnitude and intensity, (ii) integrity, (iii) duration and (iv) probability of impacts.</p> <p>The assessment addresses whether the impacts are direct, indirect, secondary or cumulative in nature. It also looks at the timescale of such impacts e.g. are they short, medium, long-term, and are they of a temporary, permanent, continuous or intermittent nature, and are they positive or negative impacts. The impact interactions are also addressed.</p>
Do Nothing Impact	In order to provide a qualitative and equitable assessment of the Proposed Development, this section considers the Proposed Development in the context of the likely impacts upon the receiving environment should the Proposed Development not take place.
Avoidance, Remedial and Mitigation Measures	<p>This section of each Chapter describes the mitigation measures which are required. The requirement to describe mitigation measures is laid out in the EIA Directive, as implemented by the Planning Act and the Planning Regulations.</p> <p>Avoidance, remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential impacts of the Proposed Development. This includes avoidance, reduction and remedy measures as set out in Section 4.7 of the Development Management Guidelines 2007, to reduce or eliminate any significant adverse impacts identified.</p>
Residual Impacts of the Proposed Development	This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, short, medium and long-term, temporary, permanent, continuous, or intermittent, positive and negative effects as well as impact interactions which the Proposed Development may have, assuming all mitigation measures are fully and successfully applied.
Monitoring	This involves a description of monitoring in a post-development phase, if required. This section addresses the effects that require monitoring, along with the methods and the agencies that are responsible for such monitoring.

Reinstatement	While not applicable to every aspect of the environment considered within the EIAR, certain measures may need to be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.
Interactions	This section provides a description of impact interactions together with potential indirect, secondary and cumulative impacts.
Difficulties Encountered in Compiling Information	The EIA Directive requires that the EIAR includes ' <i>details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information, and the main uncertainties involved</i> ' (EIA Directive, Annex IV, Part 6). Each Chapter that contains an environmental baseline and assessment contains a section outlining any difficulties encountered in compiling that Chapter.

1.11 EIAR Project Team

Table 1-3: EIAR Project Team

Chapter	Consultant Name and address	Specialist Area
1.0 Introduction and Methodology including Non-Technical Summary	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Louise Hewitt	Multidisciplinary Environmental Consultants
2.0 Project Description and Alternatives Examined	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Nikita Coulter	Multidisciplinary Environmental Consultants
3.0 Planning & Policy Context	McCutcheon Halley Planning Cora Savage	McCutcheon Halley Chartered Planning Consultants
4.0 Population and Human Health	McCutcheon Halley Planning Gemma Glenn	McCutcheon Halley Chartered Planning Consultants
5.0 Biodiversity	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Bryan Thompson	Multidisciplinary Environmental Consultants
6.0 Land and Soils	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Fionnuala Joyce	Multidisciplinary Environmental Consultants
7.0 Hydrology & Hydrogeology	Arup, 50 Ringsend Road Dublin 4 D04 T6X0 Mesfin Desta	Multidisciplinary Environmental Consultants
8.0 Air Quality & Climate	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Laura Griffin	Multidisciplinary Environmental Consultants

9.0 Noise and Vibration	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Mairead Foran	Multidisciplinary Environmental Consultants
10.0 Landscape & Visual Amenity	Cunnane Stratton Reynolds, Copley Hall, Cotters Street, Cork. Jim Kelly	3D Visualisation and animation studio
11.0 Archaeology, Architectural, and Cultural Heritage	John Cronin & Associates, 3a Westpoint Trade Centre, Ballincollig, Co. Cork John Cronin and David Murphy	Archaeological Consultancy
12.0 Material Assets: Traffic, Waste, and Utilities	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Nikita Coulter Martin Hanley Consulting Engineers Martin Hanley	Multidisciplinary Environmental Consultants Traffic Consultant
13.0 Risk Management	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Nikita Coulter	Multidisciplinary Environmental Consultants
14.0 Interactions	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Louise Hewitt	Multidisciplinary Environmental Consultants
15.0 Mitigation and Monitoring Measures	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Louise Hewitt	Multidisciplinary Environmental Consultants

1.12 Non-Technical Summary

A Non-Technical Summary of the EIAR has also been prepared. The EIA Directive states that one of the objectives of the EIA process is to ensure that the public are fully aware of the environmental implications of any decisions. EPA Guidelines note that the non-technical summary of the EIAR should facilitate the dissemination of the information contained in the EIAR and that the core objective is to ensure that the public is made as fully aware as possible of the likely environmental impacts of projects prior to a decision being made by An Bord Pleanála. A Non-Technical Summary of the EIAR has therefore been prepared which summarises the key environmental impacts and is provided as a separately bound document.

1.13 Links between EIAR and Appropriate Assessment

A Screening Report for Appropriate Assessment (AA) has been carried out for the Proposed Development to determine if there is a risk of effects to any Natura 2000 sites. The AA screening screened out potential impacts on the Great Islands Channel Special Area of Conservation (SAC) (001058). However, the possibility may not be excluded that the

Proposed Development will have a likely significant effect on the Cork Harbour Special Protection Area (SPA) (004030). Accordingly, a Natura Impact Statement has been prepared for the Proposed Development. Where potentially significant adverse effects were identified, mitigation and avoidance measures have been proposed to negate them and as such the Proposed Development will not result in any significant adverse effects on European Sites.

While AA is required by the proposer of any plan or project likely to have an adverse effect on a Natura 2000 site, EIA is required for projects listed in Annex I of the EIA Directive. The requirement for EIA relative to projects listed in Annex II of the EIA Directive is determined on a case by case. While these two different types of assessment are independent and are required by separate legislation, namely the Birds and Habitat Directives (i.e. AA) and the EIA Directive (i.e. EIAR) there is a degree of overlap, particularly in the biodiversity Chapter of the EIAR.

1.14 Availability of EIAR Documents.

A copy of this EIAR document and Non-Technical Summary is available for purchase at the offices of An Bord Pleanála at a fee not exceeding the reasonable cost of reproducing the document.

1.15 Difficulties Encountered in Compiling Information

No exceptional difficulties were experienced in compiling the necessary information for the Proposed Development. Where any specific difficulties were encountered these are outlined in the relevant Chapter of the EIAR.

1.16 Quotations

The application is also accompanied by a Non-Technical Summary of the EIAR, which is laid out in a similar, but condensed format to the main EIAR. The structure, presentation and the Non-Technical Summary of the EIAR, as well as the arrangements for public access, all facilitate the dissemination of the information contained in the EIAR. The core objective is to ensure that the public and local community are aware of the likely environmental impacts of the Proposed Development prior to the granting of consent.

However, it is important to acknowledge that the EIAR by its nature contains statements about the Proposed Development, some of which are positive and some less than positive. Selective quotation or quotations out of context can give a very misleading impression of the findings of the study. Therefore, the study team urge that quotations should, where reasonably possible, be taken from the conclusions of specialists' sections or from the Non-Technical Summary and not selectively.

The EIA Regulations require that difficulties such as technical deficiencies, lack of information or knowledge encountered in compiling any specified information for the EIAR be described. There were no such difficulties encountered in the production of this EIAR.

2 PROJECT DESCRIPTION & DESCRIPTION OF ALTERNATIVES

2.1 Introduction

This Chapter provides a detailed description of the Proposed Development together with details of the existing environment. In accordance with Article 5(1)(a) of the EIA Directive, the description of the project should comprise:

'...information on the site, design, size and other relevant features of the project'.

A description of the Proposed Development and its surroundings is provided in this Chapter, together with the proposed design parameters. This description sets the basis against which the specialist assessments presented in this EIAR have been undertaken.

The EIAR must contain information in relation to the environmental impact of both the Proposed Development and all other "reasonable" alternatives studied. An indication of the main reasons for the option chosen must be given, taking into account the effects of the Proposed Development on the environment.

2.1.1 Quality Assurance and Competence This Chapter was prepared by Enviroguide Senior Environmental Consultant Nikita Coulter. Nikita Coulter has a B.Sc. in Zoology (Hons) from University College Dublin, an M.Sc in Biodiversity and Conservation and a Postgraduate Diploma in Environmental Engineering from Trinity College Dublin, and a NEBOSH accredited International Diploma in Environmental Risk Management. Nikita has 8 years professional experience as an Environmental Compliance Specialist.

2.2 Site Location and Description

The Proposed Development Site is located in the townland of Kilmoney within the town of Carrigaline which is identified as a 'Metropolitan Town' in the Cork County Development Plan 2014, and the Bandon-Kinsale Municipal District Local Area Plan 2017. The Site of the Proposed Development is situated to the west of the Carrigaline Town Centre and approximately 10km southeast of Cork City Centre. The Proposed Development Site lies to the south of the N28 Cork-to-Ringaskiddy route. The total Site area comprises 3.7 hectares and has a sloped topography. There is a net developable area of 1.9 hectares.

The Site of the Proposed Development is situated towards the southwest of the designated Carrigaline Town Centre zone. The Site is bounded to the north by Owenabue River (**Owenboy River is variously referred to as Owenboy and Owenabue. Any reference to either refers to the same watercourse**) and mature trees and hedgerows, to the east by the Dairygold Co-op Superstore and associated car park, to the south by a number of detached bungalows with the Kilmoney Road beyond, and to the west by the Carrigaline Inner Western Relief Road (IWRR) (due to be complete in May 2022) and agricultural fields.

The Proposed Development Site is within easy walking distance of a number of commercial and community facilities including local shops, churches and schools. Access to the Site is via the Carrigaline IWRR and the Kilmoney Road which runs to the south of the Proposed Development Site.

The Carrigaline IWRR has unlocked the development potential of the lands lying to the West of the main street in Carrigaline, which have remained largely underdeveloped while the town has expanded north toward Cork City and to the East towards the harbour. The IWRR defines the western edge of the town centre. Further to the west lies the flood plain for the Owenabue River and lands zoned for Open Space / Amenity (*Building Height Rationale, Henry J Lyons, 2022*).

2.3 Site History / Background

The Proposed Development Site is predominantly composed of agricultural grassland, dry meadows, and grassy verges, and has been open fields as far back as 1840's (Ordnance Survey of Ireland Online Maps, 2022). The northern and southern boundaries of the Site have sections of deciduous treelines and a drainage ditch runs directly adjacent to the treeline on the southern boundary. The eastern section of the Proposed Development Site consists of buildings and artificial surfaces which are currently used as a storage yard for a co-operative.

2.3.1 Site Planning History

Planning Application Reference - 19/4642 Cork County Council - Permission Granted 22.07.2019

Piton Properties Ltd were granted permission for the construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works in the north-western portion of the Site of the Proposed Development. The development permitted under 19/4642 was constructed as part of the Carrigaline IWRR project and was designed with the IWRR taken into consideration. The wastewater pumping station was deemed to be essential for future urban growth and as such was designed to be suitable for town centre planning. The wastewater pumping station will also serve future development on the land zoned for town centre use. A Natura Impact Statement and a Flood Risk Assessment report were submitted to the Planning Authority with the application (Planning Application References 19/4122 and 19/4362 were applications for the same development as 19/4642 but both were deemed incomplete).

2.4 Project Overview

Permission is sought for the following Proposed Development:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. 3 storey townhouse/duplex units
- A 184 m² creche/childcare facility
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about area, an activity trail/greenway along the river, a gathering area/amphitheatre with tiered seating areas, a civic space/promenade and 2 no. courtyard areas
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level, and

- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

A range of unit types and sizes are provided comprising 95 no. 1 bed (42%), 95 no. 2 bed (42%) and 12 no. 3 bed units (5%) to be provided in a mix of 202 apartment units (90%), and 22 no. townhouse/duplex units (10%). The Proposed Development will provide much needed housing within Metropolitan Cork and Carrigaline, where there is currently a chronic shortage of housing. The Proposed Development will function as a natural extension to the town centre of Carrigaline by consolidating development in the area and ensuring the retention of a compact settlement.

The Proposed Development is clearly distinguishable and takes due cognisance of the amenities of existing dwellings to the west of the Site. The Proposed Development proposes a range of building heights from 3 to 7 no. storeys to respond to the various contextual conditions surrounding the Site with the tallest elements are located in the north of the Proposed Development Site.

In terms of public open space provision, the open space areas (including both passive and active open space) comprises 20,511m² or 67% of the net Site area. A further 2,359m² communal space will be provided for the use of residents of the scheme. The public open space will consist of 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tiered seating areas, a civic space/promenade and 2 no. courtyard areas. The proposed Site layout also ensures that the existing and new neighbourhoods are lined with enhanced physical and visual connections for cyclists and pedestrians. The Proposed Development respects the character of the surrounding area, delivering a network of open spaces which will serve as a valuable amenity for future residents of the Proposed Development Site.

The Proposed Development also retains natural features where possible and incorporates significant landscaping especially in the amenity area on the northern part of the Site and along the boundaries of the Site, which will maximise screening of the Proposed Development. The existing mature trees along the boundaries of the Site, which offer both a natural noise ventilation for the Proposed Development and an aesthetic element, will be retained where possible and incorporated into the Proposed Development. The overall Proposed Development provides a mix of style, size and type of unit, to provide a selection of units in varying configurations. The proposed design reflects and builds upon the materials, form and landscape already established in the area and will provide a pleasant environment for families to live. The various apartment types add to the variety of housing available in the area, ensuring the provision of homes that will meet the needs of the future residents of the town of Carrigaline.

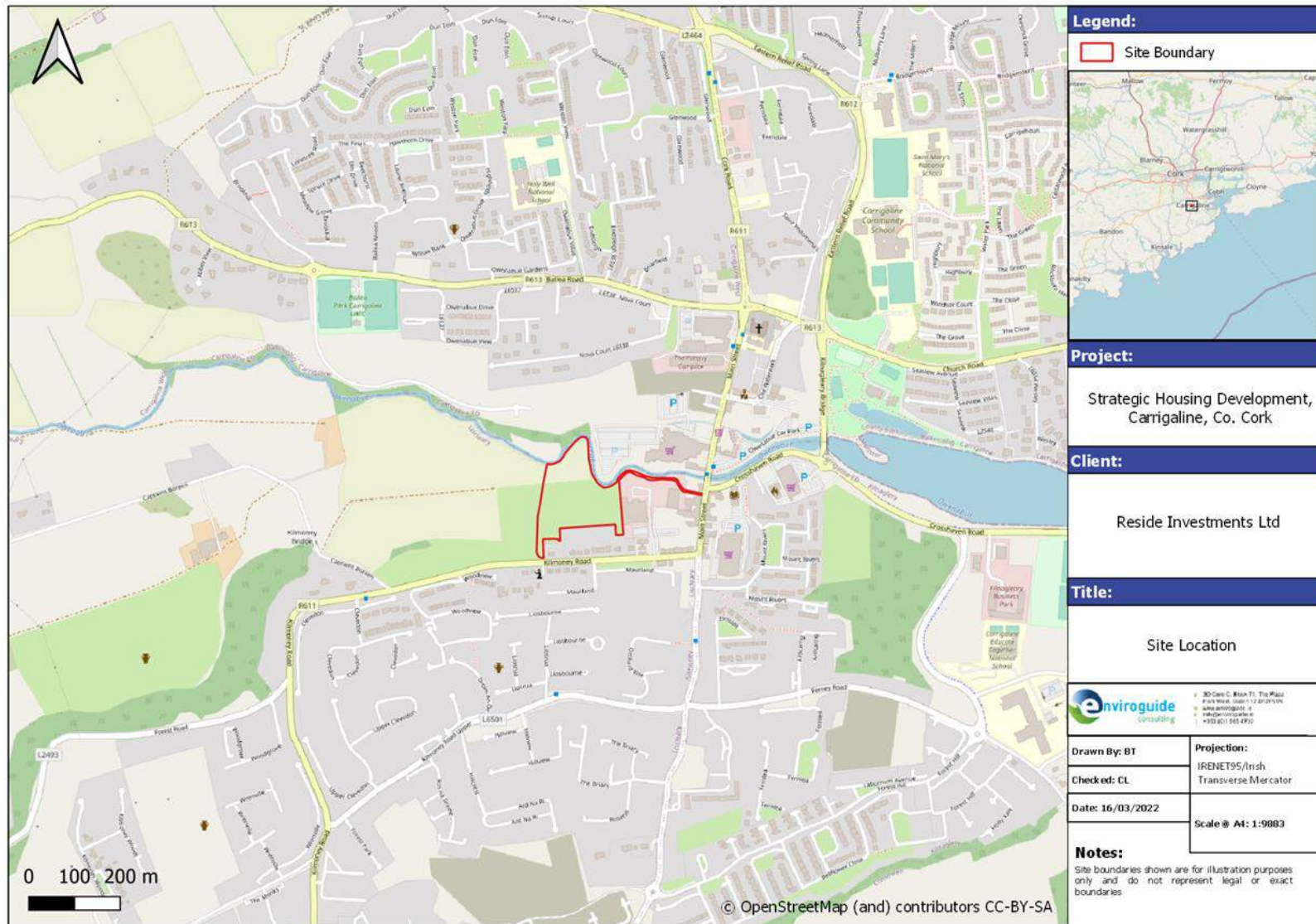


Figure 2-1: Site Location Map

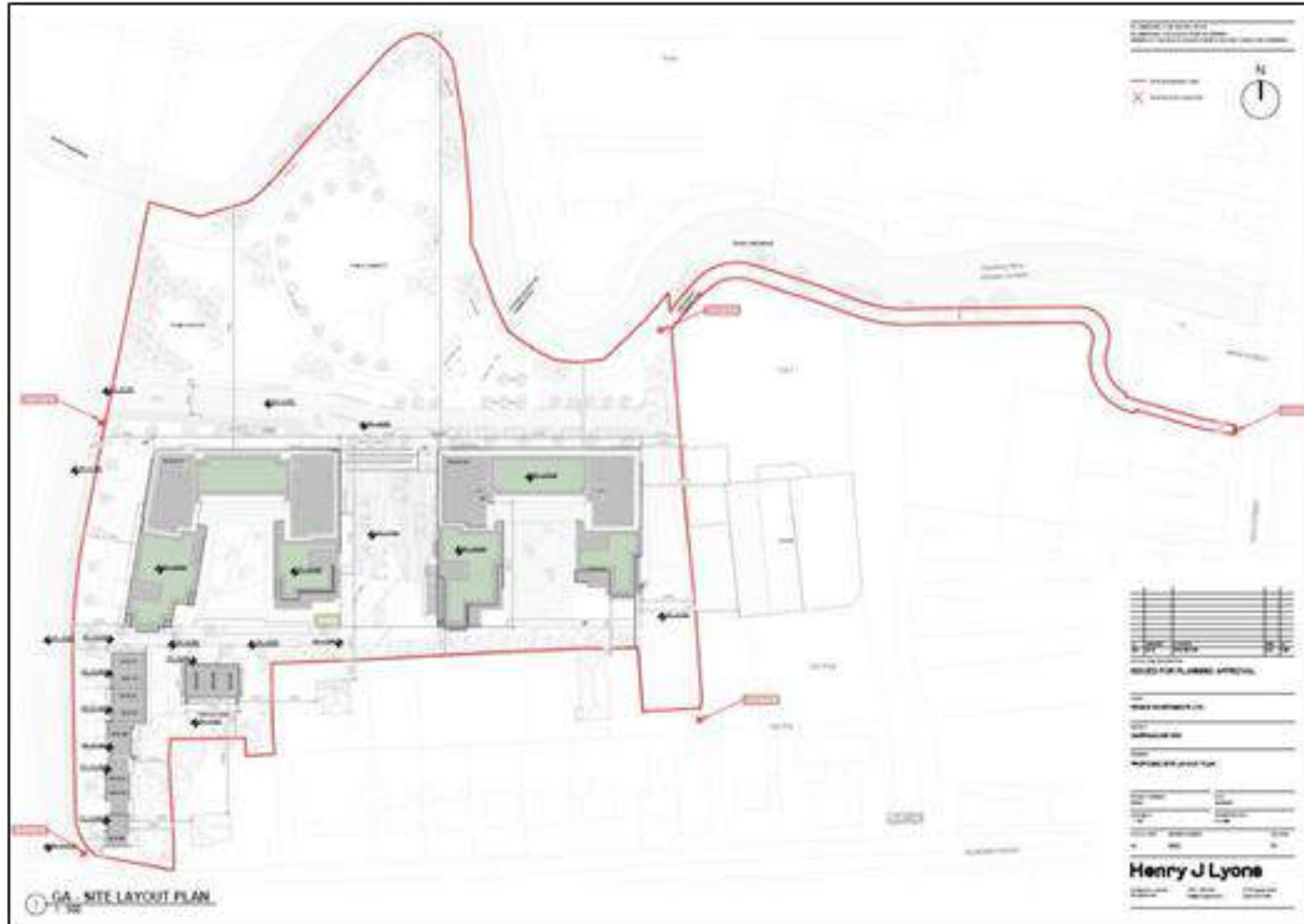


Figure 2-2: Site Layout Plan

2.5 Construction Phase

All construction works will occur in a single phase which is estimated to last 18 months. For the duration of the proposed infrastructure works it is envisaged that the maximum working hours will be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 13:00 Saturdays, subject to the restrictions imposed by the local authorities. No working will be allowed on Sundays and Public Holidays unless express permission is obtained from the Local Authority.

The construction entrance to the Proposed Development Site will be from the Carrigaline IWRR to the west of the Site and will include a vehicular access for construction traffic and a pedestrian access for construction personnel. Deliveries to the Site by Large Goods Vehicles not exceeding 10m in length will be restricted to the period 10.00 to 16.00. During the general excavation of the foundations there will be additional (heavy goods vehicle (HGV) movements to and from the Proposed Development Site. All suitable excavated material will be used for construction and fill activities where possible and appropriate.

No public personnel, be it pedestrian or vehicular, will be permitted to enter the Proposed Development Site. Appropriate signage will be positioned at approach roads to the Proposed Development Site area so as to inform the public of the Site activities.

It is envisaged that tower cranes will be erected to hoist materials on Site in the construction of apartments. Several measures to ameliorate noise, dust, litter and other environmental nuisances associated with the construction phase are outlined in the Construction and Environmental Management Plan (CEMP) (*Enviroguide Consulting, 2022*).

2.6 Operational Phase

The Proposed Development will comprise residential and commercial use consistent with the land use zoning for the area. The Operational Phase of the Proposed Development will consist of the normal day-to-day operations necessary for the management of a residential/retail development, and the ongoing maintenance of the residential dwellings, retail units, community facilities and public outdoor areas.

2.7 Statutory Planning Context

The Site of the Proposed Development is subject to National, Regional and Local level planning policy. The following outlines the key planning policy documents of relevance to the Proposed Development.

This section will not address in detail the policies and objectives contained in the various plans / policies that are relevant to the Proposed Development. These are addressed in Chapter 3 (*Planning and Policy Context*).

2.7.1 National

- Project Ireland 2040: National Planning Framework (2018)
- Sustainable Urban Housing: Design Standards for New Apartments (2018)

- Urban Development and Building Heights Guidelines for Planning Authorities (2018)
- Rebuilding Ireland - Action Plan for Housing & Homelessness (2016)
- Housing for All – A New Housing Plan for Ireland (2021)
- Design Manual for Urban Roads & Streets (2013)
- National Policy Position on Climate Action & Low Carbon Development and Climate Act (2021)
- The Planning System & Flood Risk Management (2009)
- 2009 Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (Cities, Towns & Villages)
- Urban Design Manual (A Best Practice Guide) (2009)
- National Investment Framework for Transport in Ireland (NIFTI)

2.7.2 Regional

- Southern Regional Assembly (SRA) - Regional Spatial & Economic Strategy (RSES) for the Southern Region (2020).

2.7.3 Local

- Cork County Development Plan 2014
- Draft Cork County Development Plan 2022-2028
- Bandon Kinsale Municipal District Local Area Plan 2017

2.8 Description of Alternatives

2.8.1 Introduction

Consideration of reasonable alternatives is an important aspect of the EIA process and is necessary to evaluate the likely environmental consequences of a range of development strategies for the Site of the Proposed Development within the constraints imposed by environmental and planning conditions. This section provides a description of the reasonable alternatives that have been considered.

Article 5 of the EIA Directive requires that that the EIAR contain:

“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 Development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”

This section of the EIAR provides an explanation of the reasonable alternatives examined throughout the design and consultation process. This serves to indicate the main reasons for choosing the Proposed Development, taking into account and providing a comparison of the environmental effects. The alternatives may be described at four levels:

- Alternative locations
- Alternative designs
- Alternative layouts
- Alternative processes

Pursuant to Section 3.4.1 of the Environmental Protection Agency (**EPA**) Guidelines on the *Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022), 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’ ...*”

In accordance with EPA Guidelines (EPA, 2022), different types of alternatives may be considered at several key phases during the process. As environmental issues emerge during the preparation of the EIAR, alternative designs may need to be considered early on in the process or alternative mitigation options may need to be considered towards the end of the process.

The EPA Guidelines (EPA, 2022) states:

“The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with ‘an indication of the main reasons for selecting the chosen option’. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or ‘mini-EIA’) of each alternative is not required.”

Thus, the consideration and presentation of the reasonable alternatives studied by the project design team is an important requirement of the EIA process.

2.8.2 Alternative Locations

Three possible alternatives have been considered in terms of alternative locations for the Proposed Development :

1. The Do-Nothing Alternative
2. Develop another greenfield site
3. Purchase another existing site with current planning permission for a similar development

The Do-Nothing Alternative would see the Site remain for agriculture/wetland and as a storage yard for a co-operative. Also, the wastewater pumping station and foul rising main that have been constructed on the Proposed Development Site under Planning Reference 19/4642 as part of the Carrigaline IWRR and in order to allow for future urban growth and to serve future development on the land zoned for Town Centre Use would not be sufficiently utilised.

Another theoretical greenfield site was developed on the assumption that such a site was available. It was deemed that a greater impact would be created by the siting of a residential development with retail and childcare units at this scale on such a site, given that the existing Site of the Proposed Development lies within lands that have already been zoned for Town Centre Use, and are currently underutilised in that respect. Additionally, if the theoretical greenfield site was in an area of outstanding natural beauty, the impact would be significant.

The Site of Proposed Development is owned by the applicant, hence purchasing another existing site with current planning permission was discounted due to the unlikely availability of such a site on the market and the levels of capital that would be required to purchase such a

site. In addition, another site would not have the proximity to the Carrigaline IWRR that the current site offers.

Having regard to the above alternatives, the selected location is considered the most suitable location for the Proposed Development.

2.8.3 Alternative Uses

The Proposed Development is located in the townland of Kilmoney within the town of Carrigaline, which is identified as a 'Metropolitan Town' in the Cork County Development Plan 2014. The zoning objectives for all the settlements in Co. Cork are set out in the relevant Local Area Plan. The Site of the Proposed Development is covered by the Bandon-Kinsale Municipal District Local Area Plan (LAP) 2017. In the 2017 LAP, the Proposed Development Site is zoned for *Town Centre Use* as part of a larger CL-T-01 town centre zoning, and the Zoning Objective states that "*the southern part of the site backing onto existing residential development on the Kilmoney Road may have a mix of residential development*" subject to a mandatory Flood Risk Assessment. A mandatory Flood Risk Assessment has been completed for the Proposed Development Site, and as the Proposed Development combines residential development with retail units, community facilities and public open spaces, the mixture of uses are in accordance with Zoning Objective CL-T-01 of the Kinsale Municipal District Local Area Plan (LAP) 2017.

Feedback from the Public Consultation on the Carrigaline Transportation and Public Realm Enhancement Plan (TPREP) (2022) noted that "*enhancement to the public realm*" was raised by 20% of respondents, specifically referring to "*better access to the river, wider public amenities, more trees, and improved lighting and green spaces*". The Proposed Development includes 20,511m² of both passive and active public open space (67% of the net Site area). The public open space will consist of 1 no. local play area, 1 no. kick about area, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade, 2 no. courtyard areas, a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river) and outdoor lighting. The Proposed Development respects the character of the surrounding area and retains natural features where possible. The existing mature trees along the boundaries of the Site, will be retained where possible and incorporated into the Proposed Development.

There is the potential for the Site of the Proposed Development to be alternatively used for, or to incorporate other uses under the zoning objective CL-T-01, including youth facilities, theatre, cinema, town hall/ multi-purpose building and town square, however, as stated in the Department of Housing, Local Government and Heritage's (DoHLGH) Plan 'Housing for All – A New Housing Plan for Ireland' (2021), Ireland needs an average of 33,000 homes to be constructed per annum until 2030 to meet targets set out for additional households.

Considering these objectives and targets, the Proposed Development has emerged as the best use option for the Site.

2.8.4 Alternative Design & Layouts

Both the context and approach to the Site of the Proposed Development, and the emerging design rationale have been subject to consultation with the the Planning Authority. The

Statement of Consistency prepared McCutcheon Halley Chartered Planning Consultants, in conjunction with Henry J. Lyons Architects, Horgan Lynch Consulting Engineers and Cunnane Stratton Reynolds on behalf of Reside Investments Ltd. (2021) notes that the *Proposed Development* will provide an appropriate form of *high-quality residential development, which is consistent with the national, regional and local planning policy framework, for an effective and efficient use of this highly accessible under-utilised site.*

Alternative designs for the Proposed Development were considered and developed by the Architects during the design development process, with input from the overall project team. This involved a constantly evolving design whereby different solutions were tested to establish the optimum design. The final layout emerged through a design development process, which was informed by the established design principles and client brief (*Architectural Design Statement, Henry J Lyons, 2022*). The layout and design of the Proposed Development is based on the principles and 12 no. design criteria of the Urban Design Manual (A Best Practice Guide) published by the DoHLGH (2009). The apartments in the Proposed Development have also been designed having regard to and are consistent with the DoHLGH's 2018 publication, Sustainable Urban Housing: Design Standards for New Apartments - Guidelines for Planning Authorities. Overall, a high-quality layout and design has been achieved, based on the provision of a mix of high-quality apartments in a quality neighbourhood area and through the creation of a sustainable extension to the settlement of Carrigaline which prioritises pedestrians and cyclists. (*Statement of Consistency, McCutcheon Halley, 2021*)

The development potential of the Proposed Development Site is constrained by flood levels of the River Owenabue, resulting in the Proposed Development being restricted to the southern part of the Site, adjoining the existing houses. However, this positioning of the building unlocks the river's edge, thus keeping the riverbank free for large outdoor amenity development. Starting with two large blocks, the building was gradually carved out to promote amenity space, connectivity, and consideration for the existing adjacent properties.

The Proposed Development sits into the slope of the Site, allowing two storeys of the building become submerged on the southern side. The Proposed Development builds up gradually from south to north, with the highest points on the north of the building, facing onto the large expanse of the proposed open space and river frontage.

The Architectural Design Statement (*Henry J Lyons, 2022*) states that a number of considerations have been made to fully satisfy the surrounding context, which has resulted in the proposed massing form (refer to Figure 2-3 for an example of the Design Development Process). Careful consideration has been given to the dwellings which reside in close to the southern side of the Site of the Proposed Development. Particularly important design approaches include:

- The building naturally steps down with the existing topography to minimise elevation height to the south face of dwellings facing the Proposed Development.
- The penthouse and upper levels have been set back significantly to avoid overlooking existing properties.
- The massing of the building has also been set back to maximise daylighting to the existing residents.

- Courtyards have been created to enable scheme to look inward to promote privacy for the existing dwellings.

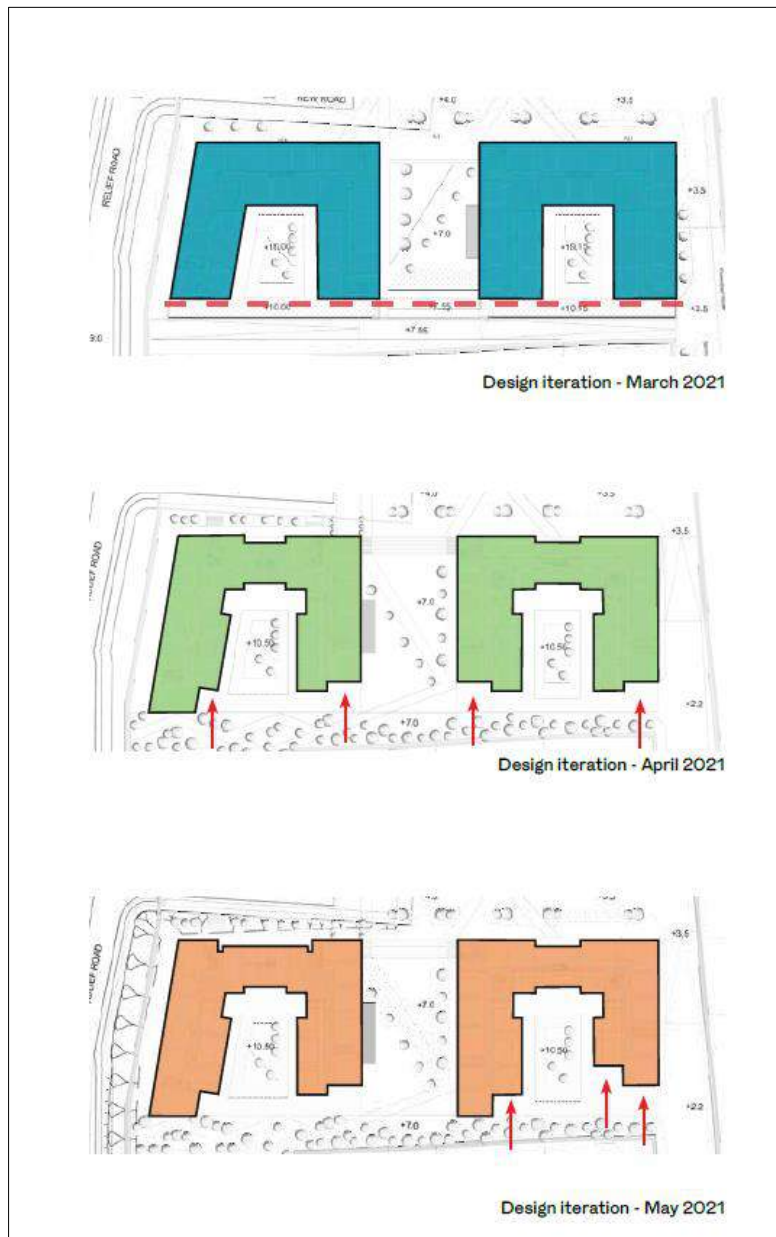


Figure 2-3: Design Development Process (extracted from Architectural Design Statement, Henry J Lyons, 2022)

In order to minimise impact on adjoining properties and respect to site boundaries, a number of design strategies have been explored and employed. Important design strategies are as follows:

- Ensuring a minimum of 11m distance from the Proposed Development to the boundary with adjacent properties.
- Providing adequate screening to all southern facades through means of hit and miss brick elements.
- Avoiding glazing where at all necessary on the southern façade.

- Providing adequate screening through carefully designed landscape along all boundaries to adjacent properties.

The stepped design of the upper parts of the building are a deliberate response to protecting the visual and private amenity of the neighbouring properties. The stepped architectural forms reduce the massing of the building and provide visual interest. The orientation of the buildings also present slender gable ends to the neighbours, helping to bridge the change in scale from the single storey houses to the urban apartment buildings (*Residential Amenity Report, Henry J Lyons, 2022*).

A full Daylight, Sunlight and Overshadowing Analysis report has been prepared for the Proposed Development by Passive Dynamics (2022). The report confirms that the gardens of the neighbouring properties receive sufficient levels of sunlight in line with the BRE guidance, achieving 2 hours of sunlight over the vast majority of their total area on the design day. The Proposed Development will not cause a significant impact to the level of sunlight in the neighbouring gardens as the development is located north of the gardens themselves. In addition, the amenity areas of the Proposed Development were analysed, and the report confirms that the design achieves upward of 2 hours of sunlight on the design day (21st March) across the vast majority of areas, therefore complying with the BRE Guidelines.

As parts of the Site near the river are located within Flood Zones A (high risk) and B (medium risk of flooding), Arup was commissioned to undertake a Flood Risk Assessment (FRA) for the Proposed Development. Flood mitigation measures, including dedicating large areas within Flood Zone A for open space amenity uses that are water compatible, and raising finished floor levels above the design flood protection level, have been developed to prevent flood inundation of the Proposed Development Site. Level for level flood compensation is also proposed within the Site to replace any flood storage taken by the development. As such, there are no negative flood impacts from the Proposed Development to other sites. The proposed drainage system will not increase flood risk to the Proposed Development Site or off site. A Justification Test was carried out in accordance with the OPW Guidelines, and it has been demonstrated that the Proposed Development satisfies the criteria of the development management Justification Test (*Flood Risk Assessment, Arup, 2022*).

As part of the pre-application planning process, the Applicant requested consent from Watfore Ltd for an amenity pathway connecting the Site of the Proposed Development to Main Street over lands in the ownership of Watfore Ltd at Lower Kilmoney Road, Kilmoney, Carrigaline, Co. Cork. On the 15th and 19th of October 2021, the Applicant submitted proposals for boundary treatments, hours of operation, and security, as well as confirmation that the final route of the amenity path will be designed to ensure it does not impact on Watfore Ltd's future proposals for the subject lands. On the 20th of October 2021, a Letter of Consent was issued by Watfore Ltd to the Applicant for the amenity pathway, and Watfore Ltd furthered confirmed that the letter may be submitted as evidence of such consent as required under the Planning & Development Regulations, 2001, as amended.

2.8.5 Alternative Process

Due to the nature of the current proposal, where the planning application will be submitted to the Planning Authority, it was not considered necessary to consider alternative processes for the Proposed Development.

2.9 The Existence of the Project

The Construction Phase will last approximately 18 months. During the Construction Phase of the Proposed Development there will be approximately a maximum of 150 construction workers at the peak of the construction works. Hence, for the duration of the Construction Phase of the Proposed Development there will be a short-term increase in construction employment in the area, which will have a positive impact, both directly and indirectly, on the local economy.

The Operational Phase of the Proposed Development will result in an increase in the population of the area, and it will have a positive impact on the long-term supply needs of housing in Carrigaline. In addition to housing, a number of retail facilities are located on the ground floor, with childcare facilities accessible via the central podium deck. Residential facilities such as a gym and residential work lounge spaces are located off the podium deck also. Hence, the Operational Phase of the Proposed Development will have the potential to create employment in the local area, while also providing a high standard of living for the residents. Employment will be also created by the maintenance and management of the Proposed Development. The provision of passive and active public open space with a mixture of recreational and amenity facilities will have a long-term, positive impact on the local human health and the socio-economic environment.

The primary likely significant environmental impacts of the Proposed Development are fully addressed in the relevant specialist Chapters of this EIAR. These impacts relate to Population & Human Health, Land & Soil, Hydrology and Hydrogeology, Landscape & Visual, Noise and Air Quality & Climate associated with the Proposed Development.

The Proposed Development has the potential for cumulative, secondary, and indirect impacts, these can be difficult to quantify due to complex inter-relationships. All interactions and cumulative impacts have been addressed in Chapter 14 (Interactions) with cumulative impacts and interactions fully addressed in the relevant specialist Chapters of this EIAR.

3 PLANNING CONTEXT

The planning and policy context gives an overview of the relevant legislation that supports the Proposed Development at a local, regional and national level, and sets out the strategic and statutory context governing the planning and development of the Proposed Development.

This chapter was prepared by Cora Savage of McCutcheon Halley Planning Consultants, Cora Savage, Senior Planner, has a Bachelor Degree in Arts, a Masters Degree in Planning and Sustainable Development and a Professional Diploma in Education. She is a Corporate Member of the Irish Planning Institute . Cora has experience on a broad range of projects providing planning advice on various forms of development including residential development, student accommodation, mixed-use town centre schemes, commercial/office developments and retail. Cora also has experience in the preparation of site feasibility and planning appraisals, development plan submissions, strategic housing developments, coordinating planning applications, planning appeals, public consultation, retail analysis, planning compliance and enforcement, and Environmental Impact Assessment Reports.

3.2 Site Context

The Proposed Development Site is located in the townland of Kilmoney within the town of Carrigaline which is identified as a 'Metropolitan Town' in the Ballincollig Carrigaline Municipal District Local Area Plan 2017. The Proposed Development Site is situated to the west of the Carrigaline town centre and approximately 10km southeast of Cork City Centre. The Site lies to the south of the N28 Cork to Ringaskiddy route. The total Site area comprises 3.7 hectares and has a flat topography. There is a net developable area of 1.9 hectares. The Proposed Development Site is bounded on the west by agricultural lands, to the north by Owenboy river and mature trees and hedgerows, to the east by the Dairygold Co-op Superstore and associated car park and to the south by a number of detached bungalows with the Kilmoney Road beyond.

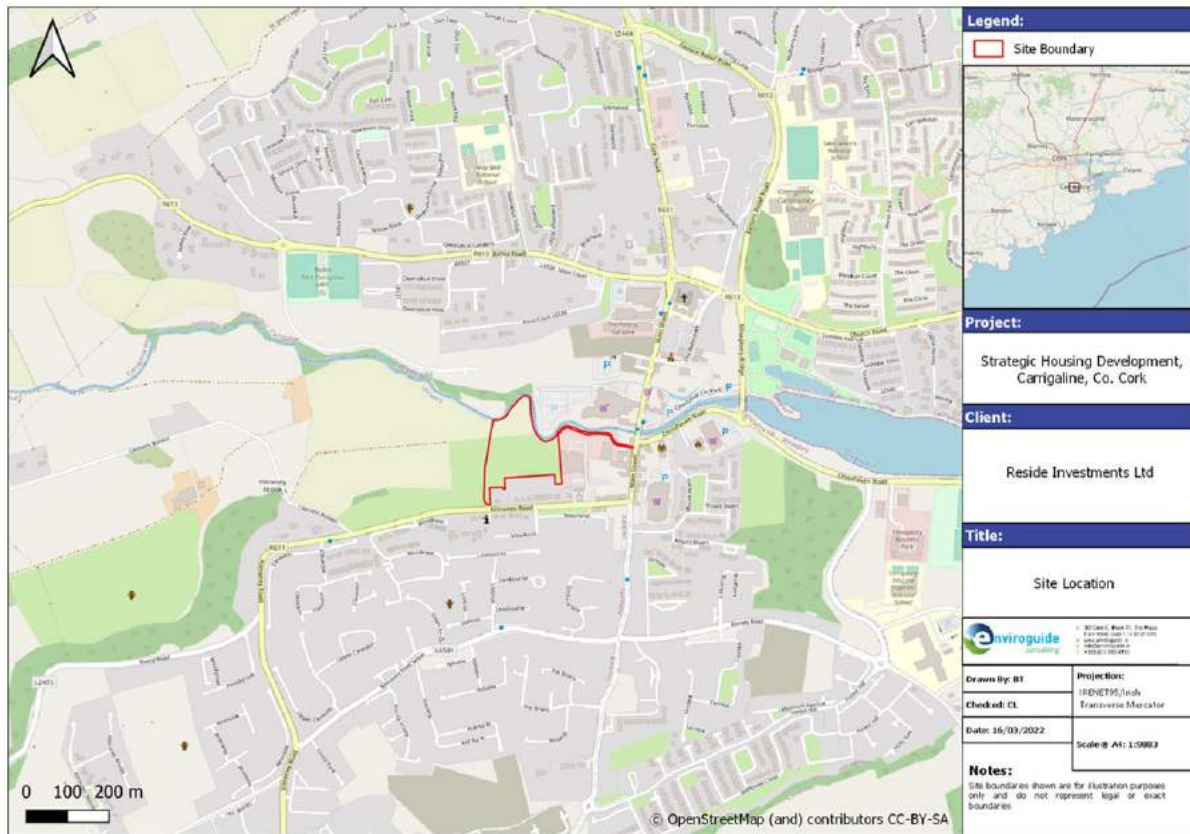


Figure 3-1: Location of the Proposed Development Site at Kilmoney, Carrigaline.

The Proposed Development Site is within easy walking distance of a number of commercial and community facilities including local shops, churches and schools. Access to the Site is via the inner relief road (currently under construction) and the Kilmoney Road which runs to the south of the Site. The Site is served by the 220 bus route which stops 200m to the south east of the Site. There are services numerous times throughout the day Monday to Friday.

3.3 Planning Policy Context

The Planning Policy documents which are most relevant to the proposed residential scheme include the following:

3.3.1 National Planning Framework 2040

In line with the recommendations set out in Rebuilding Ireland, the Government launched Ireland 2040, which comprises the National Planning Framework (NPF) and National Development Plan (NDP) 2018-2027. These plans aim to achieve balanced regional development by outlining a clear hierarchy for the urban centres outside the greater Dublin area, with Cork being promoted as the State's second city, fulfilling a nationally important role in counterbalancing the Capital.

A core objective of the National Planning Framework is to build an average of 25,000–30,000 new homes annually to meet future planned needs of the population and deal with the demand-supply imbalance over recent years, in effect a doubling of annual housing output from 2016/2017 levels. According to the National Development Plan, Cork is expected to

increase its population by 125,000 by 2040, which will require the provision of additional housing to accommodate 2,400 people every year up to 2040.

The NPF highlights the urgent requirement for a major uplift of the delivery of housing within the existing built-up areas. According to the NDP, a key tenet to achieving these ambitious housing targets is through compact growth. This compact growth model focuses on the prioritisation of housing development in locations within and contiguous to existing urban footprints where it can be served by public transport, walking and cycling.

Key Facts and Figures:

- The Population of Ireland will increase by around one million people or by 20 % over 2016 levels by 2040.
- The population aged over 65 will more than double; and
- Need for at least an additional half a million new homes by 2040.

Compact Growth Objectives:

- Targeting a greater portion (40 %) of future housing development to be within and close to the existing 'footprint' of built-up areas; and
- Future homes are required to be located where people have the best opportunities to access a high standard quality of life.

To address rural decline, a significant proportion of national population and economic growth will be targeted at building up the fabric of our network of smaller towns, villages and rural areas with much of that happening by redeveloping derelict and under-utilised lands inside small towns and villages.

3.3.2 Regional Spatial & Economic Strategy for the Southern Region (RSES)

RSES is a strategic document, which identifies high-level requirements and policies for the Southern Region, setting out the high-level statutory framework to empower each local authority to develop Cork County development Plans (CCDPs), Local Area Plans (LAPs) and LECPs that are coordinated with regional and national objectives.

RSES identifies rural towns and villages as the local drivers for their surrounding areas. It is an objective of the RSES to ensure that development plans tailor the appropriate planning response to the scale, nature and location of the settlement.

3.3.3 The Sustainable Residential Development in Urban Areas (Cities, Towns & Villages)

Towns & Villages)" issued by the Department of the Environment, Heritage and Local Government in 2009, provides guidance in relation to the development of larger towns. The Guidelines recommend that planning authorities should encourage increased densities in appropriate locations such as larger towns with 5,000 or more people. This recommendation was based on three considerations which include the following:

- The trend towards smaller household sizes;
- The need to encourage the provision of affordable housing; and
- The need to reduce CO² emissions by reducing energy consumption.

It is an objective of the Guidelines to achieve ‘*an efficient use of land appropriate to its context, while avoiding over-development*’ It is imperative that the planning authorities encourage design and layouts that ensure the highest quality of residential environment is achieved. The criteria to be considered in the design and assessment of higher density is as follows:

- Acceptable building heights;
- Avoidance of overlooking and overshadowing;
- Provision of adequate private and public open space;
- Adequate internal space;
- Suitable parking close to dwellings; and
- Provision of ancillary facilities including child care.

In relation to the appropriate locations for higher densities, the guidelines state that increased densities should be on residentially zoned lands in cities and towns.

Section 5.11 of the *2009 Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (Cities, Towns & Villages)* states that for town centre sites there should, in principle, be no upper limit on the number of dwellings that may be provided within any town centre site, subject to the following safeguards:

- compliance with the policies and standards of public and private open space adopted by development plans;
- avoidance of undue adverse impact on the amenities of existing or future adjoining neighbours;
- good internal space standards of development;
- conformity with any vision of the urban form of the town or city as expressed in development plans, particularly in relation to height or massing;
- recognition of the desirability of preserving protected buildings and their settings and of preserving or enhancing the character or appearance of an Architectural Conservation Area; and
- compliance with plot ratio and site coverage standards adopted in development plans.

3.3.4 Urban Design Manual – A Best Practice Guide

The ‘Urban Design Manual – a Best Practice Guide’ issued by the Department of the Environment, Heritage and Local Government (2009) states that all residential development should evolve naturally in response to its surroundings and be of high quality in terms of design and layout. The Manual sets out 12 key design criterion (i.e. Context, Connectivity, Inclusivity, Variety, Efficiency, Distinctiveness, Layout, Public Realm, Adaptability, Privacy and Amenity, Parking and Detailed Design) – these criteria are addressed in the ‘Statement of Consistency’ and Planning and Design Statement prepared by McCutcheon Halley.

3.3.5 Cork County Development Plan 2014

The Cork County Development Plan (CDP 2014) establishes a hierarchical network of settlements in the County, allocating related population and housing growth projections. Carrigaline is located within Metropolitan Cork Area and is designated as a ‘Metropolitan Town’ which forms part of the ‘Cork Gateway’ and is located within the rail corridor where major population, employment and housing development is encouraged and where the following strategic objective applies:

“Critical population growth, service and employment centres within the Cork “Gateway”, providing high levels of community facilities and amenities with infrastructure capacity high quality and integrated public transport connections should be the location of choice for most people especially those with an urban employment focus.”²

Policy CS 4-1 prioritises certain locations, including Carrigaline, to accommodate the planned population growth in the Cork Gateway region:

“n) In the Cork Gateway, development to provide the homes and jobs that are necessary to serve the planned population will be prioritized in the following locations... Carrigaline (Shannon Park)...”

The County Development Plan 2014 establishes a population target of 17,870 for Carrigaline representing growth of just over 3,000 people on Census 2011 figures (14,775). In order to accommodate this level of population growth, it is estimated that an additional 2,422 housing units will be required during the period 2011-2022.

Notwithstanding this, and in acknowledgement of the level of growth projected, not only in the town of Carrigaline but also across the county, the CDP puts forward several policies which promote the achievement of sustainable residential communities. One such policy, Policy HOU 3-1 promotes sustainable residential communities especially through the location of residential development so as to optimise sustainable modes of transport and integrate positively with existing facilities:

“b) Promote the provision of high quality, accessible and suitably proportioned areas of public open space and promote linking of new open spaces with existing spaces to form a green infrastructure network ...”

Policy objective HOU 3-3: Housing Mix of the Cork County Development Plan aims to improve the range and choice of available housing throughout Cork County by ensuring developers secure a mix of house types and sizes to meet the needs of the likely future population. In response to this, the proposed housing mix has been influenced by a range of factors including:

- The desirability of providing for mixed communities and a range house types and tenures;
- The nature of existing stock in the area;
- The existing social mix in the area and the need to cater for groups such as the elderly and disabled; and
- The saleability of different types of housing having regard to the local housing market.

3.3.6 Ballincollig Carrigaline Municipal District Local Area plan 2017

The 2017 Ballincollig Carrigaline Municipal District Local Area plan (LAP) outlined the development strategy for Carrigaline. It sets out a clear aim for the ‘Metropolitan Town’ of Carrigaline:

² 2014 Cork County Development Plan, p.23.

“The strategic aim for Carrigaline is to consolidate the rapid growth of recent years broadly within the town’s existing development boundary, protecting its important green belt setting while maintaining its distinctiveness as a self-contained Metropolitan Town with improvement of the town centre and the towns residential amenities.”

The Proposed Development Site is situated within the development boundary of Carrigaline and zoned for Town Centre Use as part of a larger CL-T-01 town centre zoning with the following objective:

CL-T-01: This area denotes the built existing footprint of the town centre and any proposals for development within this core area should comply with the overall uses acceptable in town centre areas.

It is desirable that the inner western relief road is delivered prior to any further development. However, in order to prevent any undue delays to development, future proposals (which will include a community element) that are submitted prior to the construction of this road should be for limited development and accompanied by a detailed traffic management and access proposals. Any such development proposals in the CL-T-01 area will provide only pedestrian access to the main street. Vehicular access to such developments will not be provided directly from the main street.

Delivery of the inner relief road offers opportunities to deliver an updated public realm for the town including the introduction of new public spaces. These should be designed to accommodate a number of community functions including a market space, festival space, meeting place, seating area etc. The desirable location of these future public spaces are:

- 1. The site of the existing car park adjoining the Main Street and River;*
- 2. Within the town centre expansion area west of the Main Street and should form part of a wider public realm strategy for the town.*

Community uses which will be considered appropriate for this site include youth facilities, theatre, cinema, town hall/multi-purpose building and town square. Within the site there will be opportunity for regeneration and town centre expansion. The scheme will give priority to pedestrians and cyclists and shall provide permeability to the rest of the town including the open space area directly adjacent to the site (CL-O-02).

*The southern part of the site backing onto existing residential development on the Kilmoney Road may have a mix of residential development.” **

* (Flood Risk Assessment Required).

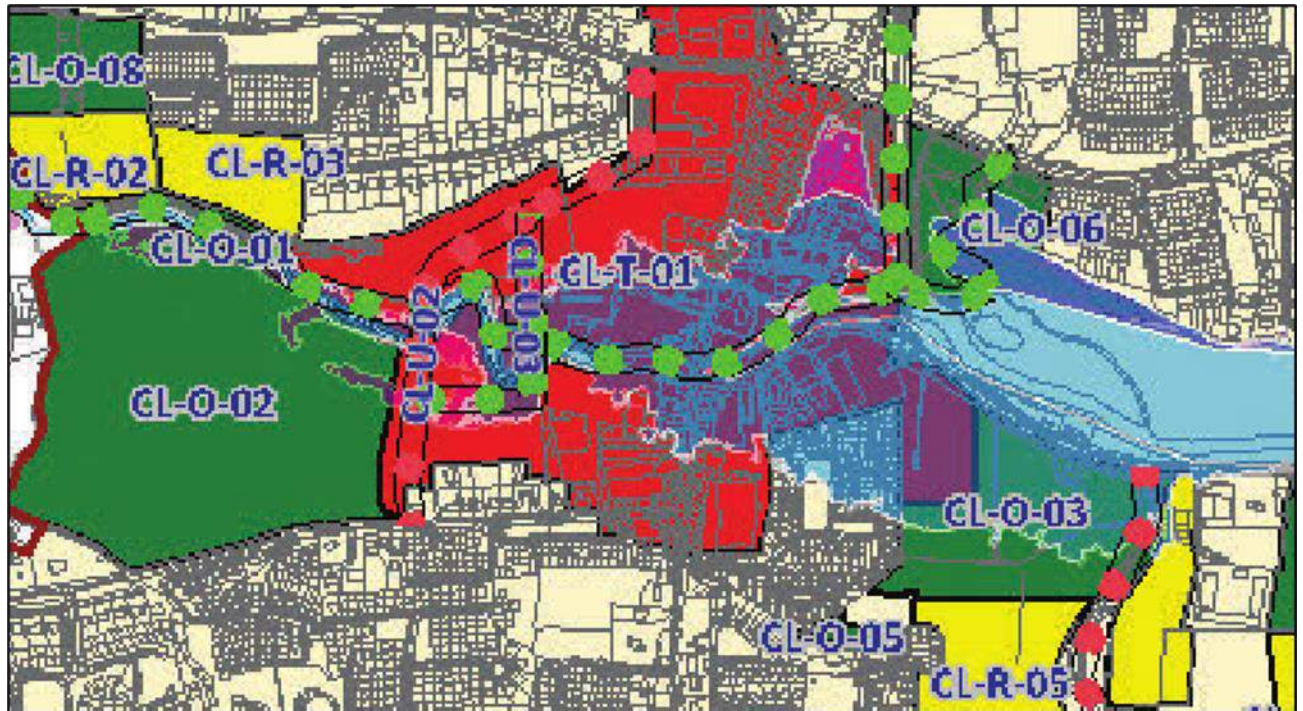


Figure 3-2: Extract from Ballincollig Carrigaline Municipal District Local Area Plan.

3.3.7 Draft Cork County Development Plan 2022

In the forthcoming Cork County Development Plan 2022 – 2028 stage due to come into effect on Monday June 6th, 2022, the strategic aim for Metropolitan Cork is to:

“Recognise the importance of the role to be played by the Cork Metropolitan Area in the development of the Cork ‘MASP’ as identified in the RSES for the Southern Region, in tandem with the development of Cork City, to promote its 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.

It is an objective of the plan to achieve:

“Growth in population and employment so that the Cork Metropolitan Area (CMA) can compete effectively for investment and jobs in line with the key enablers identified in the RSES for the Southern Region and the Cork MASP..

Consolidate employment at existing employment locations with improved supporting infrastructure, and in particular public transport improvements including those identified in the CMATS (2020). Continue with the strategic rebalancing of the city and county through the development of the UEAs along the East Cork Corridor and the Monard SDZ. Critical population growth, service and employment centres within the Cork Metropolitan Area, providing high levels of community facilities and amenities with infrastructure capacity high quality and integrated public transport connections should be the location of choice for most people especially those with an urban employment focus.”

The lands are situated within the development boundary of Carrigaline and zoned for Town Centre Use as part of a larger CL-T-01 town centre zoning with the following objective:

*“This area denotes the built existing footprint of the town centre and any proposals for development within this core area should comply with the overall uses acceptable in town centre areas. The western inner relief is due to commence construction in 2021 and the delivery of this road offers opportunities to deliver an updated public realm for the town including the introduction of new public spaces. These should be designed to accommodate a number of community functions including a market space, festival space, meeting place, seating area etc. The desirable location of these future public spaces are: • The site of the existing car park adjoining the Main Street and River; • Within the town centre expansion area west of the Main Street and should form part of a wider public realm strategy for the town. Community uses which will be considered appropriate for this site include youth facilities, theatre, cinema, town hall/multi purpose building and town square. Within the site there will be opportunity for regeneration and town centre expansion. The road scheme will give priority to pedestrians and cyclists and will provide permeability to the rest of the town including the open space area directly adjacent to the site (CL-GR-02).”**

4 POPULATION AND HUMAN HEALTH

4.2 Introduction

This chapter of the EIAR assesses the potential impacts of the proposed Strategic Housing development (SHD) at Kilmoney (townland), Kilmoney Road, Carrigaline, Co. Cork on population and human health that are not covered elsewhere in the EIAR. It also details the proposed mitigation measures where necessary. The potential impacts on, and mitigation measures for population and human health were assessed under the following headings: Do Nothing Impact, Human Health, Population and Economic Activity, and Local Amenity.

According to European Commission's Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report (2017), human health is:

“a very broad factor that would be highly project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population.”

The Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (May 2022) advise that

“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.”

4.2.1 Author Information and Competency

This chapter was prepared by Gemma Glenn of McCutcheon Halley Planning Consultants. Gemma holds an undergraduate degree in Urban and Regional Planning from Ryerson University as well as a Master's Degree in Urban Planning and Sustainable Development from University College Cork. She is a Graduate Member of the Irish Planning Institute. Gemma has experience on a range of projects providing planning advice on various forms of development including residential development, mixed-use town centre schemes and retail. Gemma also has experience in the preparation of planning appraisals, planning applications, retail analysis and Environmental Impact Assessment Reports.

4.2.2 Reference to Guidelines Relevant to Discipline

This chapter has been prepared having regard to the following guidelines:

- *Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (Environmental Protection Agency [EPA], May 2022)*
- *Revised Guidelines on the Information to be Contained in Environmental Impact Statements (Environmental Protection Agency [EPA], draft August 2017);*
- *Advice Notes for Preparing Environmental Impact Statements (EPA, draft September 2015);*
- *Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002);*
- *Advice notes on Current Practice in the Preparation of Environmental Impact Statements (EPA,2003).*

4.3 Study Methodology

The EPA advice notes (EPA, 2015) recommended considering the following issues when assessing the potential impacts and effects of a Proposed Development on Population and Human Health;

- *Economic Activity likely to lead to projects – will the development stimulate additional development and/or reduce economic activity, and if either, what type, how much and where?*
- *Social Consideration – will the development change the intensity of patterns and types of activity and land use?*
- *Land – Use – will there be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the surroundings?*
- *Tourism – will the development affect the tourism profile of the area?*
- *Health – have the vectors through which human health impacts could be caused been assessed, including adequate consideration of inter-relationships between those assessments?*

For the purposes of this assessment impacts on tourism have been scoped out as a topic, as the proposed project comprises a residential development in a built-up area, and the Site does not have any intrinsic tourism value and is not in proximity to any important tourism or amenity resources. This is due to Carrigaline having community-oriented facilities rather than tourism attractions as well as nature of the development, as the scheme comprises a neighbourhood creche, residential units, and comparison/convenience retail units that focus on the resident population. However, Carrigaline's relationship with tourism is noted under section 4.5.4.

The appraisal of the likely significant effects of the Proposed Development on population and human health was conducted by reviewing the current socio-economic environment in Carrigaline. This comprised of desktop research and visual assessments of the proposed Site and the surrounding area, as well as an analysis of aerial photography and Ordnance Survey (OS) mapping.

The Primary study area is defined by the 3 no. Electoral Divisions (ED) of Carrigaline that overlap or are immediately adjacent to the Proposed Development and are likely to be affected by Proposed Development.

Information was gathered with respect to the demographic and employment characteristics of the resident population within the relevant catchment area, sourced from the 2011 and 2016 Censuses. The data included information on population, structure, age profile and household size, number of persons at work and the unemployment profile. A desktop survey of the following documents and websites also informed this:

- Cork County Development Plan 2014;
- Cork County Draft Development Plan 2022-2028;
- Bandon Kinsale Municipal District Local Area Plan 2017 (Carrigaline South);
- Central Statistics Office (CSO) website www.cso.ie;
- Department of Education and Sciences (DES) website www.education.ie.

The HSE issued a response to the consultation letter commenting on a number of areas specific to Environmental Health. The comments are summarised below and are dealt with in this chapter of the EIAR and other chapters where appropriate:

- Project description.
- Any future monitoring required.
- **Consideration of alternatives:** the EIAR should fully describe and consider alternatives to this project.
- **Construction:** a site-specific Construction Management Plan should be prepared.
- **Drainage:** an integrated approach to surface water management should be implemented.
- **Climate:** incorporate sustainable design concepts.
- **Sustainable Transport:** assess construction and operational traffic impact on roads and prepare a detailed travel plan.
- **Health Gain:** provide landscaping
- **Noise:** traffic caused by construction phase and proposed scheme should be assessed.
- **Sustainable Development:** review impact on increased population on key infrastructure and community facilities.

Detailed consideration was given to the surrounding area and the potential receptors and receiving environment that might be affected by the Proposed Development. These are discussed in detail in the following sections and include the following:

- The surrounding residents/homes;
- The community facilities and services in the area;
- Local schools and childcare facilities;
- Local amenities such as community groups, clubs and societies, as well as temporary receptors such as pedestrians passing the Site (although these impacts are generally considered to relate to visual impact, covered in Chapter 10 Landscape and Visual Impact).

4.4 The Existing and Receiving Environment (Baseline Situation)

The following provides a description of the existing environment with a focus on demography, land use, and local amenity. A detailed description of the project is provided in Chapter 2. The assessment of the effects on population and human health refers to those environmental topics under which human health effects may occur (e.g., noise, water quality, air quality, etc). Specific sections of this EIAR provide the baseline scenario relevant to the environmental effect being assessed.

4.4.1 Demography

Carrigaline is a town in County Cork located along the River Owenabue and is situated approximately 13 km from Cork City Centre. Due to its location within the Cork Metropolitan Area, Carrigaline acts as a gateway to both Cork City as well as West Cork. The Cork County Development Plan (CDP) 2014 and the Cork County Draft Development Plan 2022 identifies Carrigaline as one of the nine Metropolitan Towns within Cork. Under objective CS 3-1 in the Cork Draft County Development Plan, this designation defines Metropolitan Towns as areas that '*strengthen and consolidate the retail role and function of the smaller metropolitan towns and to provide retail development in accordance with their planned population growth to serve their local catchments*'. Further, this is reinstated in the Draft Development Plan as this designation signifies the importance of ensuring accessibility through national and international connectivity, strong business cores, as well as a role in innovation, education, retail, health, and culture.

These areas provide an important contribution to Metropolitan Cork as a whole, as it ensures a balance of development while providing sufficient infrastructure in order to act as gateways in and out of the City Centre and hinterlands. The Cork County Draft Development Plan notes under section 1.3.1 that the council aims to consolidate the existing rapid growth in the town within its current development boundary while protecting the greenbelt setting as well as improving Carrigaline's town centre and residential amenities.

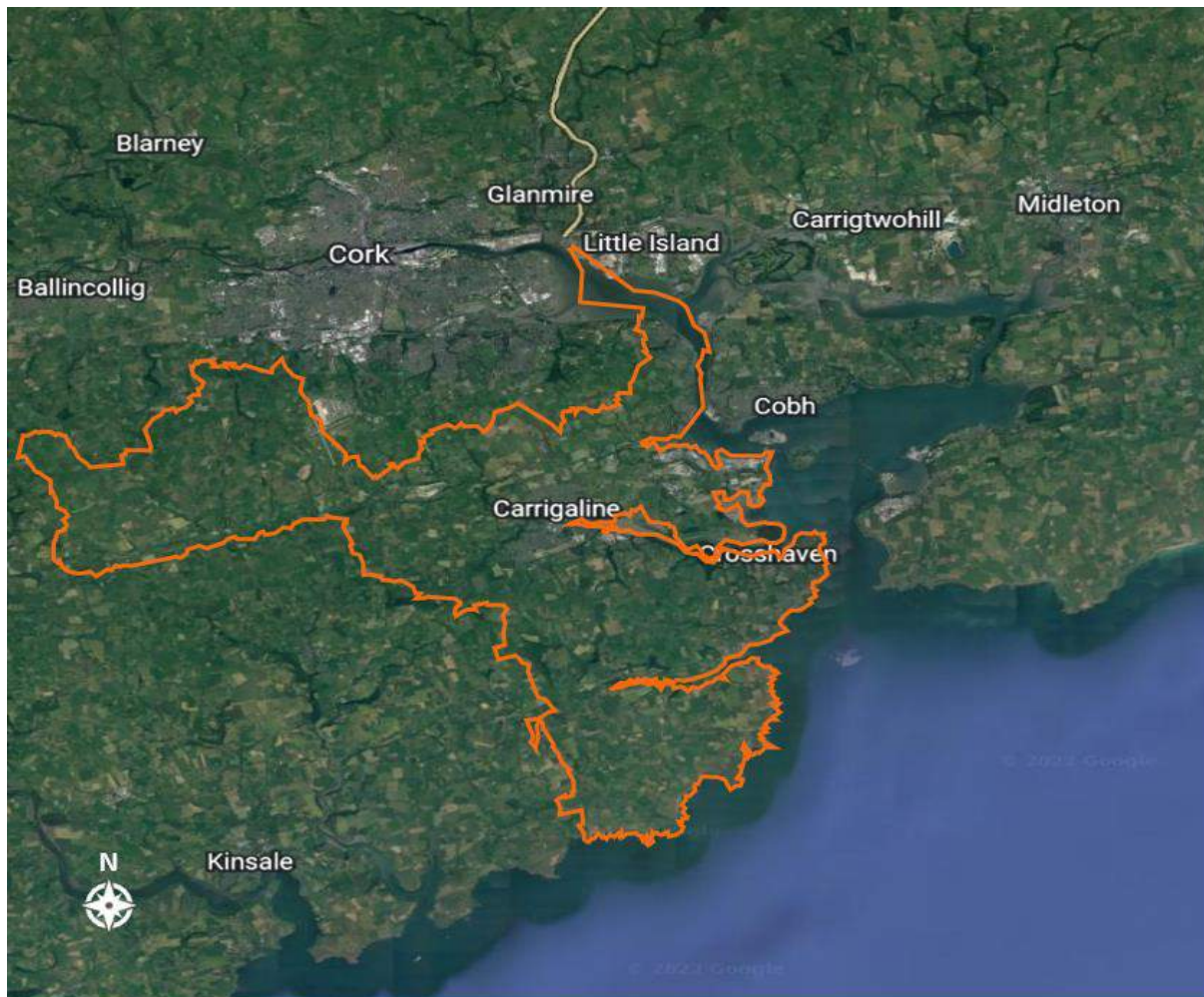


Figure 4-1: Carrigaline Municipal District

The Population and Labour Force Projection 2017 – 2051 Report released by the CSO in 2018 identifies that Ireland’s population is projected to grow substantially by 2051. This growth is expected to occur from a population of 4.74 million in April 2016 to 6.69 million by 2051. Population growth will be influenced by inward migration and fertility, but even in the case of low inward migration and declining fertility, Ireland’s population is still expected to reach at least 5.58 million in 2051.

The 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 by 2040; indeed, within the Framework’s time frame. Within the Cork County Draft Development Plan, Carrigaline’s population was set to achieve a population target of approximately 20,501 by 2028, representing a growth of 4,731 from its 2016 Census population of 15,770. Both current and Draft Development Plans note the rapid population growth in Carrigaline, and it is an objective of the Council to accommodate growth in the existing development boundary and will primarily focus upon the redevelopment and rebalancing of the Town Centre, the completion of existing planning permissions (as noted in section 1.3.10). For this assessment, statistical analysis and assessment will encompass the 3 no. of Electoral Divisions (ED) that are within Carrigaline. These include Carrigaline North ED, Carrigaline South ED, and Liscleary ED.

Figure 4-2: Carrigaline Electoral Division (Proposed Development Site identified at red star)



Figure 4-2: Carrigaline Electoral Division (Proposed Development Site identified at red star)

The Regional Spatial Economic Strategy (RSES) for the Southern Region which came into effect in January 2020 identifies that the Southern Region is the second most population Regional Assembly area and that all 10 local authority areas within the region have experienced growth at varying levels since 2006. Population projections anticipate large increases in the 15 – 24 year (+26%), 45 – 44 year age groups are projected to decrease by approximately 14%.

The Cork County Development Plan 2014 sets a population target of 620,622 for Cork City and County to be achieved by 2022, representing an increase of c.15%. However, it is recognised that this will be revised to consider changes to the county boundary. Carrigaline is anticipated to experience a significant increase in its population from a figure of 15,770 to 20,501 by 2028. According to these figures provided in the Cork County Development Plan 2014 and the associated Census, calculations reveal that in order to cater to such rapid growth, an additional 1,944 residential units in total will be required to meet this population projection.

Table 4-1: Tables compiled using information from CSO Census Statistics Ireland 2011 and 2016 and Cork County Development Plan 2014 - 2021

Housing Requirement					Housing Supply	
Census 2011	Population Target 2022	Total New Housing Units Required	New Housing Units Required	New Housing Requirement (ha)	Net Residential Area Zoned in LAP (ha)	Estimated Housing Yield
6,489	7,589	831	938	47	93.46	1,619

4.4.1.1 Household Size

Both of the Carrigaline Electoral Divisions (EDs) recorded a total population of 14,648 in 2016. This is an increase of 15.1% from 2011 (i.e. 13,696) and an 59.3% increase from 2006 (i.e. 9,894) With regards to household size, an average of 2.9 was identified in Carrigaline’s North ED and an average of 2.7 in the South ED. The Liscleary ED recorded a total population of 4,690 with an increase of 6.9% from the 2011 population (i.e. 4,385). Overall, this population reflects an average household size of 3.2. These figures are all above the Cork City household averages but are in close alignment with the averages presented within Cork County. This suggests that both EDs caters to both large and small household sizes, but the majority of households in this area are larger. These figures reveal the opportunity to accommodate the household types through residential development for family and starter housing.

Table 4-2: Average household size in 2016

Area	Households	Persons	Average Household Size
Carrigaline North ED	4,061	12,172	2.9
Carrigaline South ED	906	2,476	2.7
Liscleary ED	1,434	4,690	3.2
Cork County	146,442	414,062	2.8
Cork City	49,411	120,980	2.4
State	1,702,289	4,676,648	2.7

It is important to note that the household figures are based on those persons who are considered as usual residents in Carrigaline. This excludes visitors on census night, but the figures include people who were elsewhere in Ireland on Census night but stated their place of usual residence is Ireland. This figure also exudes caravans and is only expressed as permanent private housing units.

4.4.1.2 Household Type

When considering both Carrigaline EDs, the 2016 Census found that 7.8% of the population of the ED were of pre-school age (i.e. 0-4 years) within the Carrigaline North ED, and 10% of

the population were of this age in the Southern ED. The Liscleary ED records 7.9% of the population in this age group. In total, this accounts for 8.2% when all three EDs within Carrigaline are amalgamated. This is slightly higher than the figures identified County-wide (7.5%) and across the State (6.9%).

The age identified as primary school children age is classified through ages 5 – 11 years, where this age group encompasses 12.3% of the population in the North ED, and 9.3% in the South ED. The Liscleary ED has 12.8% of this age group within its ED population. In total, this age group is 12% of all of the ED populations combined, which is lower than the state average of 10.2% and aligned with the Cork County average of 12.2% but is significantly higher in contrast to the Cork City average of 6.6%.

The post-primary age group, Ages 12 – 18, encompasses 10.7% of the population in the North ED and 7.6% in the South ED. Further, 13% of the Liscleary population falls within this age group. In total, 10.9% of the population in Carrigaline as a whole are within this age group when all EDs are considered. The total percentage is reflective of both state and county figures.

There are 18.5% of young adults (age 19-34) and in the North ED and 19% of this age group in the South ED. In total, 18.6% of the population in Carrigaline are between the ages of 19-34, which also consistent with the state and county averages. The age group of 35-64 consists of 42.3% of the population in the North ED and 41.5% in the South ED. In regards to the Liscleary ED, there are 17.2% of the population is within the age of 19 – 34, and 41.6% fall within the ages 35 – 64. When these age groups are totalled with all of three EDs, 60.3% of the Carrigaline population is of this age bracket, which is significantly higher than state and county averages. This is significant, as the Census reveals that both of these age groups are the largest in Carrigaline and therefore play a significant role in development and growth in the town, as these groups consist of renters, homeowners, young families, and mature families.

The aging population consists of residents aged 65 and older. This age group encompasses 8.2% of the population in the North ED and 11.9% in the South ED. The Liscleary ED population records 7.2% of residents within this age group. Overall, 8.4% of the population of Carrigaline (with both North, South, and Liscleary EDs amalgamated) falls under this age group. This average falls below the state, county, and city average.

Table 4-3: Demographic Breakdown of School – Going Children, Census 2016

Area	Age 0-4	Age 5-11	Age 12-18	Age 19-34	Age 35-64	Age 65+	Total Population
State	331,515	484,368	435,913	990,618	1,881,884	637,567	4,761,865
As percentage of total population	6.9%	10.2%	9.2%	20.8%	39.5%	13.4%	n/a
Cork County	31,337	46,583	39,969	74,664	170,524	54,116	417,211
As percentage of total population	7.5%	12.2%	9.6%	17.9%	40.9%	12.9%	n/a
Cork City	6305	8,270	8,661	37,932	44,762	19,727	125,657
As percentage of total population	5%	6.6%	6.9%	30.2%	35.6%	15.7%	n/a
Carrigaline North	954	1,495	1,301	2,241	5,133	994	12,118
As percentage of total population	7.8%	12.3%	10.7%	18.5%	42.3%	8.2%	n/a
Carrigaline South	253	231	189	472	1,022	295	2,462
As percentage of total population	10%	9.3%	7.6%	19%	41.5%	11.9%	n/a
Liscleary ED	370	598	606	799	1,932	336	4,641
As percentage of total population	7.9%	12.8%	13%	17.2%	41.6%	7.2%	n/a

4.4.1.3 Travel Trends

The demographic analysis of travel trends, as outlined in Table 4 – 4, indicate that the majority of people commute locally within all three EDs and other employment centres in the immediate facility such as Cork City. It is noted that 65% of the Carrigaline North ED population travel for up to a ½ hour, 58.2% of the population in the South ED travel for up to ½ hour, and 61.7% of the population for the Liscleary ED travel this time period. When all ED statistics are amalgamated, a total of 63.7% of residents travel up to ½ hour.

Table 4-4: Journey Time to Work, School, or College for both Carrigaline North ED, Census 2016

Time Taken to Travel to Work, School, or College	Total Population Aged 5 Years and Over
Under 15 mins	2,777
¼ hour – under ½ hour	2,771
½ hour – under ¾ hour	1,870
¾ hour – under 1 hour	418
1 hour – under 1 ½ hours	264
1 ½ hours and over	105
Not Stated	2,461
Total	8,461

Table 4-5: Journey time to Work, School, or College for both Carrigaline South ED, Census 2016

Time Taken to Travel to Work, School, or College	Total Population Aged 5 Years and Over
Under 15 mins	351
¼ hour – under ½ hour	530
½ hour – under ¾ hour	368
¾ hour – under 1 hour	125
1 hour – under 1 ½ hours	62
1 ½ hours and over	13
Not Stated	63
Total	1,512

Table 4-6: Journey time to Work, School, or College for both Liscleary ED, Census 2016

Time Taken to Travel to Work, School, or College	Total Population Aged 5 Years and Over
Under 15 mins	754
¼ hour – under ½ hour	1251
½ hour – under ¾ hour	767
¾ hour – under 1 hour	187
1 hour – under 1 ½ hours	120
1 ½ hours and over	40
Not Stated	130
Total	3,249

This reveals that Carrigaline provides access to sufficient services, employment, and amenities within the town, as most residents can access such amenities within a ½ time frame. The settlement’s position as an important residential base for workers and families within the three EDs is further reinforced when considering the level of aging population (65 years and over) is just 8.4%, which is lower than those for the County (12.9%), City (15.7%) and State (13.4%).

4.4.1.4 Tenure

In regards to tenure, 20.8% of residents in Carrigaline North ED rent accommodation and 77.1% of residents own their own home. The South ED presents a rent rate of 19% and an ownership rate of 77.3%. The Liscleary ED also presents a rent rate of 19.8% followed by an ownership rate of 76.9%. In reference to Table 4 – 7, there is a total of 20.4% of rented accommodation and 77.1% of owner-occupied accommodation when all EDs are combined. The rented accommodation figures are slightly lower than that of the state, where 27.6% of households are renting as well as the county figures, where 22.7% of accommodation is rented. However, they overall ED figures are higher than the state average for owner occupied accommodation (67.6%) and the county average of 72.9%.

The low average of each ED (and amalgamated figures) reveal that most residents own there home, which can suggest that there are a high proportion of families buying homes within the town.

Table 4-7: Demographic Breakdown of Household Tenures, Census 2016

Area	Total Households	Rented Accommodation	Owner Occupied
State	1,697, 665	469,671	1,147,522
As percentage of total population	100%	27.6%	67.6%
Cork County	146,052	33,180	106,559
As percentage of total population	100%	22.7%	72.9%
Cork City	49,370	21,736	24,840
As percentage of total population	100%	44%	50.3%
Carrigaline North ED	4,058	848	3,130
As percentage of total population	100%	20.8%	77.1%
Carrigaline South ED	904	173	699
As percentage of total population	100%	19%	77.3%
Liscleary ED	1,433	285	1,102
As percentage of total population	100%	19.8%	76.9%

Table 4 – 8 suggests that the level of dwelling vacancy in all EDs are relatively low, where each are below the state, county, and city averages. This suggests that it is likely that residential demand is high and that Carrigaline is an attractive place to live long-term.

Table 4-8: Vacancy Levels, Census 2016

Area	Total Permanent Dwellings	Vacant Dwellings	As Percentage of Total Permanent Dwellings
State	2,003,645	183,312	9.1%
Cork County	173,735	15,645	9%
Cork City	55,760	4,292	7.6%
Carrigaline North ED	4,363	148	3.3%
Carrigaline South ED	1,010	71	7%
Liscleary ED	1,537	67	4.3%

4.4.2 Economic Activity

As noted, Carrigaline is located within the Metropolitan Area of Cork, and is designated as a Metropolitan Town. It is within the Cork County Development Plan (2014) and its current Draft Plan to accommodate for Carrigaline’s rapid population growth through residential and industrial development, as such development is the main employment activity in Carrigaline.

The CSO releases quarterly publications on labour force estimates for the state (Table 4-9). The table distinguishes Covid-19 adjusted estimates from ‘generalised’ predictions.

The Labour Force Survey (LFS) is the official source of labour market statistics for Ireland. It includes the official rates of employment and unemployment, which are based on International Labour Organisation (ILO) concepts and definitions. The Central Statistics Office (CSO) has compiled LFS estimates for Q4 2021 to the usual ILO standards and separate COVID-19 adjusted estimates (refer to Table 4-9).

4.4.2.1 Employment

The Central Statistics Office (CSO) releases quarterly publications on labour force estimates for the state (Table 4-8). Table 4-9 distinguishes Covid-19 estimates from ‘normal’ predictions.

The Labour Force Survey (LFS) is the official source of labour market statistics for Ireland. It includes the official rates of employment and unemployment, which are based on International Labour Organisation (ILO) concepts and definitions. The CSO has compiled LFS estimations for Q4 2021 to the usual ILO standards and separate Covid-19 adjusted estimations (refer to Table 4-8).

Table 4-9: Results of CSO Labour Force Survey for the State Q4 2021

Indicator	Standard LFS Methodology (ILO)	COVID – 19 Adjusted Estimates December 2021
	Q4 2021	End of Q4 2021
Employed persons aged 15-89	2,506,000	2,439,099
Employment rate for those aged 15-64 years	73.0%	70.9%
Unemployed persons aged 15-74 years	127,400	195,313
Unemployment rate for those aged 15-74 years	4.9%	7.4%
In labour force	2,633,300	-
Not in labour force	1,411,800	-

To summarise, the results in the chart above (Table 4-9) indicate growth in the economy, showing that there were 2,633,300 persons in the labour force in Q4 2021, which was up by 8.9% (214,800) from Q4 2020. The participation rate in Q4 2021 stood at 65.1% up from 60.6% a year earlier.

The 2016 labour force participation figures for Cork City and County show a decline in unemployment and increased participation in the labour force, as can be expected due to the start of a period of economic recovery. It is also noted that the boundary extension of Cork City will result in significant changes to any future assessment of the Labour Force Participation Rate for Cork City in the forthcoming census.

Table 4-10: Labour Force Participation Rate

Area	Factor	2011	2016
State	Labour Force Participation Rate (%)	61.9%	61.4%
	Unemployment Rate (Rate)	19%	12.9%
Cork County	Labour Force Participation Rate (%)	54.4%	55.2%
	Unemployment Rate (Rate)	22.2%	15%
Cork City	Labour Force Participation Rate (%)	62.7%	61.6%
	Unemployment Rate (Rate)	14.8%	9.2%

According to the CSO data, the results are indicative of a growing economy that is recovering from the most recent downturn that was mainly caused by the Covid-19 pandemic.

4.4.2.2 Land Use and Amenity

Due to the town being within the Metropolitan Greenbelt, the landscape in which the EIAR study area is located is categorised in the Cork County Landscape Strategy as ‘Very High Value’ landscape as well as ‘Very High’ landscape sensitivity with National Importance landscape types. As a whole, the Bandon – Kinsale South Local Area Plan defines the landscape in Carrigaline as an “incised patchwork and Wooded Estuary with Mudflats and Islands’. When assessing the Proposed Development Site, the Cork County Development Plan (2014) reveals that the Site is located outside of the High Value Landscape to the east towards Crosshaven along the River Owenbue that transforms into the Owenabue Estuary. According to the Cork County Development Plan (2014), the Proposed Development Site has an ‘indented estuarine coast’ landscape character type. Further, it is important to note that the Proposed Development Site is in close proximity to two National Parks and Wildlife designations. To the east of the Site, the River Owenbue is designated as both a Special Protection Area as well as a Proposed Natural Heritage Area. Along this river corridor, the Carrigaline Walk is designated as a scenic route, and is approximately 1.4 km from the Proposed Development Site.

Carrigaline town is distinctive, as it encompasses a strong village character, unique setting, history, and community spirit as noted in the Cork County Development Plan (2014). There a total of 6 no. protected structures within or in close proximity to Carrigaline and the town contains a number of archaeological monuments that obtain historical significance.

The Proposed Development Site is within the townland of Kilmoney to the south of Carrigaline town. The Site is approximately 250m from Main Street which is otherwise known as the town

centre. The Site is best accessed through Kilmoney Road as well as Main Street/Cork Road/R611 that provides immediate access throughout the town and connects to the N28. There is a mixture of uses that surround the Site but are most referred to as retail, residential, and institutional. This includes the variety of retail stores, neighbouring estates, as well as various educational facilities. The Site itself is generally level and comprises of agriculture/greenspace lands.

According to the Bandon – Kinsale Local Area Plan (LAP), the Proposed Development Site is zoned under CL-U-02 zoning, otherwise classified as 'Town Centre/Neighbourhood Centre' zoning. Directly adjacent to the Site to the west, the greenspace is zoned as 'Open Space/Sports/Recreation/Amenity'. It is also important to note that the Site is also surrounded by lands zoned as 'Residential' and 'Existing Built-up Area' to the north and south of the Site boundary.



Figure 4-3: Site boundary outlined in red.

Carrigaline is identified in the Regional Spatial & Economic Strategy for the Southern Region (RSES) as a thriving Metropolitan Town with a strong village character, set in a high-quality harbour environment and in close proximity to Ringaskiddy employment area". It is an objective of the RSES to ensure that development plans tailor the appropriate scale nature and location of the settlement. It is important to note that the Proposed Development Site is in close proximity to an area of Very High Landscape Value along the River Owenabue and includes the Owneabue Estuary. This is addressed further under Chapter 5: Biodiversity.

It is key to note that the Carrigaline area benefits from a wide selection of community facilities and services including doctor and dentist clinics, library, retail outlets, post office, sport and community facilities, gyms, parks, banks, and churches. Most of these services are located 2 – 5 km from Carrigaline town centre or are located within the centre itself.

Carrigaline has a strong network of community groups and clubs hosted at the centre of the town within the Carrigaline Community Complex/Centre run by local volunteers. There are a total of 55 clubs within the centre; some clubs include Tiny Towns Committee, Carrigaline Folk Choir, Carrigaline Arts Network, Carrigaline Active Retired association, as well as Carrigaline Parents & Toddlers Group.

The settlement of Carrigaline has an abundance of amenity trails, walks and cycle routes that are in close proximity to the Proposed Development Site. Such amenity areas include Carrigaline Walk Trail, Ballea Park, and Carrigaline Playground & Skatepark. In lieu of this, the Site layout proposed will provide the provision for pedestrian connectivity for the development to link with the town centre which will provide greater access to amenity areas and walks.

4.5 Characteristics of the Proposed Development

The Proposed Development consists of the construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units, a 184m² creche/childcare facility, the provision of landscaping and amenity areas to include 1 no. local play area, 2 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas, the provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level and all associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle and car parking, as well as bin storage. The local play and kick about areas are located at the north of the proposed scheme along the River Owenabue. A cycle and pedestrian pathway connects the Site to the R611, otherwise known as Carrigaline's town centre.

4.6 Potential Impact of the Proposed Development

In identifying potential impacts and receptors, consideration was given to the proposed residential scheme and the identified receiving environment. The principal potential receptors that will be affected by the development proposals have been identified as follows:

4.6.1 Local Residents

There are several existing residents that are in close proximity to the Proposed Development Site which have the potential to be impacted by the Proposed Development, specifically the residents of:

- 24 no. detached dwellings to the north of the Proposed Development Site along Nova Road and Owenabue in addition to the residential estate as a whole;
- 9 no. detached dwellings and neighbouring estate to the south of the Proposed Development Site along Kilmoney Road Lower;
- Residential dwelling units existing along Main Street.

4.6.2 Community Facilities and Services

As previously noted, Carrigaline has an abundance of community facilities and services within the town centre which are identified as potential receptors. Such services include pharmacies, post office, dentist, various banks, gyms, farmers market, sport playing pitches, a community centre, as well as a selection of local convenience/comparison retail stores.

With regards to childcare facilities, a total number of 11 childcare facilities were identified within a 10–30-minute travel time of the EIAR study area (see table 4 – 10).

A crèche is proposed as part of the Proposed Development. The closest childcare facility to the Proposed Development Site includes the Tots & Co. (800m south of the Proposed Development Site), the Shine Centre for Autism (1.0 km north of the Proposed Development Site), as well as Ena’s Montessori (1.2 km south of the Proposed Development Site).

The travel times and distance were determined based on the distance and average journey times from Google Maps.

Table 4-11: Crèche/Childcare Facilities Located within 10-20 Minutes of the Proposed Development Site

No.	Name of Crèche/Childcare Facility	Distance from EIAR Study Area (km)	Travel Mode (mins)			
			Drive	Cycle	Walk	Transit
1	The Wishing Well	2.2 km	6	10	29	18
2	Scoil Mhuire Lourdes Boys National School/Holy Well National School (childcare facility)	1.9 km	6	6	20	14
3	Shine Centre for Autism	1.0 km	4	4	12	11
4	Heronswood Childcare Centre	2.3 km	7	9	26	14
5	Little Einsteins Childcare Centre	1.6 km	6	7	19	10
6	First Steps Pre-School	1.3 km	5	4	12	13
7	An Naíonra Charraig Uí Leighin	1.3 km	5	4	13	13
8	Starting Point Montessori School	1.8 km	5	8	21	21
9	Ena’s Montessori	1.2 km	3	7	15	9
10	Tots & Co. Childcare	800 m	2	6	12	n/a
11	The Orchard Preschool	2.6 km	6	9	31	18



Figure 4-4: Location of Childcare Facilities in Relation to Site

The Carrigaline study area is also served by 6 no. primary schools as well as 3 no. post-primary schools located in the study area that are all within a 3 – 35 min travel time or 2.5 km radius of the Proposed Development Site. The closest primary school from the Proposed Development Site is Holy Well National School (1.4 km) and St. Mary’s National School (1.8 km). Table 4-12 and Table 4-13 identify the distance from the Proposed Development Site to the schools and indicates the various walking, cycling and driving times required to access the schools.

Table 4-12: Primary Schools and Distance from the Site (travel times in minutes)

No.	Primary School	Distance from EIAR Study Area (km)	Travel Mode (mins)			
			Drive	Cycle	Walk	Transit
1	Gaelscoil Charraig Uí Leighin	2.1 km	6	10	29	19
2	Sonas Special Needs Primary School	2.3 km	6	11	31	21
3	Holy Well National School	1.4 km	5	6	17	15
4	St. Mary’s National School	1.8 km	6	7	20	17
5	Owenabue Educate Together National School	2.3 km	7	10	30	18
6	Carrigaline Educate Together National School	2.5 km	7	10	32	20



Figure 4-5: Location of Primary School Facilities in Relation to the Site

All post-primary schools are accessibly close to the Proposed Development Site. The closest school is Carrigaline Community School (1.1 km from the Proposed Development Site) and Edmund Rice Catholic College (1.4 km from the Proposed Development Site). All schools are accessible within a 15 min travel time by drive, cycle, and bus. Table 4-12 and Table 4-13 identify the distance from the Proposed Development Site to the schools and indicates the various walking, cycling, and driving times required to access the schools.

Table 4-13: Post-Primary Schools and Distance from Site (travel time in minutes)

Post-Primary School	Distance from EIAR Study Area (km)	Travel Mode (mins)			
		Drive	Cycle	Walk	Transit
Carrigaline Community School	1.1 km	3	5	14	10
Edmund Rice Catholic College	1.4 km	3	6	16	10
Gaelcholáiste Charraig Uí Leighin	2.1 km	6	11	29	14



Figure 4-6: Location of Post – Primary School Facilities in Relation to the Site

4.6.3 Local Amenity

Section 4.3.2.2 identifies that Carrigaline benefits from a strong network of community groups, clubs, and societies. The development is considered and designed to improve and protect the residential amenity by including 1 no. open space/river walk amenity area along the southern boundary of the Site.

4.6.4 Economic Activity & Tourism

Owners and employees of other commercial activities may be impacted by the Proposed Development i.e. local business owners, industries, and adjacent farms. Consideration is given under economic activity to the potential impact on other neighbouring commercial activities.

It is important to note that an increase of tourism is not expected from the Proposed Development and does not hinder on any existing tourism areas such as the Carrigaline Walk. While Carrigaline does not have any intrinsic tourism value it is in close proximity to Crosshaven. Cork Harbour provides a very significant resource both in terms of tourism and leisure activities. The Cork CDP 2014 identifies the Marine Leisure sector as the fastest growing sector within the tourism industry. The world's oldest yacht club is located in Crosshaven, and Cork Harbour hosts a bi-annual Cork Sailing Week regatta. The Cork CDP also recognises that the maintenance, improvement and in some cases construction of new piers and harbours is essential in coastal and estuarine areas in order to facilitate the activities associated with fishing and tourism (Cork CDP, paragraph 8.4.4). Objective TO 4-1 of the Cork CDP relates to developing the Marine Leisure Sector, and supporting the development of sustainable recreation and activity related marine tourism developments at appropriate locations along the coastline.

4.6.5 Temporary Receptors

In relation to temporary receptors, the Proposed Development is adjacent to Kilmoney Road. Due to the topography of the EIAR study area as well as the notable vegetation and trees along the southern Site boundaries, in addition to the store frontage along Main Street/Cork Road, much of the Site is screened from view. Where visible it is considered that there will be an impact on drivers passing the Site. Potential impacts are thoroughly assessed in Chapter 10 Landscape and Visual Impact Assessment.

4.6.6 Construction Phase

General construction activities and excavation may give rise to emissions to air or surface water and may generate noise and vibration. The details of the construction phase of the project are provided in Chapter 9 and in the preliminary Construction and Environmental Management Plan (CEMP). To summarise, the development will be constructed and expected to be completed within the 5-year planning permission. The construction phase is estimated to be 18 months in duration.

The development will consist of 224 no. residential units consisting of 202 no. apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units, a 184 m² creche/childcare facility, landscaping amenity areas that include 1 no. local play area, 2 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade, and 2 no. courtyard areas, the provision of 3 no. retail units, residential amenity and management spaces, as well as vehicular access on to the Kilmoney Road Lower and a cycle/pedestrian connection on to the R611.

The construction of the proposed scheme is expected to begin in Q1 2023 and will be completed in Q3 2024. The expected hours of construction works will commence from 7:00am to 18:00 from Monday to Friday (excluding bank holidays), and from 8:00 to 13:00 on Saturdays. In total, there is expected to be 150 construction workers employed on the Site. For more information, please refer to the Construction Environmental Management Plan and the Phasing Approach outlined by ARUP.

4.6.7 Population and Settlement Patterns

The construction phase of the project will be short term and is not likely to result in any changes to the population and settlement patterns as described in Section 4.2. Generally, the potential impacts arising during the construction phase relate to short term impacts to quality of life including visual impact/amenity, noise, air quality, and transport. Where relevant, these impacts have been considered in the relevant chapters of the EIAR and will be minimised or mitigated where appropriate. It is unlikely that these impacts will be of a scale to either encourage people to move from the area or discourage people from moving to the area. No significant impacts are anticipated as a result of the construction phase of the development.

4.6.8 Economic Activity

The construction phase of the development is anticipated to result in a temporary boost to the local economy. Approximately 150 construction workers will be employed during the peak of the construction phase. Indirect employment will be created as construction workers employed at the Site can be expected to make use of local retail facilities and other services that are in

immediate proximity to the Proposed Development Site. If the application is successful, construction works will continue until the final phase of development is completed by Quarter 3 of 2024 which will benefit the other industries as a result of demand for construction materials and services. The loss of the agricultural lands is anticipated to have a neutral effect as the lands are under ownership of the applicant.

It is anticipated that the construction phase of the project will result in likely positive short term moderate effects locally and within the wider Carrigaline area.

4.6.9 Land Use and Amenity

The project is in accordance with the statutory land use zoning objective. There will be no severance of lands or loss of rights of way as a result of the Proposed Development. In general, the overall construction phase impacts on local amenity and receptors identified in proximity will be mainly related to noise, air quality and traffic. These are dealt with in the specific chapters of the EIA.

The construction works may result in a short-term negative/neutral impact on the nearby receptors.

Potential impacts will mainly relate to noise from construction works and traffic as well as perception of visual changes associated with removal of trees and hedgerows and emerging plant and machinery.

The assessment of potential impacts of noise and vibration is presented in Chapter 9. No significant impacts from vibration are anticipated. The assessment identified that during construction the chief source of noise emissions will be from works on site. Rock breaking is unlikely to be required. Constriction traffic and HCV's activity will represent a continuation of activity that has occurred for previously in Carrigaline and It is not likely to increase significantly. Overall, the impacts from the construction phase will be slight, localised and short term in duration.

Potential impacts from construction traffic are considered in Chapters 12 under Traffic and Material Assets. A Construction Traffic Management Plan will be developed and implemented to avoid impacts by restricting the majority of HGV movements to local roads at off peak times and implement the delivery of materials on site to avoid peak traffic periods. This will be especially considered in regards to traffic along Main Street/Cork Road.

4.6.10 Health

Therefore, a number of mitigation measures are proposed and following the implementation of these measures, potential significant impacts are deemed unlikely. If there are the presence of any potential significant negative impacts, they are anticipated to be short-term an imperceptible with respect to human health. For further information regarding such measures please refer to Chapter 9: Noise and Vibration as well as the Construction Environmental Management Plan.

The Site will be made secure, and the general public will be separated from the Site by means of fencing and hoarding. All Site facilities will be contained within the Site area. The main entrance gate will be controlled by site personnel (gateman) for deliveries. Site lighting and a

camera security system may be used to secure the Site in out-of-hour times, and any proposed Site lighting will be set up with consideration for adjoining properties.

A temporary construction compound will be established within the red line boundary of the Proposed Development Site.

Following the implementation of these mitigation measures, the construction phase of the project to present any adverse effects is deemed to be unlikely, neutral, and short-term. However, there is a present risk of Covid-19 impacting construction timelines and the number of workers on Site.

4.6.11 Operational Phase

Due to the nature of the development, there will be no significant impacts associated with the operational phase of the development and will therefore present no potential significant negative impacts in regards to construction and development of the proposed scheme.

4.6.12 Population and Settlement Patterns

The Proposed Development is in alignment with the statutory land use zoning specified in the LAP. Therefore, it will deliver 224 no. residential units (apartments and townhouses/duplex units) a creche, where 10% of residential units satisfied the 10% Part V Social Housing requirement. The total number of units that are capable of accommodating families residing in a 2-bedroom and over unit for the Proposed Development equates to 108. Based on a national average household size of 2.75, the Proposed Development is likely to generate a demand for approximately 616 persons. According to the trends for Carrigaline, the development would result in a demand for approximately 20 no. creche/pre-school places, 43 primary, and 31 no. post-primary school places.

4.6.13 Economic Activity

There will be an economic benefit to local business during operation. Residents will use the local facilities and services provided, as it is anticipated that the additional population will result in increased business for the wider Carrigaline community. It is anticipated that the development will bring a positive impact on local business in the area, particularly along Main Street/Cork Road. The implementation of the proposed scheme will provide employment opportunities through the construction of the neighbourhood creche as well as the retail convenience/comparison units.

4.6.14 Land Use and Amenity

The Proposed Development is in line with the site-specific zoning objective for town centre mixed-use development (refer to Chapter 2, Project Description, for further details) and will consist principally of residential units, a creche, retail units, and open space amenity areas. This development will facilitate an appropriate, sustainable pattern which will accommodate residential, community, retail, leisure, and recreational facilities to satisfactorily match the anticipated level of population growth and household generation.

The amenity provision within the development is described in detail in the Planning and Design Statement prepared by Henry J Lyons Architects. The Site has a natural screening boundary

to the north along the River Owenabue. The existing hedgerows running north and south along the Site forms the framework of the design and integrate smoothly with the near completed Western Relief Road. The landscaping of the development is suitable for a town centre mixed-used scheme that provides open space amenities for both residents and the public who frequent the area, creating a user-friendly environment with a strong and attractive landscape setting. Please refer to Chapter 10 Landscape and Visual of the EIAR report. This future amenity is a positive consideration to define the relationship and connectivity of both the open spaces and the development itself, as well as the town centre of Carrigaline as a whole. The open spaces provided are all accessible within a 2 min walk from most of the Site.

Such open spaces include play areas, kick about areas, a walking and activity route towards the town centre, visual amenity, as well as positive opportunities for congregation.

Community facilities identified in section 4.4.2 are expected to benefit from the increased population, particularly in sports clubs, community centres, and gyms, as well as community services such as the post office, library, and GP services. Any potential impacts are anticipated to be long-term, neutral, and not significant.

4.6.15 Health

The baseline data for Carrigaline indicates that in general the population is in good health. The Proposed Development will not result in any significant negative impacts to the health and wellbeing of the existing population or its neighbouring natural amenity areas, such as the River Owenabue. In particular, the design of the scheme ensures that both future and existing residents within the local environs will benefit from the proposed retail outlet within the development.

The operational phase of the Proposed Development, in terms of recreation and amenity facilities, will have a long term and moderate positive impact on Human Health.

The development has been designed to incorporate the principles of Universal Design, to provide appropriate choice of accommodation to residents with diverse abilities and ages. A Universal Design Statement has been prepared by Henry J. Lyons Architects which provides insight into the design concept. The Statement concludes that the development can be accessed, understood, and used by the widest possible extent of people, regardless of their age, size, or ability. This includes the townhouses/duplex units, and apartments as well as the external spaces, pedestrian, cycle routes, and roads.

The potential impacts on population and human health as a result of operational noise and vibration are assessed in Chapter 9. The assessment found that noise emissions arising from the completed Site will be urban-residential in character, will not give rise to offsite impacts, and will be identical in character to emissions arising within surrounding residential zones.

4.6.16 Daylight and Sunlight Assessment

A Daylight, Sunlight, and Overshadowing Report has been prepared and submitted with this application which concludes that the proposed residential development achieves the best practice guidelines in relation to daylight, sunlight, and overshadowing.

4.6.17 Building Life Cycle Report

A Building Life Cycle Report has been prepared by Aramark to assess the long-term running and maintenance costs of the apartment buildings associated with this Proposed Development. All measures have been included in the design of the Proposed Development to consider the reduction of potential costs in the functioning of the completed development. These measures were included within the design, layout, and selection of proposed materials for the development.

4.6.18 Risk of Major Accidents and Disasters

The potential of major risks and disasters as a result of the Proposed Development has been assessed and the findings are presented in Chapter 13 of this EIAR and by other disciplines within this EIAR. No risk of major accidents and disasters has been identified. The project comprises the development of a townhouse/duplex and apartment residential unit scheme, in a greenfield area at the periphery of Carrigaline's town centre. There are no sites in proximity which are subjects to The Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015. A desktop study of the flood history at the Site was carried out in the Civil Engineering documents prepared by Horgan Lynch Consulting Engineers. According to the Office of Public Works, as well as the Ballincollig Carrigaline LAP, the Proposed Development Site is located within Flood Zone A (high risk) and B (medium risk of flooding). The Flood Risk Assessment conducted by Arup has determined that flood mitigation measures provided by the proposed scheme, such as water compatible open space amenity uses and raised finished floor levels, will provide protection if a flooding event occurs. It is important to note that the Justification Test conducted was in accordance with the OPW Guidelines and determined that the Proposed Development satisfied the criteria of the development management Justification Test. For further information, please refer to Chapter 2: Description of Alternatives, Chapter 5: Biodiversity, as well as Chapter 7: Hydrology and Hydrogeology.

4.6.19 Do Nothing Scenario

If the development were not to proceed there would be no immediate impact on the existing population, or economic activity for residents living in that area. However, due to the size of the Site in relation to other areas of land zoned for residential/town centre, the increased housing targets presented in the Cork County Development Plan 2014 and its Draft Plan 2022, as well as the Bandon Kinsale LAP. This would have a negative impact on the Carrigaline Municipal District as a whole as well as its role as a Metropolitan Town, which subsequently undermines the Core Strategy and supportive objects in the Development Plans.

As previously stated, the Bandon Kinsale LAP has the Site zoned under CL-U-02 (Town Centre/Neighbourhood Centre). Due to the nature of the development providing a mixed-use scheme with amenity areas suitable for town centre environments, the consideration of alternative sites is not necessary. The consideration of an alternative location would equate to a 'do-nothing' alternative for the Proposed Development Site and the Site would become overgrown and unkept. This would mean that these lands would not be developed in accordance with the objectives of the Local Area Plan.

Both the Cork Development Plan 2014, its Draft Plan 2022, as well as the LAP note the importance of prioritising town centre growth in Carrigaline in order to enhance its role as a Metropolitan Town. Improving these qualities will create opportunity and employment, increase the range of services in order to effectively serve the needs of the community while attracting town centre growth in Carrigaline. These objectives will be difficult to maintain without a residential development element to such schemes. In the absence of the relevant policies and specific objectives of the Site there would be no framework directing developments to appropriate locations and this would have the potential to result in adverse impacts on the environmental components, which could negatively affect human health.

The land would likely remain agricultural use. Therefore, the impacts on land use are therefore envisaged to be neutral for the ‘do – nothing’ scenario.

4.6.20 Potential Cumulative Impacts

There are few permitted and Proposed Development in the vicinity of the EIAR study area which are in combination with the Proposed Developments that may have cumulative impacts. The cumulative impacts related to the following projects have been considered where relevant, in the context of the human environment:

Table 4-14: Cumulative Impacts – List Permitted and Proposed Developments

No.	Planning Reference No.		Comment
1	21/17180	The demolition of a two-storey existing dwelling. The construction of a three storey, 5 no. unit, apartment building (Block A) consisting of 4 no. 1 bedroom apartments, and 1 no. 3 bedroom apartment and the construction of a four storey, 32 no. unit, apartment building (Block B) consisting of 20 no. 1 bedroom apartment and 12 no. 2 bedroom apartments to the rear of Dunmahon Main Street, Carrigaline with vehicular access off of Kilmoney Road Lower. The creation of a new pedestrian entrance off of Main Street and a vehicular delivery access gateway and a pedestrian escape gateway to the existing adjacent public house from the proposed new carpark area. The proposed development will comprise of a total of 37 no. apartments.	Application was received on 14/12/2021 by Cork County Council and is currently undergoing the Further Information stage of the planning process.
2	21/4818	A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the proposed development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753	Applied for extension of duration that was granted by Cork County Council on 25/05/2021.

No.	Planning Reference No.		Comment
3	21/6926	The change of use of an existing disused dry-cleaning shop to a new Pizzeria, including the sale of hot food for consumption off the premises, internal refurbishment works, new signage to the front elevation, and all associated site development works.	Granted permission with 20 conditions on 16/12/2021.
4	21/7464	The construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.	Application was received on 19/01/2022 and awaiting a decision from Cork County Council.
5	19/4642	Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting, and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application. Located on Proposed Development Site.	Granted permission with 11 conditions on 22/08/2019.
6	19/4204	Demolition of the annex to the rear of existing retail unit and change of use from disused furniture shop to optician practice and to construct a two-storey extension to the rear and alterations to elevations, all to existing retail unit.	Granted permission with 21 conditions on 18/06/2019.
7	19/4698	Demolition of two vacant residential properties and construction of a new building for retail use which will be amalgamated into the existing Newsagents and Deli area of the adjoining retail building on the northern side with associated seating area, signage and all associated site works.	Granted permission with 19 conditions on 02/09/2019.

4.7 Avoidance, Remedial & Mitigation Measures

No likely negative impacts have been identified for the population or land use. Therefore, no mitigation measures are required.

The Proposed Development has been designed to avoid negative impacts in relation to local amenities and recreational facilities by:

- Incorporating the provision of a creche within the design proposal.
- Incorporating amenity facilities within the layout, including a large open space area, play areas and kick about areas, as well as the provision for walking and cycling trails throughout the development that brings further connectivity to the town centre.

Accordingly, no further mitigation measures are required.

No significant risks to human health have been identified within this discipline in relation to the operational phase of the development. Accordingly, no further mitigation measures are required.

4.7.1 Construction Phase Mitigation

During the construction phase, safety will be a primary concern. A Project Supervisor for the Construction Process (PSCP) will be appointed to oversee site safety. A contractor safety management programme will be implemented identifying potential hazards associated with the proposed works. Temporary contractor facilities and areas under construction will be fenced off from the public with adequate warning signs of the risks associated with entry to these facilities. Entry to these areas will be restricted and they will be kept secure when construction is not taking place. Measures to ensure public safety, with respect to construction traffic will be included in the final Traffic Management Plan, to be agreed with the Planning Authority prior to commencement of development.

4.7.2 Operational Phase Mitigation

Measures to avoid potential negative impacts on population and human health have been fully considered in the design of the project and are integrated into the final layout and design. Compliance with the layout and design will be a condition of the permitted development. As such no mitigation measures are required.

4.7.3 “Worst Case” Scenario

In the event that all mitigation measures fail to hinder potential negative impacts, the possibility of an increase of traffic within the surrounding roads and junctions of the Site can occur. Further, without these mitigation measures in place, noise caused by the construction of the proposed scheme may increase and can cause a disturbance any residential dwellings in close proximity to the Site. Further, when mitigation measures are not considered, there is the possibility of the impact on dust that can be carried throughout the Site. Dust can expand beyond the Site and create adverse effects on the neighbouring environment, including the River Owenabue, residential dwellings, as well as businesses in the town centre. However, it is imperative that such mitigation measures are implemented to ensure that the worst-case scenario does not occur. When considering the mitigation measures that will be in place, the event of a worst-case scenario is deemed to be unlikely.

4.8 Residual Impacts

The proposed mitigation measures will avoid, prevent, or reduce impacts on the human environment during the construction and operational phases of the Proposed Development.

It is anticipated that the Proposed Development will realise significant positive overall economic and social benefits for the local community and the wider Carrigaline area. Strict adherence to the mitigation measures recommended in this EIAR will ensure that there will be no negative residual impact or effects on Population and Human Health from the construction and operation of the proposed scheme. Indeed, the delivery of much needed housing will realise a likely significant positive effect for the local area, particularly Carrigaline's town centre.

4.9 Monitoring

No specific monitoring is proposed in relation to population and human health. Monitoring is outlined in the interacting chapters – Air, Noise and Traffic.

4.10 Interactions

Population and human health do not have a significant number of interactions with other topics. The most significant interactions are between population and human health and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the Proposed Development will ensure that the impact of the Proposed Development complies with all ambient air quality legislative limits and therefore the predicted impact is short term and imperceptible with respect to human health. For more information, please refer to Chapter 8: Air Quality and Climate. Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The impacts of the Proposed Development on air quality are assessed by reviewing the change in annual average daily traffic on the surrounding road network. In this assessment, the impact of the interactions between traffic and air quality are considered to be imperceptible. Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and biodiversity along with interactions between air quality and land and soils in the form of dust emissions. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and biodiversity. It is also predicted that there will be no significant interactions between air quality and land and soils once mitigation measures are in place. No other significant interactions with air quality and climate have been identified. A breakdown of these elements has been analysed further below:

4.10.1 Land and Soil

During construction works offsite removal of surplus soil will be required. The necessary mitigation measures will be implemented to address any nuisance issues associated with dust dispersion during this time. No public health issues associated with the land, soil, geology conditions at the Site have been identified for the Construction Phase of the Proposed

Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers.

4.10.2 Hydrology and Hydrogeology

No public health issues associated with the water (hydrology and hydrogeology) conditions at the Proposed Development Site have been identified for the Construction Phase or Operational Phase of the Proposed Development.

Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

4.10.3 Air Quality and Climate

Interactions between Air Quality and Population and Human Health have been considered as the Operational Phase has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic-related pollutants have been assessed and determined as imperceptible, therefore air quality impacts from the Proposed Development are not expected to have a significant impact on population and human health.

4.10.4 Noise and Vibration

The impact assessment of noise and vibration has concluded that additional noise associated with the operation of on-site machinery will be intermittent and will not create any major negative impacts beyond the Site boundary. Mitigation and monitoring measures will be incorporated to further reduce the potential for noise generation from the Proposed Development.

4.10.5 Landscape and Visual

During the Construction Phase there will be visual changes associated with removal of trees and hedgerows and emerging plant and machinery. During the Operational Phase there will be permanent visual changes to the landscape which may impact residential dwellings surrounding the Proposed Development. A full impact assessment has been carried out in Chapter 10 Landscape and Visual to quantify this impact.

4.10.6 Material Assets: Waste and Utilities

The improper removal, handling and storage of hazardous waste could negatively impact on the health of construction workers. Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health.

4.10.7 Material Assets: Traffic

There can be a significant interaction between population and human health and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived

pollutants which may affect Air Quality and thus Population and Human Health have been deemed as insignificant.

4.11 Difficulties Encountered When Compiling

Overall, there were no difficulties encountered when compiling this Chapter of the EAR. All research was conducted through a desk top study.

4.12 References

Bandon Kinsale Municipal District Local Area Plan 2017, Cork County Council

Cork County Development Plan 2014, Cork County Council

Cork County Draft Landscape Strategy 2007, Cork County Council

The Provision of Schools and the Planning System - A Code of Practice for Planning Authorities (2008), The Department of Education and Science, and the Department of the Environment, Heritage and Local Government

Health and Safety Authority website - <http://www.hsa.ie/eng/Topics/Hazards/> (Accessed 20/04/2022).

Central Statistics Office (CSO) website www.cso.ie (Accessed 08/04/2022).

Department of Education and Sciences (DES) website www.education.ie (Accessed 24/04/2022).

Tusla website www.tusla.ie/ (Accessed 08/04/2022).

Google Earth (Google Earth) (Accessed 09/04/22)

5 BIODIVERSITY

5.1 Introduction

This Chapter describes the Biodiversity of the Site of the Proposed Development and surrounding environs, with emphasis on habitats, flora, and fauna, and details the methodology of assessment used in each case. It provides an assessment of the impacts of the Proposed Development on habitats and species, particularly those protected by national and international legislation, or considered to be of Conservation Importance; and proposes measures for the mitigation of these impacts, where appropriate.

The Chapter has been completed having regard to the *Guidelines for Ecological Impact Assessment in the UK and Ireland*, by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018), together with the guidance outlined in the Environmental

Protection Agency documents *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (May 2022) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015). The value of the ecological resources, the habitats and species present or potentially present, was determined using the ecological evaluation guidance given in the National Roads Authority's (NRA) *Ecological Assessment Guidelines* (NRA, 2009b).

5.1.1 Quality assurance and competence

All surveying and reporting has been carried out by qualified and experienced ecologists and environmental consultants. Dr Bryan Thompson, Ecologist with Enviroguide Consulting, authored this Chapter and undertook the desktop research, winter waterfowl and shorebird surveys for this EIAR. Liam Gaffney, Senior Ecologist with Enviroguide undertook the bat surveys, habitat mapping surveys, mammal surveys, invasive species surveys and common bird surveys at the Proposed Development Site. Brian McCloskey, Ornithologist with Enviroguide Consulting undertook the breeding bird survey pertaining to this report.

Bryan has a B.Sc. in Environmental Biology (Hons) and a PhD in Marine Ecology from University College Dublin, and a wealth of experience in desktop research, literature scoping-review, and report writing, as well as practical field experience (Habitat surveys, intertidal surveys, winter bird surveys, vantage point surveys and fresh water macro-invertebrates etc.). Bryan has experience in compiling Biodiversity Chapters of EIARs, Appropriate Assessment (AA) screening and Natura Impact Statement (NIS) reports, and in the overall assessment of potential impacts to ecological receptors from a range of developments.

Liam Gaffney, Senior Ecologist with Enviroguide Consulting, has a M.Sc. Hons. (Wildlife Conservation and Management) from University College Dublin, and a wealth of experience in desktop research, literature scoping-review, and report writing; as well as practical field experience (Habitat surveys, Wintering bird surveys, large mammals, fresh water macro-invertebrates etc.) Liam is also a Qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

Brian McCloskey, Ornithologist with Enviroguide Consulting has a B.Sc. in Environmental Management from Technical University Dublin (TUD) and a wealth of experience in a range of ornithological surveys including breeding bird, vantage point, hinterland and breeding wader surveys as well as research and report writing.

5.1.2 Relevant Legislation

5.1.2.1 National Legislation

5.1.2.1.1 Wildlife Act 1976 (as amended)

The Wildlife Act 1976 (as amended) was enacted in order to provide protection to birds, animals and plants in Ireland and to control activities which may have an adverse impact on the conservation of wildlife. Regarding the listed species, it is an offence to disturb, injure or damage their breeding or resting place wherever these occur without an appropriate licence from National Parks and Wildlife Service (NPWS). This list includes all birds along with their nests and eggs. Intentional destruction of an active nest from the building stage up until the chicks have fledged is an offence. This includes the cutting of hedgerows from the 1st of March to the 31st of August. The act also provides a mechanism to give statutory protection to Natural

Heritage Areas (NHAs). The Wildlife Amendment Act 2000 widened the scope of the Act to include most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

5.1.2.1.2 EU Habitats Directive 1992 and EC (Birds and Natural Habitats) Regulations 2011

The EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992) provides protection to particular species and habitats throughout Europe. The Habitats Directive has been transposed into Irish law through the EC (Birds and Natural Habitats) Regulations 2011.

Annex IV of the EU Habitats Directive provides protection to several listed species, wherever they occur. Under Regulation 23 of the Habitat Directive any person who, regarding the listed species; “Deliberately captures or kills any specimen of these species in the wild, deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration, Deliberately takes or destroys the eggs from the wild, or damages or destroys a breeding site or resting place of such an animal shall be guilty of an offence.”

5.1.2.1.3 Flora (Protection) Order, 1999

The Flora (Protection) Order grants protection to 76 species of plant in Ireland (56 vascular plants, 14 mosses, 4 liverworts and 2 stoneworts). This Act makes it illegal for anyone to up-root, cut or damage any of the listed plant species and it also forbids anyone from altering, interfering or damaging their habitats. This protection is not confined to within designated conservation sites and applies wherever the plants are found.

5.1.2.2 Invasive Species Legislation

Certain plant species and their hybrids are listed as Invasive Alien Plant Species in Part 1 of the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations 2011* (SI 477 of 2011, as amended). In addition, soils and other material containing such invasive plant material, are classified in Part 3 of the Third Schedule as vector materials and are subject to the same strict legal controls.

Failure to comply with the legal requirements set down in this legislation can result in either civil or criminal prosecution, or both, with very severe penalties accruing. Convicted parties under the Act can be fined up to €500,000.00, jailed for up to 3 years, or both.

Extracts from the relevant sections of the regulations are reproduced below.

“49(2) Save in accordance with a licence granted [by the Department of Arts, Heritage and the Gaeltacht], any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in anyplace [a restricted non-native plant], shall be guilty of an offence.

49(3) ... it shall be a defence to a charge of committing an offence under paragraph (1) or (2) to prove that the accused took all reasonable steps and exercised all due diligence to avoid committing the offence.

*50(1) Save in accordance with a licence, a person shall be guilty of an offence if he or she [...] offers or exposes for sale, transportation, distribution, introduction, or release—
(a) an animal or plant listed in Part 1 or Part 2 of the Third Schedule,*

(b) anything from which an animal or plant referred to in subparagraph (a) can be reproduced or propagated, or
(c) a vector material listed in the Third Schedule, in any place in the State specified in the third column of the Third Schedule in relation to such an animal, plant or vector material.”

5.1.2.3 International Legislation

5.1.2.3.1 EU Birds Directive

The Birds Directive constitutes a level of general protection for all wild birds throughout the European Union. Annex I of the Birds Directive includes a total of 194 bird species that are considered rare, vulnerable to habitat changes or in danger of extinction within the European Union. Article 4 establishes that there should be a sustainable management of hunting of listed species, and that any large scale non-selective killing of birds must be outlawed. The Directive requires the designation of Special Protection Areas (SPAs) for listed and rare species, regularly occurring migratory species and for wetlands which attract large numbers of birds. There are 25 Annex I species that regularly occur in Ireland and a total of 153 Special Protection Areas have been designated.

5.1.2.3.2 EU Habitats Directive

The Habitats Directive aims to protect some 220 habitats and approx. 1000 species throughout Europe. The habitats and species are listed in the Directives annexes where Annex I covers habitats and Annex II, IV and V cover species. There are 59 Annex I habitats in Ireland and 33 Annex IV species which require strict protection wherever they occur. The Directive requires the designation of Special Areas of Conservation for areas of habitat deemed to be of European interest. The SACs together with the SPAs from the Birds Directive form a network of protected Sites called Natura 2000.

5.1.2.3.3 Bern and Bonn Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) was enacted to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was introduced in order to give protection to migratory species across borders in Europe.

5.1.3 Description of the Proposed Development

The Proposed Strategic Housing Development consists of the following:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units;
- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tiered seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity

trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage

5.1.4 Construction Phase

The construction entrance to the Site will be from the new relief road to the west of the Site and will include vehicular access for construction traffic and pedestrian access for construction personnel. No public personnel, be it pedestrian or vehicular, will be permitted to enter the Site. Appropriate signage will be positioned at approach roads to the Site area so as to inform the public of the Site activities.

All construction works will occur in a single phase which is estimated to take 18 months to complete. During the general excavation of the foundations there will be additional heavy goods vehicle (HGV) movements to and from the Site. All suitable material will be used for construction and fill activities where possible and appropriate. It is understood that tower cranes will be erected to hoist materials on Site in the construction of the Proposed Development. Several mitigation measures for noise, dust, litter and other environmental nuisances associated with the Construction Phase are outlined in the Construction and Environmental Management Plan (CEMP).

For the duration of the proposed infrastructure works it is envisaged that the maximum working hours will be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 13:00 Saturdays, subject to the restrictions imposed by the local authorities. No working will be allowed on Sundays and Public Holidays unless express permission is obtained from the Local Authority.

5.1.5 Operational Phase

The Operational Phase will comprise commercial and residential use consistent with the neighbouring land use in the area.

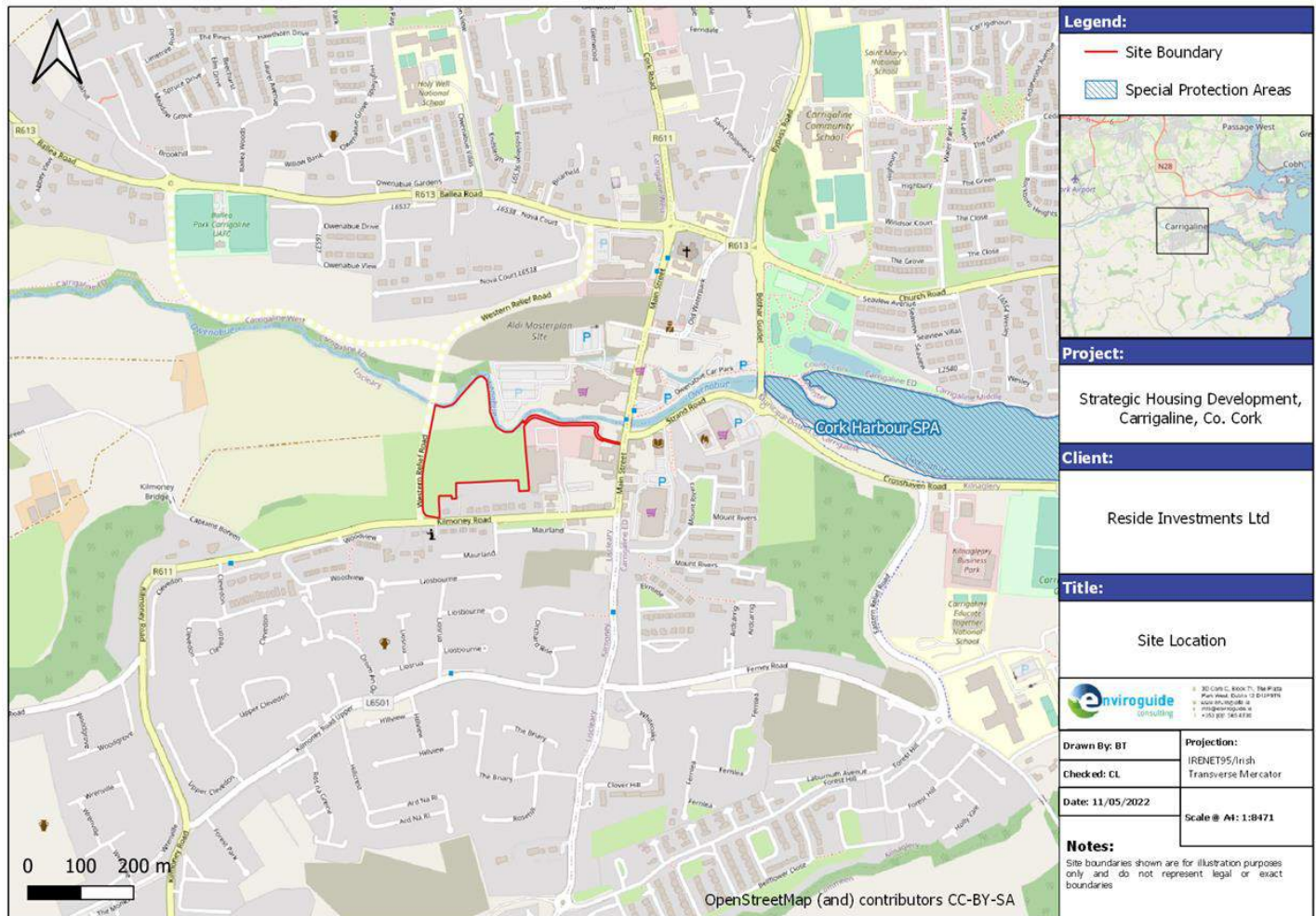


Figure 5-1: Site Location Map

5.2 Study Methodology

This section details the steps and methodology employed to undertake the Ecological Impact Assessment of the Site of the Proposed Development.

5.2.1 Scope of assessment

The specific objectives of the study were to:

- Undertake a baseline ecological survey of the Site and evaluate the nature conservation importance of the Site.
- Assess the direct, indirect, and cumulative ecological implications or impacts of the Proposed Project during its lifetime.
- Where possible, propose mitigation measures to remove or reduce those impacts at the Design and Construction Phases; and
- Achieve the best possible biodiversity outcome from a change in current land use.

5.2.2 Desk Study

A desktop study was carried out to collate and review available information, datasets and documentation sources pertaining to the Site's natural environment. The desk study, completed in May 2022, relied on the following sources:

- Information on species records³ and distributions, obtained from the National Biodiversity Data Centre (NBDC) at www.maps.biodiversityireland.ie
- Information on waterbodies, catchment areas and hydrological connections obtained from the Environmental Protection Agency (EPA) at www.gis.epa.ie
- Information on bedrock, groundwater, aquifers and their statuses, obtained from Geological Survey Ireland (GSI) at www.gsi.ie
- Information on the network designated conservation sites, site boundaries, qualifying interests and conservation objectives, obtained from the National Parks and Wildlife Service (NPWS) at www.npws.ie
- Satellite imagery and mapping obtained from various sources and dates including Google, Digital Globe, Bing and Ordnance Survey Ireland.
- Information on the existence of permitted development, or developments awaiting decision, in the vicinity of the Proposed Development from the National Planning Application Database available at <https://housinggov.ie/maps.arcgis.com/apps/webappviewer/index.html?id=9cf2a09799d74d8e9316a3d3a4d3a8de>
- Information on the extent, nature and location of the Proposed Development, provided by the applicant and/or its design team.

³ The Site of the Proposed Development lies within the 10km grid square W76 and the 2km grid square W76G. Records from the last 30 years from available datasets are given in the relevant sections of this report.

A comprehensive list of all the specific documents and information sources consulted in the completion of this report is provided in Section 5.11 - References.

5.2.3 Field Surveys

5.2.3.1 Habitat surveying, mapping and evaluation

Habitat surveys were completed by Liam Gaffney, Enviroguide Consulting in September 2021. Habitats were categorised according to the Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000) to level 3. The habitat mapping exercise had regard to the 'Best Practice Guidance for Habitat Survey and Mapping' (Smith *et al.*, 2010) published by the Heritage Council. Habitat categories, characteristic plant species and other ecological features and resources were recorded on field sheets.

5.2.3.2 Bird Surveys

Enviroguide Consulting carried out winter waterfowl and shorebird surveys, common bird surveys and breeding bird surveys on Site between September 2021 and April 2022 (Table 5-1). The objective of the winter waterfowl and shorebird surveys was to determine the composition, number, frequency, and transit height of species in passage over the Site of the Proposed Development and to inform decisions on potential disturbance to flight lines of birds commuting to/from roost sites and/or between feeding sites as a result of the Proposed Development. Each survey day commenced at either dawn or 6 hours prior to dusk. A common bird survey for the Proposed Development was carried out by Liam Gaffney from Enviroguide Consulting in September 2021 (Table 5-1). The survey methodology followed the British Trust for Ornithology's (BTO) *Common Bird Census* (CBS) technique (2nd edn) (Bibby *et al.*, 2000), and the equipment used was Opticron Natura BGA 8 x 42 Binoculars. A pre-determined transect was walked and all bird species encountered were recorded on field sheets as well as location (on 1:500 field maps), behaviour and numbers. Bird identifications were confirmed where necessary using 'The Complete Guide to Ireland's Birds' by Dempsey E. & O' Cleary (2002). A breeding bird survey was carried out on the 3rd of May 2022 by Brian McCloskey from Enviroguide Consulting to determine the degree of usage of breeding birds at the Site (Table 5-1).

Table 5-1 Details of bird surveys undertaken at the Site

Survey	Date	Time	Surveyor
Common bird survey	17/09/2021	2pm-5pm	Liam Gaffney (Enviroguide Consulting)
Winter waterfowl and shorebird survey	29/12/2021	6 hours to dusk (16:30pm)	Brian McCloskey (Enviroguide Consulting)
Winter waterfowl and shorebird survey	17/01/2022	6 hours to dusk (17:00pm)	Dr Bryan Thompson (Enviroguide Consulting)
Winter waterfowl and shorebird survey	27/01/2022	6 hours from dawn (08:20am)	Dr Bryan Thompson (Enviroguide Consulting)
Winter waterfowl and shorebird survey	08/02/2022	6 hours to dusk (17:35pm)	Dr Bryan Thompson (Enviroguide Consulting)
Winter waterfowl and shorebird survey	24/02/2022	6 hours to dusk (16:59pm)	Dr Bryan Thompson (Enviroguide Consulting)
Winter waterfowl and shorebird survey	23/03/2022	6 hours from dawn (06:30am)	Dr Bryan Thompson (Enviroguide Consulting)
Winter waterfowl and shorebird survey	29/03/2022	6 hours from dawn (07:15am)	Dr Bryan Thompson (Enviroguide Consulting)
Winter waterfowl and shorebird survey	07/04/2022	6 hours from dawn (06:54am)	Dr Bryan Thompson (Enviroguide Consulting)
Breeding bird survey	03/05/2022	3 hours from dawn (05:55am)	Brian McCloskey (Enviroguide Consulting)

5.2.3.3 Mammal surveys

Mammal surveys for the Proposed Development were carried out in conjunction with other field surveys. The habitat types recorded throughout the survey area were used to assist in identifying the fauna considered likely to utilise the area. During this survey, the Site was searched for tracks and signs of mammals as per Bang and Dahlstrom (2001).

5.2.3.4 Bat surveys

A suite of bat surveys were carried out on Site by Enviroguide Consulting on the 17th of September 2021 as detailed in the following sections:

5.2.3.4.1 Roost Inspection Surveys

A bat roost inspection survey was carried out on the 17th of September 2021. Survey methodology followed the best-practice techniques outlined in the Bat Conservation Trusts “Bat Surveys for Professional Ecologists” (3rd edition, 2016) guidelines. The habitats on-site, particularly mature trees, were systematically inspected from ground level for any signs of roosting bats. This included searches for live/dead specimens, droppings, and urine splashes. Any potential bat roosts (PBR) were also noted.

5.2.3.4.2 Activity Surveys

A bat activity survey was carried out at the Site of the Proposed Development by Enviroguide Consulting on the 17th of September 2021.

Survey methodology followed the best-practice techniques outlined in the Bat Conservation Trusts “Bat Surveys for Professional Ecologists” Good Practice Guidelines (3rd edition, 2016) guidelines. A post-sunset (dusk) activity survey commenced approximately 15 minutes before sunset and lasted until approximately 1.5 – 2 hours after sunset. A Batlogger M2 bat detector was used to detect any bat activity.

5.2.3.4.3 Other fauna

During the habitat surveys at the Site of the Proposed Development, other species of fauna were noted, and these are included in the report where applicable.

5.2.3.5 Invasive Species Surveys

The Site was assessed for the presence of invasive plant species during the habitat surveys undertaken on the 17th of September 2021.

5.2.4 Assessment

The value of the ecological resources – the habitats and species present or potentially present was determined using the ecological evaluation guidance given in the National Roads Authority’s Ecological Assessment Guidelines (NRA, 2009b). This evaluation scheme, with values ranging from locally important to internationally important, seeks to provide value ratings for habitats and species present that are considered ecological receptors of impacts that may ensue from a proposal. The NRA (2009a) defines key ecological receptors as those ecological features which are evaluated as Locally Important (higher value) or higher, that are likely to be impacted significantly by the Proposed Development. Internationally important receptors include Special Areas of Conservation (SAC) or Special Protected Areas (SPA) while those of national importance include Natural Heritage Areas (NHA).

This evaluation scheme has been adapted here to assess the value of habitats and fauna within the Site of the Proposed Development. The value of habitats is assessed based on the condition, size, rarity, conservation and legal status. The value of fauna is assessed on its biodiversity value, legal status and conservation status. Biodiversity value is based on its national distribution, abundance or rarity, and associated trends.

Using this evaluation criteria, some of the habitats and species identified as being present were assessed. Any of those selected that were evaluated as being of Local Importance (higher value) and higher in this study were selected as potential key ecological receptors and the impact significance on each of these receptors was assessed.

5.2.4.1 Value of Ecological Resources

The ecological features identified within the Site of the Proposed Development and the wider area are evaluated based on their value. These values are detailed in *Table 5-2* and are taken from the Guidelines for Assessment of Ecological Impacts of National Road Schemes published by the NRA (2009b), now Transport Infrastructure Ireland (TII).

Table 5-2 Description of values for ecological resources based on geographic hierarchy of importance (NRA, 2009b).

Importance	Criteria
International Importance	<ul style="list-style-type: none"> - ‘European Site’ including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. - Proposed Special Protection Area (pSPA). - Site that fulfils the criteria for designation as a ‘European Site’ (see Annex III of the Habitats Directive, as amended).

	<ul style="list-style-type: none"> - Features essential to maintaining the coherence of the Natura 2000 Network. - Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. - Resident or regularly occurring populations (assessed to be important at the national level) of the following: <ul style="list-style-type: none"> o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive - Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). - World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). - Biosphere Reserve (UNESCO Man & The Biosphere Programme) - Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). - Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). - Biogenetic Reserve under the Council of Europe. - European Diploma Site under the Council of Europe. - Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
<p>National Importance</p>	<ul style="list-style-type: none"> - Site designated or proposed as a Natural Heritage Area (NHA). - Statutory Nature Reserve. - Refuge for Fauna and Flora protected under the Wildlife Act 1976 (as amended) - National Park. - Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act 1976 (as amended); and/or a National Park. - Resident or regularly occurring populations (assessed to be important at the national level) of the following: <ul style="list-style-type: none"> o Species protected under the Wildlife Act 1976 (as amended); and/or o Species listed on the relevant Red Data list o Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive
<p>County Importance</p>	<ul style="list-style-type: none"> - Area of Special Amenity. - Area subject to a Tree Preservation Order. - Area of High Amenity, or equivalent, designated under the County Development Plan. - Resident or regularly occurring populations (assessed to be important at the County level) of the following: <ul style="list-style-type: none"> o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;

	<ul style="list-style-type: none"> ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; ○ Species protected under the Wildlife Act 1976 (as amended); and/or ○ Species listed on the relevant Red Data list. ○ Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. <ul style="list-style-type: none"> - County important populations of species; or viable areas of semi-natural habitats; or natural heritage features identified in the National or Local BAP; if this has been prepared. - Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. - Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
<p>Local Importance (higher value)</p>	<ul style="list-style-type: none"> - Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; - Resident or regularly occurring populations (assessed to be important at the Local level) of the following: <ul style="list-style-type: none"> ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; ○ Species protected under the Wildlife Act 1976 (as amended); and/or o ○ Species listed on the relevant Red Data list. ○ Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; - Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
<p>Local Importance (lower value)</p>	<ul style="list-style-type: none"> - Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; - Sites or features containing non-native species that is of some importance in maintaining habitat links.

5.2.4.2 Impact Assessment Criteria

Once the value of the identified Key Ecological Receptors (KERs) was determined, the next step was to assess the potential effect or impact of the Proposed Development on these KERs. This was carried out with regard to the criteria outlined in various impact assessment guidelines (NRA, 2009b; CIEEM, 2018) that set down a number of parameters such as quality, magnitude, extent and duration that should be considered when determining which elements of the proposal could constitute impact or sources of impacts. Once impacts are defined, their significance was categorised using EPA Guidelines (EPA, 2017).

Identification of a risk does not constitute a prediction that it will occur, or that it will create or cause significant impact. However, identification of the risk does mean that there is a possibility of ecological or environmental damage occurring, with the level and significance of the impact depending upon the nature and exposure to the risk and the characteristics of the ecological receptor.

5.2.4.2.1 Criteria used to Define Quality of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the quality of effects. See Table 5-3.

Table 5-3. Definition of Quality of Effects.

Quality	Definition
Positive Effects	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
Negative/adverse Effects	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).

5.2.4.2.2 Criteria used to Define Significance of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the significance of impacts. See Table 5-4.

Table 5-4. Definition of Significance of Effects.

Significance of Effects	Definition
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.

5.2.4.2.3 Criteria used to Define Duration of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects. See Table 5-5.

Table 5-5. Definition of Duration of Effects.

Quality	Definition
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day.
Temporary Effects	Effects lasting less than a year.
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.
Reversible Effects	Effects that can be undone, for example through remediation or restoration.

5.3 The Existing and Receiving Environment (Baseline Situation)

5.3.1 Site Overview

The Proposed Development is located in the townland of Kilmoney within the town of Carrigaline which is identified as a 'Metropolitan Town' in the Bandon-Carrigaline Municipal District Local Area Plan 2017. The Development Site is situated to the west of the Carrigaline town centre and approximately 10km southeast of Cork City Centre. The Site lies to the south of the N28 Cork to Ringaskiddy route. The total Site area comprises 3.7 hectares (Ha) and has a sloped topography. There is a net area of 1.9 Ha. suitable for development. The Site is bounded on the west by agricultural lands, to the east by the Dairygold Co-op Superstore and associated car park, to the north by the Owenboy River and to the south by a number of detached bungalows with the Kilmoney Road beyond. Access to the Site is via the inner relief road (currently under construction) and the Kilmoney Road which runs to the west of the Site.

5.3.2 Geology, Hydrology and Hydrogeology

The quaternary sediments beneath the Site are mapped by Geological Survey Ireland (GSI) as "*Alluvium*" and "*Till derived from Namurian sandstones and shales*" (GSI, 2022). The SIS National Soils database also classifies the Site as '*Urban*' (GSI, 2022). The bedrock units underlying the area is mapped by the GSI as "*Sandstone & interbedded pyritic mudstone*" (GSI, 2022).

The Proposed Development Site is located in the Lee, Cork Harbour and Youghal Bay catchment, the *Owenboy [Cork]_ SC_010* sub-catchment and the *Owenboy (Cork)_040* river sub-basin. The Owenboy River (EPA code: 19O01), is a 4th order river that runs along the northern boundary of the Proposed Site and flows east through the Owenboy estuary until it reaches the mouth of Cork harbour at Rams Head. Water quality monitoring stations (RS19O011000 and RS19O011400) located upstream of the Proposed Development report water quality as being "*Moderate-Good*" with a Q value score of 3-4 for the most recent monitoring timepoints in 2005 and 2020 respectively. The Owenboy River is classified under the Water Framework Directive (WFD) as being of "*Moderate*" status (2013-2018). The water quality of the Owenboy Estuary downstream of the Proposed Development was classed as "*intermediate*" during the latest reporting period 2018-2020.

The Site is located within the *Ballinhassig East* groundwater body (GWB) (IE_SW_G_004). The GWB covers the majority of the greater Cork City area reaching from Carrigaline in the south to Watergrasshill in the north and extents from Coolcower in the west to Youghal in the east. The main rivers flowing through the GWB are the rivers Lee, Glashaboy, Owenboy, Bride and Glen. The GWB covers a total area of 1,209 km². The current WFD risk status for this GWB is reported as 'Good', and the groundwater 2013-2018 Risk Status was reported as *At Risk* (EPA, 2022). The Site area is located on a bedrock aquifer that is Classed as Rkd: *Locally Important Aquifer – Bedrock which is moderately productive only in local zones* with groundwater vulnerability classed as either *High* or *Moderate* across the Site.

5.3.3 Designated Sites

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (79/409/EEC) seeks to protect birds of special importance by the designation of Special

Protection Areas (SPAs). It is the responsibility of each member state to designate SPAs and SACs, both of which will form part of Natura 2000, a network of protected sites throughout the European Community. SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each Site is selected correspond to the qualifying interests of the Sites; from these the conservation objectives of the Site are derived.

National Heritage Areas (NHAs) are designations under the Wildlife Act 1976 (as amended) to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with SAC and/or SPA Sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection in the meantime under planning policy which normally requires that planning authorities give recognition to their ecological value.

Table 5-6 presents details of the key ecological features of designated Sites with 15km of the Proposed Development and gives their distance from the Site of the Proposed Development. None of the European Sites outside the 15km distance are considered to be linked by a hydrological pathway, or any other possible pathway, to the Proposed Development. European Sites outside of this 15km radius were also considered but are deemed to be either; located a considerable physical distance inland; separated by a significant marine buffer; and/or located within different catchment zones to the Proposed Development. Figure 5-2 details the European Sites within a 15km radius of the Proposed Development.

Table 5-6 European Sites located within a 15km radius of the Site of the Proposed Development.

Site Code	Site Name	Qualifying Interests	Distance to Site
Special Areas of Conservation (SAC)			
(001058)	Great Islands Channel SAC	<p>Conservation Objectives Version 1.0 (NPWS, 2014a)</p> <ul style="list-style-type: none"> - Mudflats and sandflats not covered by seawater at low tide [1140] - Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] 	8.7 km
Special Protection Areas (SPA)			
(004030)	Cork Harbour SPA	<p>Conservation Objectives Version 1.0 (NPWS, 2014b)</p> <ul style="list-style-type: none"> - Little Grebe (<i>Tachybaptus ruficollis</i>) [A004] - Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] - Cormorant (<i>Phalacrocorax carbo</i>) [A017] - Grey Heron (<i>Ardea cinerea</i>) [A028] - Shelduck (<i>Tadorna tadorna</i>) [A048] - Wigeon (<i>Anas penelope</i>) [A050] - Teal (<i>Anas crecca</i>) [A052] - Pintail (<i>Anas acuta</i>) [A054] 	50m

		<ul style="list-style-type: none"> - Shoveler (<i>Anas clypeata</i>) [A056] - Red-breasted Merganser (<i>Mergus serrator</i>) [A069] - Oystercatcher (<i>Haematopus ostralegus</i>) [A130] - Golden Plover (<i>Pluvialis apricaria</i>) [A140] - Grey Plover (<i>Pluvialis squatarola</i>) [A141] - Lapwing (<i>Vanellus vanellus</i>) [A142] - Dunlin (<i>Calidris alpina</i>) [A149] - Black-tailed Godwit (<i>Limosa limosa</i>) [A156] - Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] - Curlew (<i>Numenius arquata</i>) [A160] - Redshank (<i>Tringa totanus</i>) [A162] - Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] - Common Gull (<i>Larus canus</i>) [A182] - Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] - Common Tern (<i>Sterna hirundo</i>) [A193] - Wetland and Waterbirds [A999] 	
National Heritage Area (NHA)			
<i>No NHAs within zone of influence</i>			
Proposed National Heritage Area (pNHA)			
1990	Owenboy River	<p>No official qualifying interests exist for this Site.</p> <p>No NPWS Official Site Synopsis exists for this Site</p>	0.2 km
1979	Monkstown Creek	<p>No official qualifying interests exist for this Site.</p> <p>NPWS Official Site Synopsis:</p> <p>No NPWS Official Site Synopsis exists for this Site</p>	3.6 km
1066	Lough Beg (Cork)	<p>No official qualifying interests exist for this Site.</p> <p>NPWS Official Site Synopsis:</p> <p>No NPWS Official Site Synopsis exists for this Site</p>	4.6 km
1966	Minane Bridge Marsh	<p>No official qualifying interests exist for this Site.</p> <p>NPWS Official Site Synopsis:</p> <p>The narrow Ringabella estuary runs west to east to the mouth of Cork Harbour and is fed by a stream from Ballyfeard and Minane Bridge. Much of the valley bottom has been impounded by a sluice and embankment so that tidal flooding no longer occurs. The stream however, still causes some flooding in winter and the extreme flatness of the valley above Minane Bridge means that the adjacent fields experience a regular wet phase though they also dry out in summer. These conditions mean that the grasslands and marshes are mineral in character and there is little accumulation of peat. Another feature of the valley is that limestone does not occur, which makes it unlike most of those that run into Cork Harbour. The resulting vegetation is dominated by rushes (<i>Juncus effusus</i> and <i>J. inflexus</i>) but there are many ditches and hollows where marsh plants grow, among them Fool's Watercress (<i>Apium nodiflorum</i>), Floating Sweet-grass (<i>Glyceria fluitans</i>) and horsetails (<i>Equisetum palustre</i> and <i>E. fluviatile</i>). Mud exposed by grazing cattle is a particular habitat in which Blinks (<i>Montia</i></p>	5.8 km

		<p><i>fontana</i>), Round-leaved Crowfoot (<i>Ranunculus omiophyllus</i>) and Celery-leaved Buttercup (<i>R. sceleratus</i>) occur, among other species. Tussocks of Greater Tussock-sedge (<i>Carex paniculata</i>) are scattered through the Site but they reach their most numerous in a small square of cutover peat at the western end where they grow with Bulrush (<i>Typha latifolia</i>). There is some colonisation by Grey Willow (<i>Salix cinerea</i> subsp. <i>cinerea</i>) and Alder (<i>Alnus glutinosa</i>) into this area and also along the length of the central stream and ditches. The trees create cover for Heron and Mallard of which a few pairs breed. There are also Snipe and probably Water Rail present. The area is listed for its unusual vegetation type which throughout much of the country has been drained.</p>	
371	Fountainstown Swamp	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis: This Site is located in the end of a stream valley on the northern side of Ringabella Bay in Co. Cork, just before it flows into the sea. A former lake or inlet of the sea has been grown over by a mixture of marsh plants and woodland, giving rise to a quaking swamp of unusual character. The young woodland at the northern end consists of Grey Willow (<i>Salix cinerea</i>) and Alder (<i>Alnus glutinosa</i>) and shows a good transition landwards into Ash (<i>Fraxinus excelsior</i>) and Hazel (<i>Corylus avellana</i>). There are sheets of Golden-saxifrage (<i>Chrysosplenium oppositifolium</i>) beneath the mossy trees, with Bugle (<i>Ajuga reptans</i>), Hemlock Water-dropwort (<i>Oenanthe crocata</i>) and Wood Anemone (<i>Anemone nemorosa</i>), running into Bluebell (<i>Hyacinthoides non-scripta</i>), Primrose (<i>Primula vulgaris</i>) and Pignut (<i>Conopodium majus</i>). Swamp woodland which shows no signs of former management is unusual and there are as yet no introduced species in the flora (though these do occur to the west). The trees open out towards the coast where the vegetation becomes a rich floating fen. The main large species are Meadowsweet (<i>Filipendula ulmaria</i>), Branched Bur-reed (<i>Sparganium erectum</i>), Yellow Iris (<i>Iris pseudacorus</i>), Common Nettle (<i>Urtica dioica</i>) and Hemlock Water-dropwort. The abundance of this latter plant in open conditions is one of the most remarkable features of the Site. Normally it is a species of riverbanks, ditches and wet woodland. Scattered mounds of the Greater Tussocksedge (<i>Carex paniculata</i>) add variety to the community and there are also a few willow (<i>Salix</i> spp.) bushes and Bulrush (<i>Typha latifolia</i>). The undisturbed nature of the Site means that bird numbers are quite high – Mallard, Heron, Reed Bunting and Sedge Warbler occur in summer. The woodland supports Long-tailed Tit, Redpolls and other passerine species.</p>	6.2 km
107	Templebreedy National School, Crosshaven	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis: This is a nursery roost for Leisler's Bats (<i>Nyctalus leisleri</i>) which roost in the attic of a Church of Ireland primary school building. As approximately 100 bats were recorded at the house in 1987, this is a Site of international importance. There are plans to carry out some repair work to the roof of the school but this should not interfere with the bats. The school authorities are extremely well disposed towards the bats, which is an important consideration when trying to protect roosts of this species, the largest and possibly the noisiest of the seven bat species. Although the Leisler's Bat is considered common in Ireland, the number of safe nursery roosts is small.</p>	6.7 km
1046	Douglas River Estuary	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis:</p>	7.0 km

		No NPWS Official Site Synopsis exists for this Site	
1058	Great Island Channel	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis:</p> <p>No NPWS Official Site Synopsis exists for this Site</p>	8.8 km
1074	Rockfarm Quarry, Little Island	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis:</p> <p>Rockfarm Quarry is located c. 9km west of Cork City on the southern shore of Little Island in the River Lee estuary. It is situated on limestone which is of Carboniferous age and was formed of a shell reef. There are a range of rock types in the area including fine-grained crinodal limestone, pseudobreccia, reef limestone and a conglomerate - the Cork marble. Formerly, the area was quarried for its limestone, but it is now no longer actively quarried and a golf course occupies much of the Site.</p> <p>This Site's southern boundary is along the top edge of the quarries' rock cliffs. The habitats within the Site include unimproved lowland dry grassland, amenity grassland (the improved tees and greens of the golf course), scrub woodland and the exposed rock and spoil of the quarries. On the floor of the quarries and around their edges, a rich calcareous flora has developed and within this small area (30ha) there is a considerable diversity of species. The calcareous grassland species include grasses such as Red Fescue (<i>Festuca rubra</i>), Quaking-grass (<i>Briza media</i>), Downy Oat-grass (<i>Helictotrichon pubescens</i>) and a small annual species, Fern-grass (<i>Desmazeria rigida</i>). Crested Dog's-tail (<i>Cynosurus cristatus</i>) is also frequently encountered. Some of the herbs present include Kidney Vetch (<i>Anthyllus vulneraria</i>), Common Knapweed (<i>Centaurea nigra</i>), Field Scabious (<i>Knautia arvensis</i>), Oxeye Daisy (<i>Leucanthemum vulgare</i>), Fairy Flax (<i>Linum catharticum</i>), Common Bird's-foot-trefoil (<i>Lotus corniculatus</i>) and Bulbous Buttercup (<i>Ranunculus bulbosus</i>). The rock from the quarries also supports the growth of a distinct flora including species such as Round-leaved Crane's-bill (<i>Geranium rotundifolium</i>), Weld (<i>Reseda luteola</i>), Dwarf Spurge (<i>Euphorbia exigua</i>) and Great Mullein (<i>Verbascum thapsus</i>). Ferns noted in the area are Maidenhair Spleenwort (<i>Asplenium trichomanes</i>) and Rustyback (<i>Ceterach officinarum</i>). There are small areas of scrub woodland, mainly of Ash (<i>Fraxinus excelsior</i>) with Traveller's-joy (<i>Clematis vitalba</i>) and the exotic and invasive species Japanese Knotweed (<i>Reynoutria japonica</i>). The proximity of the Site to the sea also gives a maritime influence to the Site and the presence of White Campion (<i>Silene alba</i>), Wild Madder (<i>Rubia peregrina</i>) and Portland Spurge (<i>Euphorbia portlandica</i>) are noted. Many orchids are found in the Site including the Early-purple Orchid (<i>Orchis mascula</i>), Bee Orchid (<i>Ophrys apifera</i>) and Dense-flowered Orchid (<i>Neotinea maculata</i>), a species usually only found occasionally in the west and centre of Ireland. Also of note is a parasitic plant on Ivy, the Ivy Broomrape (<i>Orobanche hederæ</i>). Although the present land use within the Site would appear to maintain the Sites interest, alteration or extension of the golfing activities may be potentially damaging to the Site. It</p>	9.1 km

		is suggested that no new areas of 'rough' should be taken into the golf course, heavy fertiliser application should be avoided, as should the dumping of mown grass on the dry calcareous grassland areas; extensive reseeding or top seeding of greens and trees with rye-grass mixtures would also be detrimental to the areas species composition and diversity. The area is of considerable interest botanically because of its species diversity and the presence of 'rarities' for the region, such as Dense-flowered Orchid and Portland Spurge. The area could also be used as an educational resource for local schools – for example, projects such as comparing the species composition and phenology of the cut and uncut areas of the golf course, species composition changes with scrub invasion, invertebrate sampling and fossil identification.	
1084	Whitegate Bay	No official qualifying interests exist for this Site. NPWS Official Site Synopsis: No NPWS Official Site Synopsis exists for this Site	9.4 km
1082	Dunkettle Shore	No official qualifying interests exist for this Site. NPWS Official Site Synopsis: No NPWS Official Site Synopsis exists for this Site	9.6 km
1987	Cuskinny Marsh	No official qualifying interests exist for this Site. NPWS Official Site Synopsis: This Site is located 2.5km east of the centre of Cobh on the shores of Cork Harbour. It is a small Site with the dominant habitat being a brackish lake, joined to the sea through a sluice gate, and fed by streams flowing from the west and north. The lake is fringed with Common Reed (<i>Phragmites australis</i>) with wet deciduous woodland, composed of Alder (<i>Alnus glutinosa</i>) and willow (<i>Salix</i> spp.), occurring to the north and west. A small area has been planted with Sitka Spruce (<i>Picea sitchensis</i>). The main interest of the Site is ornithological, with the lake supporting locally important numbers of dabbling ducks and Mute Swans. The main land use is management for conservation purposes, with the Site being an Irish Wildbird Conservancy Reserve. No obvious damaging operations occur within the Site. Cuskinny Marsh is of interest because it contains a nice mix of habitats, within a small area, and supports locally important numbers of wildfowl.	9.8 km
1081	Cork Lough	No official qualifying interests exist for this Site. NPWS Official Site Synopsis: This small lake is situated in the north-west of Cork City, 1km north of the River Lee. In 1972 An Foras Forbartha noted it as an important place to observe wildfowl and gulls due to its close proximity to a large human population. It appears, however, that high numbers of birds, attracted by bread-feeding, are causing severe eutrophication which is in need of remedial action. Also, exotic fish have been released into the lake over the years. In spite of these factors the lake regularly holds over 100 Mute Swans, a feral flock of over 30 Canada Geese and small numbers (usually under 50) of Mallard, Teal, Tufted Duck and Coot. An increasing flock of wintering Lesser Blackbacked	10.1 km

		Gulls also occurs (460+ in January 1995). The Site is a NHA of local important for its bird community.	
1054	Glanmire Wood	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis:</p> <p>Glanmire Wood occurs on the east bank of the Glashaboy River, immediately south of Glanmire village in East Cork. The following description of the Site is largely based on the 1986 An Foras Forbartha County Report. The main habitat of interest is mixed broad-leaved woodlands dominated by oak (<i>Quercus</i> spp.), Beech (<i>Fagus sylvatica</i>) and Sycamore (<i>Acer pseudoplatanus</i>) with a few conifers, especially European Silver-fir (<i>Abies alba</i>). The ground flora is particularly rich and includes two grasses, Wood Fescue (<i>Festuca altissima</i>) and Wood Millet (<i>Milium effusum</i>), which are thought to indicate ancient woodland. More commonly occurring species include Primrose (<i>Primula vulgaris</i>), violets (<i>Viola riviniana</i>, <i>V.reichenbachiana</i>), Wood Anemone (<i>Anemone nemorosa</i>) and Lords-and ladies (<i>Arum maculatum</i>). The tidal river below the wood adds to the diversity of the Site with patches of saltmarsh. The recent NHA survey indicates that no damaging activities occur within the wood at present. However, in the past the wood has been much modified by planting and felling. This Site is of interest because this type of woodland is rare in east Cork.</p>	10.7 km
1076	Rostellan Lough, Aghada Shore And Poul nabibe Inlet	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis:</p> <p>No NPWS Official Site Synopsis exists for this Site</p>	11.5 km
94	Lee Valley	<p>No official qualifying interests exist for this site. NPWS Official Site Synopsis:</p> <p>This Site occupies five separate sections of the valley of the River Lee, immediately to the west of Cork City. One section passes close to Ballincollig, and the Ballincollig Regional Park makes up a portion of the Site. A diverse range of semi-natural habitats occurs here, with those described below being the most prevalent: Wet broadleaved woodland has developed in a number of places on the river side. The dominant trees are either Alder (<i>Alnus glutinosa</i>), Grey Willow (<i>Salix cinerea</i>) or Small-leaved Elm (<i>Ulmus minor</i>). Downy Birch (<i>Betula pubescens</i>) is often present also. Typical species occurring in the ground flora include Cock's-foot (<i>Dactylis glomerata</i>), Yorkshire-fog (<i>Holcus lanatus</i>), Canary-grass (<i>Phalaris</i> spp.), Meadowsweet (<i>Filipendula ulmaria</i>), Cuckooflower (<i>Cardamine pratensis</i>), Common Marsh-bedstraw (<i>Galium palustre</i>), Wild Angelica (<i>Angelica sylvestris</i>) and Lesser Celandine (<i>Ranunculus ficaria</i>). Other parts have abundant Hemlock Water-dropwort (<i>Oenanthe crocata</i>), Marsh-marigold (<i>Caltha palustris</i>), Yellow Iris (<i>Iris pseudacorus</i>), Fool's Watercress (<i>Apium nodiflorum</i>) and Purple-loosestrife (<i>Lythrum salicaria</i>). Some areas behind the riverbank are frequently flooded and support wet grassland communities. Species of the wet woodland ground flora described above occur in many of these stands, as do Sweet Vernal-grass (<i>Anthoxanthum odoratum</i>), Ribwort Plantain (<i>Plantago lanceolata</i>), Meadow Buttercup (<i>Ranunculus acris</i>), Silverweed (<i>Potentilla anserina</i>), Red Clover (<i>Trifolium pratense</i>) and Common Sorrel (<i>Rumex acetosa</i>). Dry broadleaved woodland exists in other sections of the valley, with the most important trees being Ash (<i>Fraxinus excelsior</i>), oak (<i>Quercus</i> spp.) and Holly (<i>Ilex aquifolium</i>). Hazel (<i>Corylus avellana</i>) and Hawthorn (<i>Crataegus monogyna</i>) are</p>	12.5 km

		<p>important components of some stands, while the exotic species Beech (<i>Fagus sylvatica</i>) and Sycamore (<i>Acer pseudoplatanus</i>) occur in others. The ground flora of many of these woods is relatively species-rich and includes Wood Anemone (<i>Anemone nemorosa</i>), Herb-Robert (<i>Geranium robertianum</i>), Honeysuckle (<i>Lonicera periclymenum</i>), Ground-ivy (<i>Glechoma hederacea</i>), Bramble (<i>Rubus fruticosus</i> agg.), Bluebell (<i>Hyacinthoides non-scripta</i>) and False Brome (<i>Brachypodium sylvaticum</i>). In places, Hard Fern (<i>Blechnum spicant</i>), Great Wood-rush (<i>Luzula sylvatica</i>), Malefern (<i>Dryopteris filix-mas</i>) and Wood Speedwell (<i>Veronica montana</i>) are common, and one stand has a very well-developed shrub layer of Spindle (<i>Euonymus europaeus</i>). Unimproved dry grassland occurs on an area of soil that has probable glacial origins. Field Wood-rush (<i>Luzula campestris</i>), Sweet Vernal-grass, Crested Dog's-tail (<i>Cynosurus cristatus</i>), Spring-sedge (<i>Carex caryophylla</i>), Wild Carrot (<i>Daucus carota</i>), Common Bird's-foot-trefoil (<i>Lotus corniculatus</i>), Glaucous Sedge (<i>Carex flacca</i>), White Clover (<i>Trifolium repens</i>) and Cowslip (<i>Primula veris</i>) are all present here. Freshwater marsh fringes the river itself in places. Here, Bulrush (<i>Typha latifolia</i>), Branched Bur-reed (<i>Sparganium erectum</i>), Bottle Sedge (<i>Carex rostrata</i>), Canarygrass, Meadowsweet, Water Horsetail (<i>Equisetum fluviatile</i>), Marsh-marigold and Water Mint (<i>Mentha aquatica</i>) are all species frequently encountered. A number of wetland bird species breed here, including Mallard, Heron, Sedge and Grasshopper Warblers and Reed Bunting and two rather locally distributed butterflies, the Small Blue and the Wood White also occur. Land-use in the Site consists of a little cattle-grazing and hay-making in the grasslands. Sections of the valley have been improved for agriculture in the past, so that the Site now consists of five sub-sites. This should not be allowed to infringe further into the site. The spread of Sycamore poses a threat to the naturalness of parts of the woodlands, as do river engineering works to the river bank communities. Recreation is important in the Valley, especially in the Ballincollig Regional Park. The diverse range of intact semi-natural habitats in the Lee Valley makes this a Site of regional conservation importance.</p>	
1060	James Fort	<p>No official qualifying interests exist for this Site. NPWS Official Site Synopsis:</p> <p>James Fort occupies a promontory on the Cork coast, in the middle of Kinsale harbour, opposite the town. Its diamond-shaped enclosure and the slopes down to the sea on the north and east sides are included in this Site. The sandstone rock outcrops in several places where it is colonised by Bell Heather (<i>Erica cinerea</i>), Sheep's-bit (<i>Jasione montana</i>), English Stonecrop (<i>Sedum anglicum</i>) and annual grasses such as hair-grass (<i>Aira</i> spp.) and Squirreltail Fescue (<i>Vulpia bromoides</i>). On deeper soil Bracken (<i>Pteridium aquilinum</i>), Wood Sage (<i>Teucrium scorodonia</i>), Foxglove (<i>Digitalis purpurea</i>) and Bramble (<i>Rubus fruticosus</i> agg.) are frequent and there are a few clumps of Blackthorn (<i>Prunus spinosa</i>). The buildings and fortifications on the headland form a habitat in their own right. The banks have a dry grassland flora including Yellow Oat-grass (<i>Trisetum flavescens</i>), Common Vetch (<i>Vicia sativa</i>), Common Bird's-foot-trefoil (<i>Lotus corniculatus</i>) and Wild Thyme (<i>Thymus polytrichus</i>), as well as the grasses Cock's-foot (<i>Dactylis glomerata</i>), False Oat-grass (<i>Arrhenatherum elatius</i>) and Perennial Rye-grass (<i>Lolium perenne</i>). There is much Pellitory-of-the-wall (<i>Parietaria judaica</i>), Ivy-leaved Toadflax (<i>Cymbalaria muralis</i>) and ferns (<i>Polypodium</i> spp., <i>Asplenium trichomanes</i>, <i>A. adiantum-nigrum</i>) on the walls while the</p>	14.5 km

		<p>Blockhouse on the coast has, in addition, Garden Parsley (<i>Petroselinum crispum</i>), Red Valerian (<i>Centranthus ruber</i>), Biting Stonecrop (<i>Sedum acre</i>) and Musk Stork's-bill (<i>Erodium moschatum</i>). Below the fort on the north side an old meadow occurs in which Sweet Vernal-grass (<i>Anthoxanthum odoratum</i>), False Oat-grass (<i>Arrhenatherum elatius</i>), Yorkshire-fog (<i>Holcus lanatus</i>) and Creeping Bent (<i>Agrostis stolonifera</i>) are the main species. Mixed with these are Smooth Hawk's-beard (<i>Crepis capillaris</i>), Lesser Stitchwort (<i>Stellaria graminea</i>), Cat's-ear (<i>Hypochoeris radicata</i>), Wild Carrot (<i>Daucus carota</i>) and clovers (<i>Trifolium pratense</i>, <i>T. repens</i>). There is also a constant presence of Softbrome (<i>Bromus hordeaceus</i>), Changing Forget-me-not (<i>Myosotis discolor</i>), Trailing St. John's-wort (<i>Hypericum humifusum</i>) and Lesser Trefoil (<i>Trifolium dubium</i>) which gives an unusual look to the community. The Site is included as an NHA because it is floristically rich with a good number of less common plants, some of them introduced. In addition, there is a species-rich meadow of some ecological interest.</p>	
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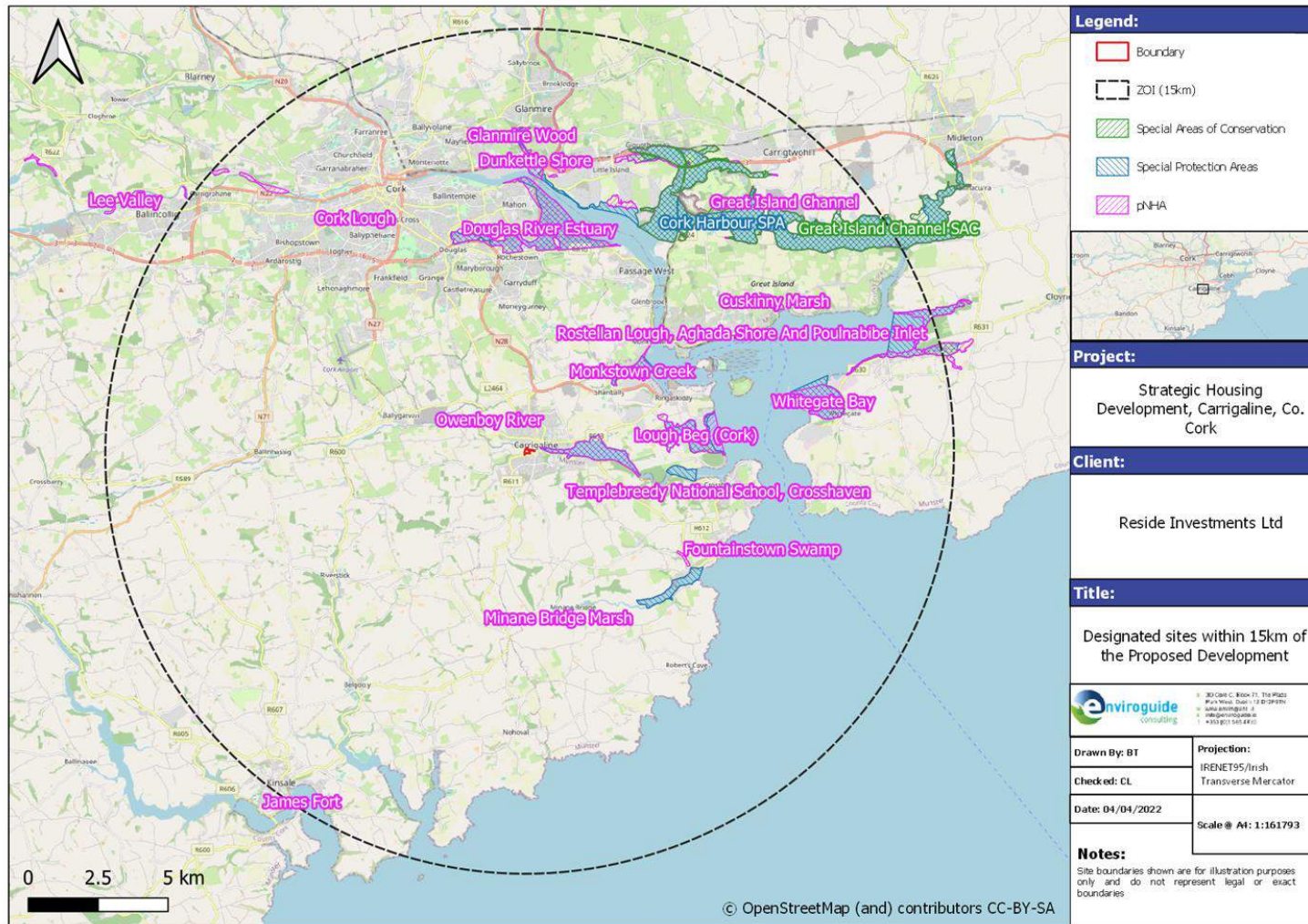


Figure 5-2: Designated Sites within 15km of the Proposed Development

5.3.4 Habitats

The habitats within the study area are coded and categorised for the most part according to (Fossitt, 2000) and described in detail in the following sections.

5.3.4.1 Buildings and Artificial Surfaces (BL3)

This habitat occurs to the east of the Site in the form of the co-operative storage yard and laneway from Carrigaline main street which will form the proposed new access walkway for the Proposed Development. The majority of this habitat is devoid of vegetation, however at the entranceway to Carrigaline Mainstreet, Butterfly-bush (*Buddleja davidii*), Ivy (*Hedera hibernica*) and Perennial Ryegrass (*Lolium perenne*) were observed growing in the cracks between the stonework and paving. This habitat also occurs in the form of newly constructed western relief road, access ramp and pumping station to the west of the Site. These habitats are devoid of vegetation and are constructed from concrete, clay berms and aggregate.



Figure 5-3 Existing buildings and yard along proposed access route to Carrigaline main street.

5.3.4.2 (Rank) Improved Agricultural Grassland (GA1)

Rank improved agricultural grassland is the dominant habitat on Site. This habitat has not been managed in recent times and is transitioning to dry meadows and grassy verges (GS2) habitat in areas, particularly towards the margins of the Site. Typical species in this habitat include Perennial Ryegrass (*Lolium perenne*), Dandelion (*Taraxacum spp.*), False oat grass (*Arrhenatherum elatius*), Ribwort plantain (*Plantago lanceolata*), Docks (*Rumex spp.*) and Creeping Buttercup (*Ranunculus repens*).



Figure 5-4 Rank agricultural grassland.

5.3.4.3 Treelines (WL2)

Several small treelines occur on-site particularly along the northern boundary adjoining the Owenboy River and on the southern Site boundary adjacent to the existing dwellings. The treelines on the northern boundary are composed of Alder (*Alnus glutinosa*), Hawthorn (*Crataegus monogyna*) and Willow (*Salix alba*). The treelines on the southern Site boundary are comprised of Sycamore (*Acer pseudoplatanus*), Turkey Oak (*Quercus cerris*) and Cypress (*Cupressus leylandii*).



Figure 5-5: Treelines occurring within and along the boundaries of the Site.

5.3.4.4 Dry meadows and Grassy Verges (GS2)

This habitat occurs along the northern, eastern and southern margins of the Site. The main species which occur here are Annual Meadow Grass (*Poa annua*), False Oat Grass (*Arrhenatherum elatius*), Yorkshire Fog (*Holcus lanatus*), Dandelion (*Taraxacum spp*), Creeping Thistle (*Cirsium arvense*), Foxglove (*Digitalis ferruginea*), Hoary Willowherb (*Epilobium parviflorum*), Marsh Thistle (*Cirsium palustre*), Cranesbill (*Geranium dissectum*), Daisy (*Bellis perennis*) Creeping Buttercup (*Ranunculus repens*), Common Buttercup (*Ranunculus acris*), Chickweed (*Veronica chamaedrys*), Shepherds Purse (*Capsella bursa pastoris*), Cocksfoot Grass (*Dactyllus glomerata*), Germander Speedwell (*Veronica chamaedrys*), Docks (*Rumex spp.*), Ragwort (*Jacobaea vulgaris*) and Yarrow (*Achillea millefolium*).



Figure 5-6 Dry meadows and grassy verges found to the north of the Site

5.3.4.5 Depositing Lowland Rivers (FW2)

A section of the Owenboy River occurs within the Site boundary to the North of the Site. The dry meadows and grassy verge habitat along the margins of the Site merges with this habitat. At particular points, the vertical gravel river bank along this stretch is devoid of vegetation as is the gravel and cobble river bed.



Figure 5-7 Section of the Owenboy River within the northern Site boundary.

5.3.4.6 Drainage Ditch (FW4)

A drainage ditch was noted on the southern Site boundary adjacent to the tree line. Typical species recorded within the drainage ditch included Nettle (*Urtica dioica*), Rush (*Juncus spp.*), Himalayan Honeysuckle (*Leycesteria formosa*), Fools Watercress (*Apium nodiflorum*) Creeping Buttercup (*Ranunculus repens*), Buckler fern (*Dryopteris dilatata*) and Coppertips (*Montbretia spp.*).



Figure 5-8 Drainage ditch on southern Site boundary.

5.3.4.7 Ornamental/Non-native shrub (WS3)

Ornamental non-native shrubs occur on the southern Site Boundary adjacent to the private dwellings on Kilmoney Road. The two main species on Site are Cypress (*Cupressocyparis leylandii*) and Griselinia (*Griselinia littoralis*).



Figure 5-9 Section of ornamental/non-native shrubs to the south of the Site.

5.3.4.8 Scrub (WS1)

A small, immature patch of scrub habitat occurred at the south east corner of the Site along the access lane to Kilmoney Road. The main species which occur here are Bramble (*Rubus fruticosus*), Butterfly-bush (*Buddleja davidii*), Marsh Thistle (*Cirsium palustre*) and St John's Wort (*Hypericum perforatum*).



Figure 5-10 Small area of scrub in the background behind dry meadows and grassy verge habitat.

5.3.4.9 Habitat Evaluation

Table 5-7 Evaluation of Habitats recorded within the Site of the Proposed Development.

Habitat	Evaluation	Rationale	Key Ecological Receptor (KER)
Tree lines (WL2)	Local Importance (Higher Value)	Small sections of tree lines are located along the Site's southern and northern boundaries. Some trees have moderate bat roost potential, but no roosts were recorded during bat surveys. Trees were being utilised as foraging habitat for bats and are likely used by nesting and foraging birds.	Yes
Depositing Lowland Rivers (FW2)	Local Importance (Higher Value)	This habitat is important reproductive, foraging and commuting habitat for a wide variety of aquatic birds, insects, mammals and fish. The majority of bat foraging and commuting activity on Site was recorded along this habitat.	Yes
Ornamental/non-native shrub (WS1)	Local Importance (Lower Value)	No birds recorded nesting in this habitat during breeding bird surveys. The structure of this habitat is not suitable for hedgehog (<i>Erinaceus europaeus</i>), pygmy shrew (<i>Sorex minutus</i>) or other small mammals due to its open structure.	No

Rank Improved Agricultural Grassland (GA1)	Local Importance (Lower Value)	This habitat is low in species diversity and is common in the surrounding area. Although small numbers of Snipe (<i>Gallinago gallinago</i>) were recorded foraging in this habitat during winter bird surveys, it is not considered to support large numbers of Snipe or to be of high ecological value.	No
Dry meadows and grassy verges (GS2)	Local Importance (Lower Value)	This habitat occurs in narrow sections towards the margins of the Site where mowing or grazing has not occurred in recent years. This habitat is of low ecological diversity or value.	No
Buildings and Artificial Surfaces (BL3)	Local Importance (Lower Value)	This habitat occurs to the east and west of the Site. The buildings to the east of the Site will not be affected by the Proposed access pathway to Carrigaline main street. There was no signs of swallow nests or potential bat roosts. They are not considered to be of ecological value. The access ramp from the western relief road and pumping station is of no ecological value.	No
Drainage Ditch (FW2)	Local Importance (Lower Value)	The drainage ditch is not regularly wet and is unlikely to be of significant value to aquatic species such as Common Frog (<i>Rana temporaria</i>). This habitat is not considered to be of high ecological value.	No
Scrub (WS1)	Local Importance (Lower Value)	This habitat is small in area and immature in structure. The sections of bramble are sparse and are unlikely to provide an important food source or nesting habitat for birds or small mammals.	No



Figure 5-11: Map of the current habitats present at the Proposed Site.

5.3.5 Species and Species Groups

5.3.5.1 Flora

5.3.5.1.1 Rare and Protected Flora

The Site of the Proposed Development is located within the Ordnance Survey National Grid 10km Square W76, 2km square (W76G) and 1km square (W7262). Species records from the National Biodiversity Data Centre (NBDC) online database for these areas were studied for the presence of rare or protected flora species. This database contained no records of rare and protected flora within the last 30 years. However, several threatened or endangered species are listed within the 10km tetrad including Little-robin (*Geranium purpureum*), Pennyroyal (*Mentha pulegium*), Round-leaved Crane's-bill (*Geranium rotundifolium*), Sharp-leaved Fluellen (*Kickxia elatine*) and Smooth Hornwort (*Phaeoceros laevis*).

The Flora Protection Order (FPO) Bryophytes database was also checked for rare and protected flora within the vicinity of the Proposed Development. Two protected species were recorded between 6-10km from the Proposed Development including Haller's Apple-moss (*Bartramia halleriana*) and Glasswort Feather-moss (*Scleropodium touretii*). However, none of the above species were recorded within the Site of the Proposed Development.

5.3.5.1.2 Invasive Species

There are records for 15 species of flora considered to be invasive within the 10km square W76 and 2km grid square W76G encompassing the Proposed Development Site. Details of these records are listed in *Table 5-8*.

Four invasive plant species were recorded on-site during Site surveys in 2021. These were Butterfly-bush (*Buddleja davidii*), Sycamore (*Acer pseudoplatanus*), Turkey Oak (*Quercus cerris*) and Himalayan Honeysuckle (*Leycesteria formosa*).

Table 5-8 Records of Invasive Species of Flowering Plant for the surrounding 2km (W76G) & 10km (W76) grid squares from the NBDC.

Species	Grid square	Date of last record	Source	Designations
Butterfly-bush (<i>Buddleja davidii</i>)	W76	16/08/2021	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- Medium Impact Invasive Species
Cherry Laurel (<i>Prunus laurocerasus</i>)	W76	08/06/2020	Community Foundation for Ireland Records	- High Impact Invasive Species
Common Cord-grass (<i>Spartina anglica</i>)	W76	01/08/2012	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- High Impact Invasive - S.I. 477/2011 (Ireland)

Evergreen Oak (<i>Quercus ilex</i>)	W76	18/09/2006	Species Data from the National Vegetation Database	- Medium Impact Invasive Species
Himalayan Honeysuckle (<i>Leycesteria formosa</i>)	W76	18/11/2021	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- Medium Impact Invasive Species
Japanese Knotweed (<i>Fallopia japonica</i>)	W76 W76G	20/07/2021	National Invasive Species Database	- High Impact Invasive Species - S.I. 477/2011 (Ireland)
Least Duckweed (<i>Lemna minuta</i>)	W76	31/12/2002	National Invasive Species Database	- Medium Impact Invasive Species
Narrow-leaved Ragwort (<i>Senecio inaequidens</i>)	W76	11/06/2021	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- Medium Impact Invasive Species
Pampas-grass (<i>Cortaderia selloana</i>)	W76	08/06/2020	Community Foundation for Ireland Records	- Medium Impact Invasive Species
Rhododendron ponticum	W76	13/04/2021	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- High Impact Invasive Species - S.I. 477/2011 (Ireland)
Spanish Bluebell (<i>Hyacinthoides hispanica</i>)	W76	14/04/2021	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- S.I. 477/2011 (Ireland)
Sycamore (<i>Acer pseudoplatanus</i>)	W76	08/06/2020	Community Foundation for Ireland Records	- Medium Impact Invasive Species
Three-cornered Garlic (<i>Allium triquetrum</i>)	W76	05/05/2021	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- Medium Impact Invasive Species - S.I. 477/2011 (Ireland)
Traveller's-joy (<i>Clematis vitalba</i>)	W76	08/06/2020	Community Foundation for Ireland Records	- Medium Impact Invasive Species

Turkey Oak (<i>Quercus cerris</i>)	W76	29/11/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- Medium Impact Invasive Species
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5.3.5.2 Mammals (excl. bats)

Records for terrestrial mammals were obtained from the NBDC online database, along with records obtained from the NPWS. Table 5-9 lists these species, their date of last record and summarises their protected status/designation.

Table 5-9 Records of Terrestrial Mammals for the surrounding 10km Grid Square (W76), 2km Grid Square (W76G) and 1km Grid Square W7262 from the NBDC and NPWS.

Species	Grid square	Date of last record	Source	Designation
Mammals				
American Mink (<i>Mustela vison</i>)	W76	23/08/2015	Atlas of Mammals in Ireland 2010-2015	- High Impact Invasive Species - S.I. 477/2011 (Ireland)
Bank Vole (<i>Myodes glareolus</i>)	W76	31/12/1992	Atlas of Mammals in Ireland 2010-2015	- Medium Impact Invasive Species
Brown Rat (<i>Rattus norvegicus</i>)	W76	13/12/2015	Atlas of Mammals in Ireland 2010-2015	- High Impact Invasive Species - S.I. 477/2011 (Ireland)
Coypu (<i>Myocastor coypus</i>)	W76	29/08/2016	National Invasive Species Database	- High Impact Invasive Species - EU. 1143/2014 - S.I. 477/2011 (Ireland)
Eurasian Badger (<i>Meles meles</i>)	W76 W76G W7262	05/07/2018	Mammals of Ireland 2016-2025	- Protected Species: Wildlife Act 1976 (as amended)
Eurasian Pygmy Shrew (<i>Sorex minutus</i>)	W76	17/06/2008	Atlas of Mammals in Ireland 2010-2015	- Protected Species: Wildlife Act 1976 (as amended)
Eurasian Red Squirrel (<i>Sciurus vulgaris</i>)	W76	14/10/2018	Mammals of Ireland 2016-2025	- Protected Species: Wildlife Act 1976 (as amended)

European Otter (<i>Lutra lutra</i>)	W76 W76G W7262	01/06/2018 01/06/2018 06/04/2016	Mammals of Ireland 2016- 2025	<ul style="list-style-type: none"> - Protected Species: EU Habitats Directive Annex II and Annex IV - Protected Species: Wildlife Act 1976 (as amended)
European Rabbit (<i>Oryctolagus cuniculus</i>)	W76 W76G	29/09/2018 12/07/2012	Mammals of Ireland 2016- 2025	<ul style="list-style-type: none"> - Medium Impact Invasive Species
Fallow Deer (<i>Dama dama</i>)	W76	04/06/2015	Atlas of Mammals in Ireland 2010- 2015	<ul style="list-style-type: none"> - High Impact Invasive Species - S.I. 477/2011 - Protected Species: Wildlife Act 1976 (as amended)
Irish Hare (<i>Lepus timidus subsp. hibernicus</i>)	W76	11/08/2013	Atlas of Mammals in Ireland 2010- 2015	<ul style="list-style-type: none"> - Game Preservation Act 1930 - Wildlife Act 1976 (as amended) - Wildlife (amendment) Act 2000 - Berne Convention Annex III Habitats Directive Annex V
Irish Stoat (<i>Mustela erminea subsp. hibernica</i>)	W76 W76G W7262	15/06/2017 17/04/2017 17/04/2017	Mammals of Ireland 2016- 2025	<ul style="list-style-type: none"> - Wildlife Act 1976 (as amended) - Wildlife (amendment) Act 2000
Pine Marten (<i>Martes martes</i>)	W76	13/03/2021	Mammals of Ireland 2016- 2025	<ul style="list-style-type: none"> - Protected Species: EU Habitats Directive Annex V - Protected Species: Wildlife Act 1976 (as amended)
Red Deer (<i>Cervus elaphus</i>)	W76	02/06/2015	Atlas of Mammals in Ireland 2010- 2015	<ul style="list-style-type: none"> - Protected Species: Wildlife Act 1976 (as amended)
Red Fox (<i>Vulpes vulpes</i>)	W76 W76G	03/12/2018 28/11/2018	Mammals of Ireland 2016- 2025	<ul style="list-style-type: none"> - Protected Species: Wildlife Act 1976 (as amended)
Sika Deer (<i>Cervus nippon</i>)	W76	31/12/2008	Deer of Ireland Database	<ul style="list-style-type: none"> - High Impact Invasive Species - S.I. 477/2011 (Ireland)

				- Protected Species: Wildlife Act 1976 (as amended)
West European Hedgehog (<i>Erinaceus europaeus</i>)	W76	21/06/2021	Hedgehogs of Ireland	- Protected Species: Wildlife Act 1976 (as amended)
	W76G	19/06/2021		
	W7262	11/04/2020		

No rare or protected mammal species were directly recorded during Site surveys in 2021.

The habitats within the Site of the Proposed Development are of variable value to mammals. There is suitable habitat for Hedgehog and Pygmy shrew on-site in the form of dry meadows and grassy verges. No Badger setts or signs of Badger activity were recorded during the Site survey in 2021. However, should a suspected Badger sett be discovered during the proposed works a professional ecologist will be consulted regarding how best to proceed. Otter are known to be present in the Owenboy River directly adjacent to the Site (NPWS, 2019). During Site visits evidence of Otter was recorded on the banks of the Owenboy River directly adjacent to the Site. In particular, Otter paw prints and access trail was observed on both sides of the Owenboy Riverbank (Figure 5-12). Although these habitats are technically outside the boundary of the Proposed Development, if present, Otter are still likely to be disturbed by the Proposed Development works. No signs of Irish Stoat, Irish Hare or Red Squirrel were recorded during field surveys nor is there suitable habitat for these species on-site. Therefore, these species are not considered further.



Figure 5-12. Evidence of Otter activity (paw prints and slide) along the Owenboy River immediately adjacent to the northern boundary of the Site.

The Site of the Proposed Development has the potential to support non-native/invasive species such as Brown Rat and European Rabbit. No signs of Fallow Deer, Greater White-toothed Shrew, House Mouse, Feral Ferret American Mink or Eastern Grey Squirrel were observed at the Site of the Proposed Development. As these species are non-native/invasive they are not considered further in this report. There were visible signs (droppings and trails) of Red Fox activity on Site however no dens were recorded. Although not afforded the same level of protection as the other mammal species mentioned above; wilful harming of the animal should be avoided. Fox is protected from a variety of hunting/extermination techniques as per the Wildlife Act 1976 (as amended); and from acts of cruelty as per the Animal Health and Welfare Act 2013. Should a suspected Fox den be discovered during the proposed works a professional ecologist be consulted regarding how best to proceed.

5.3.5.3 Bats

Records for 6 species of bat exist within the grid squares which encompass the Site. These species records are listed in Table 5-10.

Table 5-10 Records of Bats for the surrounding National Grid Squares from the NBDC.

Species	Grid square	Date of last record	Source	Designation
Brown Long-eared Bat (<i>Plecotus auritus</i>)	W76	28/08/2014	National Bat Database of Ireland	- Protected Species: EU Habitats Directive Annex IV - Protected Species: Wildlife Act 1976 (as amended)
Daubenton's Bat (<i>Myotis daubentonii</i>)	W76	20/08/2012	National Bat Database of Ireland	- Protected Species: EU Habitats Directive Annex IV - Protected Species: Wildlife Act 1976 (as amended)
Lesser Noctule (<i>Nyctalus leisleri</i>)	W76 W76G	16/08/2011 01/08/2005	National Bat Database of Ireland	- Protected Species: EU Habitats Directive Annex IV - Protected Species: Wildlife Act 1976 (as amended)

Natterer's Bat (<i>Myotis nattereri</i>)	W76	04/09/2008	National Bat Database of Ireland	<ul style="list-style-type: none"> - Protected Species: EU Habitats Directive Annex IV - Protected Species: Wildlife Act 1976 (as amended)
Pipistrelle (<i>Pipistrellus pipistrellus sensu lato</i>)	W76	04/09/2008	National Bat Database of Ireland	<ul style="list-style-type: none"> - Protected Species: EU Habitats Directive Annex IV - Protected Species: Wildlife Act 1976 (as amended)
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	W76 W76G	24/07/2014 27/07/2012	National Bat Database of Ireland	<ul style="list-style-type: none"> - Protected Species: EU Habitats Directive Annex IV - Protected Species: Wildlife Act 1976 (as amended)

5.3.5.3.1 Bat Survey Results

Four bat species/species groups were recorded during the bat survey; Soprano Pipistrelle (*Pipistrellus pygmaeus*), Leisler's Bat (*Nyctalus Leisleri*), Daubenton's Bat (*Myotis daubentonii*) and one record of *Pipistrellus sp.*, likely Common or Soprano pipistrelle (Table 5-11). The most frequently recorded species was Soprano Pipistrelle with high activity recorded along the riparian vegetation to the north of the Site (Figure 5-13). Activity here was indicative of multiple foraging bats with multiple calls and social calls recorded by the bat detector in this area. This species was also noted along a treeline to the south of the Site, where one oak tree with moderate-high roost potential was observed (Figure 5-13). However, no confirmed bat roosts were recorded on-site. One record of a Leisler's bat was made with a single bat passing through the Site at 21:10, indicating a bat commuting over the Site. Two Daubenton's bat passes were recorded at 20:35 with call shape indicating bats commuting/foraging close to the water's surface along the Owenboy River.

Over all a high level of bat activity was recorded along the Owenboy River and its riparian vegetation located along the Site's northern boundary. Very low activity was recorded elsewhere at the Site despite repeated walking transects carried out for the duration of the survey; through the centre of the field and along its boundaries.

Table 5-11 Summary of Bat activity recorded at the Site of the Proposed Development on
17th September 2021

Species Common Name	Species Scientific Name	Number of Passes	Number of Calls
Pipistrelle bat species	<i>Pipistrellus sp.</i>	1	61
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	183	6270
Leisler's Bat	<i>Nyctalus leisleri</i>	1	4
Daubenton's Bat	<i>Myotis daubentonii</i>	2	2



Figure 5-13 Location and activity of bat species recorded at the Proposed Development Site

5.3.5.3.2 Bat Conservation Landscape Suitability

The Bat Conservation Ireland Landscape Suitability Model (Lundy *et al.*, 2011) provides a habitat suitability index for bat species across Ireland. The model divides the country into 2 km grid squares and ranks the habitat within the squares according to its suitability for various bat species. The Proposed Development Site (indicated in the red box in Figure 5-14) is located in a grid square with an overall Medium to High (24.22) suitability for bats in general. The percentage suitability for specific bat species is presented in Table 5-12. The 2km grid square surrounding the Proposed Development Site has Medium-High suitability for the species of bat recorded during field surveys: Soprano pipistrelle, Leisler’s bat and Daubenton’s bat.

Table 5-12: Landscape Suitability Index for individual bat species within the 2km Grid Square (Source: NBDC)⁴.

Bat Species	Suitability Index (2km Grid Square)
Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>)	53 (High)
Brown Longed-eared bat (<i>Plecotus auritus</i>)	45 (High)
Common pipistrelle (<i>Pipistrellus pipistrellus</i>)	45 (High)
Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>)	0 (Low)
Leisler’s bat (<i>Nyctalus leisleri</i>)	49 (High)
Whiskered bat (<i>Myotis mystacinus</i>)	40 (High)
Daubenton’s bat (<i>Myotis daubentonii</i>)	32 (Medium-High)
Nathusius’s pipistrelle (<i>Pipistrellus nathusii</i>)	7 (Low)
Natter’s bat (<i>Myotis nattereri</i>)	37 (High)

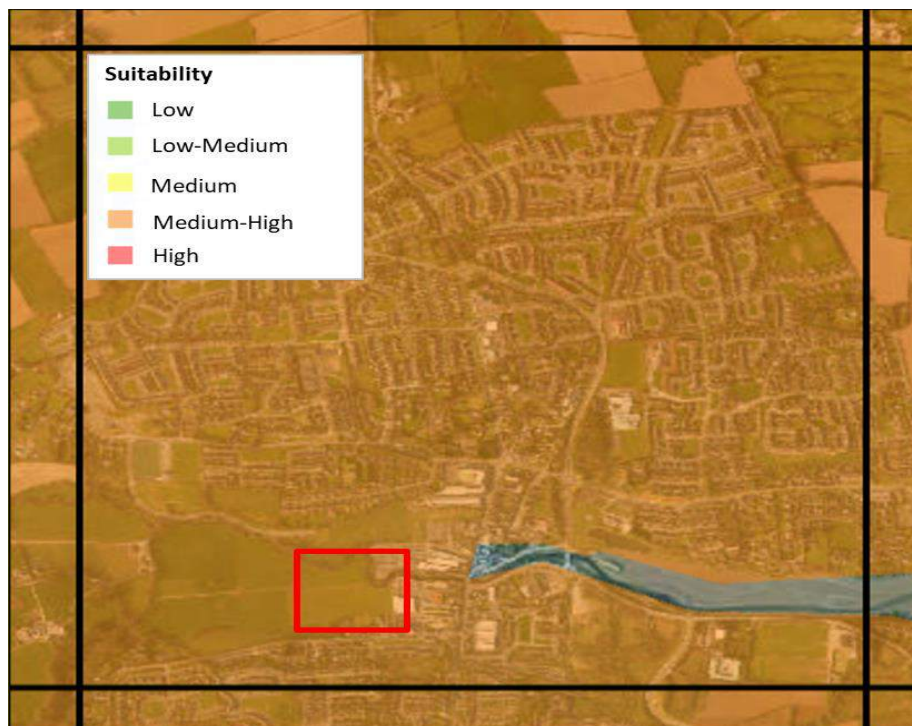


Figure 5-14 Bat Landscape Suitability Model (All bats) within the 2km grid square (W76G) surrounding the Proposed Development Site (Adapted from NBDC).

⁴ <https://maps.biodiversityireland.ie/Map>

5.3.5.4 Birds

Results from the common bird surveys, winter waterfowl and shorebird surveys conducted by Enviroguide Consulting at the Site of the Proposed Development in 2021 and 2022 are shown in Table 5-13. A total of 28 species were identified within the Site of the Proposed Development.

Table 5-13 Bird Species recorded within the Site of the Proposed Development during Common Bird Surveys in September 2021 and those recorded during winter waterfowl and shorebird surveys between December 2021 and April 2022.

Species	BoCCI ⁵ Status	Observations
Wood Pigeon	Green	Several individuals recorded flying over the Site and foraging in rank grassland.
Rook	Green	Several individuals recorded flying over the Site.
Wren	Green	Several Individuals recorded vocalising in tree lines to the north of the Site.
Buzzard	Green	Several recorded soaring over the Site.
Magpie	Green	Several individuals recorded flying over the Site and foraging in the rank grassland habitat.
Jackdaw	Green	Several individuals recorded flying over the Site and foraging in the rank grassland.
Hooded Crow	Green	Common on Site. Several individuals recorded flying over the Site and foraging in rank grassland.
Blackbird	Green	Several Individuals recorded vocalising in tree lines across the Site.
Collard Dove	Green	Several individuals recorded flying over the Site.
Goldfinch	Green	Several observed flying over the Site.
Bullfinch	Green	Pair seen perched in tree line to the north of the Site.
Great Tit	Green	Observed flying over the Site.
Long-Tailed Tit	Green	Observed landing on fence surrounding the area under

⁵ Birds of Conservation Concern in Ireland 2020-2026 (Gilbert, G., Stanbury, A. & Lewis, L. 2020).

		construction for the Site access ramp.
Pied Wagtail	Green	Observed landing on fence surrounding the area under construction for the Site access ramp.
Mallard	Green	Several individuals recorded flying over the Site and landing on the banks of the Owenboy River directly adjacent to the Site.
Little Egret	Green	Several individuals recorded flying over the Site.
Grey Heron	Green	Several individuals recorded flying over the Site and landing on the banks of the Owenboy River directly adjacent to the Site.
Snipe	Amber	Several individuals recorded foraging in the Rank grassland habitat on Site and when flushed flew towards the Owenboy River.
Stonechat	Amber	Pair seen perched on dead Ragwort plants within the Dry meadows and grassy verge habitat adjacent to the Owenboy River.
Robin	Amber	Several Individuals recorded vocalising in tree lines across the Site.
Mistle Thrush	Amber	One individual recorded flying over the Site.
Starling	Amber	Several individuals recorded flying over the Site.
Common Gull	Amber	Several individuals observed soaring over the Site.
Cormorant	Amber	Several individuals recorded flying over the Site and landing on the banks of the Owenboy River directly adjacent to the Site.
Black Headed Gull	Red	Several individuals observed soaring over the Site.
Grey Wagtail	Red	Commonly seen foraging and perching along the Owenboy River but also observed flying across the Site and landing on the construction fences.
Herring Gull	Red	Several individuals observed soaring over the Site.
Curlew	Red	Several individuals recorded flying over the Site but did not utilise the Site itself.

5.3.5.4.1 Winter Waterfowl and Shorebird Survey results

Data from waterfowl and shorebird surveys carried at the Proposed Development Site by Enviroguide Consulting are presented in Table 5-14. Several waterfowl and shorebird species were recorded during the surveys including Curlew, Grey Heron, Cormorant, Mallard, Little Egret, Snipe, Black-headed Gull, Common Gull and Lesser Black-backed Gull.

All species with the exception of Snipe were recorded flying over the Site and were not associated with or utilising the Site for foraging, roosting or nesting. Grey Heron and Cormorant were observed landing in the riparian vegetation of the Owenboy River immediately adjacent to the Site which they used for perching and foraging, however this habitat is not within the redline boundary of the Site. Small numbers of Snipe were regularly recorded foraging in the rank agricultural grassland to the south east of the Site. When flushed these birds flew towards the riparian vegetation to the north of the Owenboy River or towards the agricultural grassland fields to the west of the Site.

The flight activity of each species in relation to the proposed new 6-7 storey buildings differed over the Site. Black-headed Gull, Common Gull and Lesser Black-backed Gull were observed soaring over the Site during these surveys however, as these species are not considered to be at risk of collision due to their visual acuity and high manoeuvrability in flight (EirGrid, 2016.) The flight heights of Grey Heron, Cormorant, Mallard, Little Egret and Snipe ranged from 10-100m above ground level which is within the collision risk zone for the Proposed Development (6-7 storeys or 19-23 meters). Curlew flight heights were consistently between 40-100m above ground level and therefore were not within the collision risk zone.

Table 5-14 Results of waterfowl and shorebird surveys carried out on Site. Peak counts of relevant species - Curlew (CU), Grey Heron (H.), Cormorant (CA), Mallard (MA), Little Egret (ET) and Snipe (SN) - are shown. Peak counts of SCI gull species such as Black-headed gull (BH), Common gull (CM) and Lesser Black-Backed gull (LB) over the Site peak were not taken but were recorded as “frequent” flyovers. Bird activity on-site is classified using the following BTO activity codes: FL (flying) and FO (foraging).

Month	Date	Peak Counts							Gull species (BH,CM,LB)	Activity (BTO Code)	Flight Height	Additional Notes
		CU	H.	CA	MA	ET	SN					
December	29/12/21	0	1	1	1	1	1	Frequent sightings of one or two individuals	FL/FO	CU: 40-50m H:40-50m CA:40m MA:20m ET:15m SN: 60m	Snipe foraging in rank grassland.	
January	17/01/22	8	1	0	2	1	1	Frequent sightings of one or two individuals	FL/FO	CU:40-100m MA: 20-30m ET: 30m SN: 0-5m H.: 5-10m	Heron landed in riparian vegetation adjacent to the Site. Snipe foraging in rank grassland.	
January	27/01/22	12	1	0	2	3	1	Frequent sightings of	FL/FO	CU: 40m H: 25m	Snipe foraging in	

								one or two individuals		MA:15-25m ET:25-80m SN:0-5m	rank grassland.
February	08/02/22	0	1	0	0	1	1	Frequent sightings of one or two individuals	FL/FO	H: 15-30m ET:40m SN: 5-15m	Heron landed in riparian vegetation adjacent to the Site. Snipe foraging in rank grassland
February	24/02/22	0	1	0	0	1	0	Frequent sightings of one or two individuals	FL	H:30m ET:8-30m	-
March	23/03/22	0	1	4	3	0	0	Frequent sightings of one or two individuals	FL	CA: 10-35m MA:5-20m H: 10m	Cormorant landed in riparian vegetation adjacent to the Site.
March	29/03/22	0	2	2	3	0	1	Frequent sightings of one or two individuals	FL/FO	H:5m MA:7-25m CA: 20m SN:0-3m	Heron and Cormorant landed in riparian vegetation adjacent to the Site. Snipe foraging in rank grassland
April	07/04/22	0	1	0	0	2	1	Frequent sightings of one or two individuals	FL	H:15-20m ET:35m SN:0-5m	Snipe foraging in rank grassland

5.3.5.4.2 Breeding Bird Survey

A breeding bird survey was conducted on the 3rd of May 2022. Four transects were walked around the perimeter of the Site (Table 5-15). A total of 22 species were recorded with Grey Wagtail (*Motacilla cinerea*) being the only confirmed breeding species present. A breeding Grey Wagtail was recorded on transect 1 within the Owenboy River collecting food for its young (Table 5-15).

Table 5-15 Birds recorded during breeding bird survey on-site in April 2022.

Transect	Species	BOCCI Status	Confirmed Breeding?
T1	Grey Wagtail	Red	Yes
	House Martin	Amber	No
	Blackbird	Green	No
	Blue Tit	Green	No
	Mallard	Amber	No
	Wren	Green	No

	Jackdaw	Green	No
	Swallow	Amber	No
	Linnet	Amber	No
	Blackcap	Green	No
	Goldcrest	Amber	No
	Rook	Green	No
	Grey Heron	Green	No
	Lesser Redpoll	Green	No
	Chaffinch	Green	No
	Kingfisher	Amber	No
	Dunnock	Green	No
T2	Linnet	Amber	No
	Swallow	Amber	No
	Goldfinch	Green	No
T3	Linnet	Amber	No
	House Sparrow	Amber	No
	Goldfinch	Green	No
	Robin	Green	No
	Swallow	Amber	No
	Long-tailed Tit	Green	No
T4	Hooded Crow	Green	No
	Linnet	Amber	No



Figure 5-15: Transects walked during breeding bird survey in April 2022.

5.3.5.5 Fish

5.3.5.5.1 Atlantic salmon (*Salmo salar*)

The Atlantic salmon is listed as an Annex II species under the Habitat Directive. There are no records of this species in the 10km national grid square W76 or 2km grid square W76G in which the Site of the Proposed Development is located. Although there are no records of Atlantic Salmon within the Owenboy River, there are records of this species within the Lower River Lee which flow into Cork Harbour (Gargan, 2021). These fish migrate to and from the sea via Cork Harbour at various stages during their life cycle. As the Cork Harbour will receive surface water from the Proposed Development via the Owenboy River, potential impacts on Atlantic Salmon will be further assessed.

5.3.5.5.2 Lamprey (*Lampetra sp. & Petromyzon marinus*)

All three Lamprey species recorded in Ireland are listed on Annex II of the EU Habitats Directive. Lamprey larval burrows are characteristically found at eddies or backwaters, on the inside of bends or behind obstructions, where current velocity is below that of the main stream and where organic material tends to accumulate (Kelly & King, 2001). There are no records for any species of Lamprey within either the 10km (W76), 2km (W76G) grid squares associated with the Site of the Proposed Development.

It is commonly accepted that the distributions of the Lamprey species in Ireland are not yet fully known and that it is likely they occur in most catchments throughout the country (Igoe *et al.* 2004). For example, Sea Lamprey (*Petromyzon marinus*) were recorded in the Lower River Lee during surveys conducted by Ryan Hanley Consulting Engineers (2016). This species migrates to and from the sea via Cork Harbour at various stages during their life cycle. As the Cork Harbour will receive surface water from the Proposed Development via the Owenboy River, potential impacts on Lamprey species will be further assessed.

5.3.5.5.3 European eel (*Anguilla anguilla*)

European eel is a red listed species and is currently considered to be the most threatened fish species in Ireland (King *et al.*, 2011). European eel can inhabit a range of waterway types including lakes, small streams and rivers; migrating from where they live in freshwater habitats to breed at sea, before returning as young eel to their freshwater habitats (King *et al.*, 2011). There are records of European eel in the 10km grid square (W76) encompassing the Site. Eel were recorded in the River Lee during Inland Fisheries Ireland (IFI) surveys in 2013 (IFI, 2013). Similar to Atlantic Salmon and Lamprey, as these species will pass through Cork Harbour during their life cycle, European eel is assessed further in this report.

5.3.5.6 Other Vertebrates

5.3.5.6.1 Common Frog (*Rana temporaria*)

There are records of Common Frog within the 10km grid square (W76) and the 2km grid square (W76G) surrounding the Site. There is also no suitable breeding habitat within the Site of the Proposed Development. As such this species is not assessed further.

5.3.5.6.2 Smooth Newt (*Lissotriton vulgaris*)

There are no records for Smooth Newt within the 10km or 2km grid squares which encompasses the Site. There is also no suitable breeding habitat within the Site of the Proposed Development. As such this species is not assessed further.

5.3.5.6.3 Common Lizard (*Zootoca vivipara*)

There are no records of Common Lizard (*Zootoca vivipara*, formerly *Lacerta vivipara*) within the 10km grid square or 2km grid square encompassing the Site. There is also no suitable breeding habitat within the Site of the Proposed Development. As such this species is not assessed further.

5.3.5.7 Invertebrates

5.3.5.7.1 White-clawed Crayfish (*Austropotamobius pallipes*)

In Ireland, the White-clawed Crayfish most commonly occur in small and medium-sized lakes, large rivers, streams and drains; wherever there is sufficient lime (Reynolds, 2007). Freshwater crayfish require relatively hard water with high calcium levels, due to their requirement for sufficient calcium to harden their exoskeletons following moulting (Gallagher *et al.*, 2006 in Reynolds *et al.*, 2010a). The overall conservation status of the white-clawed crayfish in Ireland is inadequate, due to the reduction in its range and the continuing pressures that it faces (NPWS, 2013).

There are no records for this species within the grid squares which encompasses the Site of the Proposed Development. In Cork, Crayfish are largely confined to the Awbeg and Blackwater Rivers (Sweeney and Sweeney, 2017). As these rivers will not receive surface waters from the Proposed Development Site this species is not assessed further.

5.3.5.7.2 Marsh Fritillary (*Euphydryas aurinia*)

Marsh Fritillary butterfly is listed under Annex II of the EU Habitats Directive. There are no records for this species within the 10km grid square W76 or 2km grid square W76G encompassing the Site.

Neither Marsh Fritillary, nor its associated food plant; devil's bit scabious (*Succisa pratensis*), were recorded during Site surveys. Therefore, this species is not assessed further.

5.3.5.8 Faunal Evaluation

Fauna that has been observed within the Site of the Proposed Development, or for which records exist in the wider area, have been evaluated in Table 5-16 their conservation importance. This evaluation follows the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009b). The rationale behind these evaluations is also provided.

Table 5-16 Evaluation of Fauna recorded within the Site of the Proposed Development.

Species	Evaluation	Rationale	Key Ecological Receptor (KER)
Bird Assemblage (Amber)	Local Importance (Higher Value)	Several amber listed species noted at the Site. Site may provide nesting/foraging habitat in boundary tree lines.	Yes
Bird Assemblage (Red)	Local Importance (Higher Value)	Four red listed species noted flying over or immediately adjacent to the Site (Grey Wagtail, Black-headed Gull, Curlew and Herring Gull). The Site and the river habitat immediately to the north may provide nesting/foraging habitat for grey wagtail.	Yes
Badger	Local Importance (Lower Value)	No setts recorded at the Site during surveys. Abundant alternative habitat present in surrounding lands should Badger be in the locality.	No
Hedgehog	Local Importance (Higher Value)	This species may utilise the dry meadows and grassy verge habitat on Site.	Yes
Pygmy Shrew	Local Importance (Higher Value)	This species may utilise the dry meadows and grassy verge habitat on Site.	Yes
Irish (mountain) Hare	Local Importance (Lower Value)	Irish Mountain Hares (<i>Lepus timidus hibernicus</i>) are to be found in a wide variety of habitats from coastal grasslands and salt marshes to upland moors. They are most abundant on lowland pastures and areas that provide short grass, herbs and heather. No reproductive habitat on-site (rushes, heather, tall grass, marram grass) and abundant suitable habitat in the surrounding area.	No
Irish Stoat	Local Importance (Lower Value)	Irish Stoat (<i>Mustela erminea hibernica</i>) tend to occur in habitats which provide cover such as woodlands, hedgerows, marsh, heather, lowland farms, coastal areas or small mountains. In particular, they have a preference for open woodlands and rocky scrub covered areas near stone walls ditches or hedgerows. As no suitable habitat is present on Site this species is not further assessed.	No
Red Fox	Local Importance (Lower Value)	No dens recorded within the Site of the Proposed Development. Abundant suitable habitat in the vicinity.	No
Bat assemblage	Local Importance (Higher Value)	Foraging and commuting habitats for bats within the Site in the form of tree lines and the Owenboy River. Mature Turkey Oak to the south of the Site has bat roost potential.	Yes

Fallow Deer	Local Importance (Lower Value)	None recorded during field surveys. No possible access to the Site to walls and fencing.	No
Red Deer	Local Importance (Lower Value)	None recorded during field surveys. No possible access to the Site to walls and fencing.	No
Sika Deer	Local Importance (Lower Value)	None recorded during field surveys. No possible access to the Site to walls and fencing.	No
Red Squirrel	Local Importance (Lower Value)	Recorded in the surrounding areas, however no suitable habitat on Site.	No
Pine Marten	Local Importance (Lower Value)	Recorded in the surrounding areas, however no suitable habitat on Site.	No
Otter	Local Importance (Higher Value)	Suitable habitat within the Owenboy River immediately adjacent to the Site. Evidence of otter activity recorded during field surveys.	Yes
Common Frog	Local Importance (Lower value)	No records in the surrounding area and no suitable breeding habitat on Site.	No
Smooth Newt	Local Importance (Lower value)	No records in the surrounding area and no suitable breeding habitat on Site.	No
Common Lizard	Local Importance (Lower value)	No records in the surrounding area and no suitable breeding habitat on Site.	No
Atlantic Salmon	Local Importance (Higher Value)	There is the potential for Salmon to be present in Cork Harbour which will receive surface waters from the Proposed Development.	Yes
Lamprey sp.	Local Importance (Higher Value)	There is the potential for Lamprey to be present in Cork Harbour which will receive surface waters from the Proposed Development.	Yes
European eel	Local Importance (Higher Value)	There is the potential for European eel to be present in Cork Harbour which will receive surface waters from the Proposed Development.	Yes
White Clawed Crayfish	Local Importance (Lower Value)	Species restricted to Awbeg and Blackwater rivers and will not be effect by downstream surface water run-off from the Proposed Development.	No
Marsh Fritillary	Local Importance (Lower Value)	Neither marsh fritillary, nor its associated food plant; Devil's bit Scabious (<i>Succisa pratensis</i>), were recorded during Site surveys. The Proposed Development Site does not contain any wet grassland or other habitat considered suitable for Marsh Fritillary.	No

5.4 Characteristics of the Proposed Development

5.4.1 Construction Phase

The construction entrance to the Site will be from the new relief road to the west and will include vehicular access for construction traffic and pedestrian access for construction personnel. No public personnel, be it pedestrian or vehicular, will be permitted to enter the Site. Appropriate signage will be positioned at approach roads to the Site area so as to inform the public of the site activities.

All construction works will occur in a single phase which is estimated to take 18 months to complete. During the general excavation of the foundations there will be additional heavy goods vehicle (HGV) movements to and from the Site. All suitable material will be used for construction and fill activities where possible and appropriate. It is envisaged that tower cranes will be erected to hoist materials on Site in the construction of apartments. Several measures to ameliorate noise, dust, litter and other environmental nuisances associated with the Construction Phase are outlined in the Construction and Environmental Management Plan (CEMP).

For the duration of the proposed infrastructure works it is envisaged that the maximum working hours will be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 13:00 Saturdays, subject to the restrictions imposed by the local authorities. No working will be allowed on Sundays and Public Holidays unless express permission is obtained from the Local Authority.

5.4.2 Operational Phase

The Operational Phase will comprise commercial and residential use and retail activities consistent with the neighbouring land use in the area.

5.5 Potential Impact of the Proposed Development

The Potential impacts from the Proposed Development on habitats, flora and fauna associated with Site of the Proposed Development is assessed in the following sections.

5.5.1 Construction Phase

Construction will lead to the removal of several habitats present on-site. The following habitats will be completely removed:

- Dry Meadows and Grassy Verges (GS2)
- Scrub (WS1)
- Rank Improved Agricultural Grassland (GA1)
- Drainage Ditch (FW2)

As such, the removal of these habitats will result in the loss or disturbance of all species associated with them.

The section of buildings and artificial surfaces (BL3) habitat to the east of the Site will be removed and replaced with a pedestrian walkway. However, the area of BL3 habitat which comprise the newly constructed access ramp and pumping station to the west of the Site will be retained. The ornamental/non-native shrubs (WS1) and section of depositing lowland rivers

(FW2) on Site will be retained as part of the landscape plan. As part of the works, 8 trees which form part of the treelines (WL2) on the northern and southern boundary will be removed. However, the majority of the trees will be retained and there will be no loss of treelines.

5.5.2 Operational Phase

During the Operational Phase there may be increased disturbance to biodiversity, increased landscaping activities which may increase the risk of introducing invasive species. In addition, the occupation of housing will increase anthropogenic noise and lighting disturbance in the environs of the Site. Surface water discharge from Site during the Operational Phase has the potential to negatively affect water quality in the Owenboy River.

5.5.3 Proposed Foul and Surface Water Networks

The Proposed Development will be served via a new connection to an existing 225mm surface water drain which runs north from Kilmoney road along the eastern Site boundary and discharges into the Owenboy River. Therefore, there is a hydrological connection between the Site of the Proposed Development the Owenboy River, Owenboy Estuary and Cork Harbour. In the absence of standard, appropriate mitigation measures, there is potential for sediments/pollutants from the Site to enter the above storm water drain, the Owenboy River and ultimately Cork Harbour via surface water run-off during the Construction and Operational Phases. In addition, given the slope of the Site and its proximity to the Owenboy River, there is potential for direct surface water run-off from the Site during periods of heavy rainfall over the course of the Construction Phase.

A newly constructed pumping station on Site will pump foul water to an existing sewer on Kilmoney Road where it will flow to Cork Lower Harbour waste water treatment (WwTP). An Irish Water confirmation of feasibility letter for the Proposed Development has been submitted as part of this application (Irish Water, 2022). The increase of a maximum load of 616 Population Equivalent (PE) at the facility as a result of the Proposed Development, assuming each PE unit was not previously supported by the WwTP, is considered to be an insignificant increase in terms of the overall scale of the facility. The maximum capacity of the Cork lower harbour WwTP is 65,000 PE. According to the most recent Annual Environmental Report (AER) for this WwTP, the remaining organic capacity (PE) at this plant is 34203 people. Therefore, the potential maximum increased load of 616 PE does not have the capacity to alter the effluent released from the WwTP to such an extent as to result in likely significant effects on any waterbodies in Cork Harbour which received the outflow from the WwTP.

5.5.3.1 Impacts to Designated Sites

An Appropriate Assessment (AA) Screening report has been carried out in relation to the Proposed Development and accompanies this application. The AA Screening concludes as follows:

The Proposed Strategic Housing Development at Carrigaline, Co. Cork, has been assessed taking into account:

- *the nature, size and location of the Proposed works and possible impacts arising from the construction works.*
- *the qualifying interests and conservation objectives of the European Sites*

- *the potential for in-combination effects arising from other plans and projects.*

*In conclusion, upon the examination, analysis and evaluation of the relevant information and applying the precautionary principle, it is concluded by the authors of this report that, on the basis of objective information; the possibility **may be excluded** that the Proposed Development will have a significant effect on the European Site listed below:*

- *Great Islands Channel SAC (001058)*

However, upon examination of the relevant information including in particular the nature of the Proposed Development and the likelihood of significant effects on European Sites, the possibility may not be excluded that the Proposed Development will have a likely significant effect on the European Site listed below:

- *Cork Harbour SPA (004030)*

Accordingly, a Natura Impact Statement has been prepared for the Proposed Development and is included under separate cover.

The following conclusion is extracted from the Natura Impact Statement:

This Natura Impact Statement details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect effects of the Proposed Development planning application at Carrigaline, Co. Cork on the following European Site:

- *Cork Harbour SPA (004030)*

The above Site was identified by a screening exercise that assessed likely significant effects of a range of effects that have the potential to arise from the Proposed Development. The Appropriate Assessment investigated the potential direct and indirect effects of the proposed works, both during Construction and Operational Phases, on the integrity and qualifying interests of the above European Site, alone and in combination with other plans and projects, taking into account the Site's structure, function and conservation objectives.

Where potentially significant adverse effects were identified, mitigation and avoidance measures have been proposed to negate them. Therefore, as a result of the complete, precise and definitive findings of this Appropriate Assessment; it has been concluded beyond any reasonable scientific doubt, that once the mitigation measures recommended in this report are implemented correctly and in full, the Proposed Development at Carrigaline, Co. Cork will not result in any significant adverse effects on the above European Site.

As the NIS contains a full assessment of potential impacts on European Sites as well as a series of mitigation measures to protect them, they are not considered further in this Biodiversity Chapter.

The closest Proposed Natural Heritage Areas (pNHA) to the Site of the Proposed Development are the Owenboy River (ca. 50m) and Lough Beg (Cork) Bay (ca. 4.6 km) to the west of the Site. These Sites have no formal qualifying interests or official NPWS Site synopsis. However, it should be noted that as Owenboy River pNHA and Lough Beg (Cork) pNHA overlap with Cork Harbour SPA, the assessment of potential impacts and the mitigation measures outlined in the Natura Impact Statement (NIS) accompanying this application will

also apply to the protection of these Sites. Therefore, impacts on European Sites and Proposed Natural Heritage Areas are not further assessed in this report.

5.5.3.2 Loss of Habitat

5.5.3.2.1 Construction Phase

KER Habitats

As 8 no. trees within the treelines (WL2) will be removed during the Construction Phase, this represents a *negative, local, long term, moderate* impact to this habitat. No development work will occur within depositing/lowland rivers (FW2) and there will be no loss of this habitat as part of the Proposed Development. Surface water run-off to depositing/lowland rivers (FW2) may lead to *negative, local, short-term, moderate* impacts to this habitat during the Construction Phase and *negative, local, permanent, moderate* impacts during the Operational Phase.

Birds

Although local birds are likely adapted to a certain degree of urban ambient noise, human presence and nighttime lighting, there will likely be elevated noise and dust emissions, human presence and lighting during the Construction Phase. As a result, there is a potential risk of noise, dust, visual and lighting disturbance, which prevents birds from utilising potentially suitable habitat at the Site representing a *negative, local, short-term, slight* impact to birds.

Small numbers of Snipe were regularly observed foraging in the rank agricultural grassland on-site. As this habitat will be removed as part of the Proposed Development, the loss of this habitat has the potential to result in a *negative, local, permanent, slight* impact to Snipe.

Should vegetation be cleared as part of the Construction Phase during the breeding bird season (March 1st to August 31st); there is the potential for nesting birds to be harmed and nests to be destroyed. This would be in contravention of the Wildlife Act 1976 (as amended) which provides protection to breeding bird species and their nests and young. Therefore, in the absence of any mitigation or precaution, this risk represents a potential *negative, local, permanent, significant* impact to breeding birds.

As the Site is not suitable *ex-situ* foraging habitat for any bird species associated with Cork Harbour SPA and none were recorded utilising the Site during winter bird surveys, the loss of any habitat on-site will not impact these species.

Bats

Most bat activity occurred along the treelines to the north and south of the Site which were used by bat species as foraging and commuting habitat during bat surveys (Table 5-11). Bat surveys concluded that no bat roosts were present at the Site, however the large oak tree to the south of the Site was noted as being a potential bat roost (PBR) with elevated bat activity being observed around this tree (Table 5-11). In total, 4 bat species were recorded on-site including Soprano pipistrelle, Daubenton's bat, Leisler's bat and a Pipistrellus species. Construction activities such as earth works and pruning that could damage the roots or limbs of this tree may result in *negative, local, permanent, significant* impacts to roosting bats should they utilise this tree as a roost. There is potential for a *negative, local, short-term, moderate* impact to bats through the loss of potential bat habitats for foraging, roosting and commuting

due to increased lighting associated with the Construction Phase of the Proposed Development, particularly along the Owenboy River and the adjacent tree lines. High levels of luminance can impair bats' vision resulting in disorientation. Artificial lighting can impact on bat's roosting sites, commuting routes, and foraging areas especially along waterways. It is essential that lighting plans for a development site and around known roosts take into consideration the exit points, flight paths and foraging areas for bats and ensure these areas are not illuminated (BCI, 2014).

Aquatic Species

There is potential for negative impacts on aquatic species within the Owenboy River, Owenboy Estuary and Cork Harbour due to the potential to receive contaminated surface water run-off from the Proposed Development Site. This constitutes a *negative, local, short-term, significant* impact to aquatic species in the absence of suitable mitigation.

Mammals

The negative impacts to terrestrial mammals will be largely a result of habitat clearance and disturbance. Common and widespread species such as Pygmy Shrew and Hedgehog may use the dry meadows and grassy verge habitat on-site. As such, mortality of individuals as a result of clearance works may result in a *negative, local, short-term, moderate* impacts to local populations. Hedgehog and Pygmy Shrew have the potential to become entangled in construction materials such as netting and plastic sheeting, as well as other waste materials, causing entrapment and injury or death. This constitutes a *negative, local, short-term, moderate* risk at a local level associated with the Construction Phase of the Proposed Development.

Otter activity was observed on the banks of the Owenboy River on the northern Site boundary. Although no Otter holts or couches were recorded along the northern boundary, Otter are likely use this stretch of river for hunting and commuting. Therefore, emissions or noise and dust as well as increased human presence and nighttime lighting during the Construction Phase has the potential to cause *negative, local, short-term, moderate* effects in the form of disturbance to Otter at a local level, should they be present.

Invasive flora

Four invasive species (Buddleia, Sycamore, Turkey Oak and Himalayan Honeysuckle) were present on Site. The removal of topsoil from the Site may facilitate the spread of these non-natives. In addition, transport of construction materials to the Site by numerous construction vehicles raises the risk of introducing invasive species particularly during landscaping activities. This negative impact is potentially of significance and will be managed.

5.5.3.2 Operational Phase

Birds

There is potential for a *negative, local, permanent, moderate* impact on birds through disturbance resulting from increased human presence and lighting associated with the Operational Phase of the Proposed Development. In particular, bird species associated with the Owenboy River (Grey Wagtail, Mute Swan, Dipper, Grey Heron and Mallard) are likely to be disturbed by increased human presence and lighting associated with the access path from Carrigaline Main Street and the proposed river walkway.

Vantage point surveys were conducted by Enviroguide Consulting between January and April 2022. Several waterfowl and shorebird species were recorded flying over (but not utilising) the Site including Curlew, Grey Heron, Cormorant, Mallard, Little Egret, Black-headed Gull, Common Gull and Lesser Black-backed Gull. Common Snipe were also recorded foraging on Site and when flushed, flew towards the Owenboy River. As outlined in section 5.3.5.4.1 above, the flight heights of Grey Heron, Cormorant, Mallard, Little Egret and Common Snipe ranged from 10-100m above ground level which is within the collision risk zone for the Proposed Development (6-7 storeys or 19-23 meters). Conversely, Curlew were consistently recorded flying above the collision risk zone (40-100m). It is not considered that the Proposed Development poses a collision risk to any of the above species for several reasons. Firstly, these species exhibit high levels of collision avoidance and obstacle awareness (EirGrid, 2016). Secondly the proposed buildings have a high level of façade heterogeneity in terms of construction material used and the form and arrangement of the structures themselves. These architectural design features provide important visible cues as to the presence and extent of the proposed structures to any commuting/foraging bird species should they be in the vicinity of the Site (City of Toronto, 2016). In addition, there was a tendency for Grey Heron, Mallard and Little Egret to fly along the route of the Owenboy River to the north of the Site while commuting inland. As the proposed buildings will be constructed to the south of the Site, they will not present a collision risk to the species using this commuting corridor. Although Curlew were recorded flying over the north of the Site, they were consistently recorded above the collision risk zone. Common Snipe will typically fly away from structures when flushed.

Therefore, the proposed buildings do not represent a significant collision risk for Curlew or Common Snipe.

Considering the above factors, the potential collision risk for waterfowl and shorebirds during the Operational Phase of the Proposed Development is considered negligible.

Bats

There is potential for a *negative, local, permanent, moderate* impact through the increased night-time lighting associated with the Operational Phase of the Proposed Development.

Aquatic Species

There is potential for *negative, local, permanent, slight* effects on aquatic species due to the surface discharges to the Owenboy River, Owenboy Estuary and Cork Harbour during the Operational Phase of the Proposed Development.

Mammals

There is potential for a *negative, local, permanent, moderate* impact to Otter through the increased night-time lighting and human presence along the Owenboy River associated with the Operational Phase of the Proposed Development.

Invasive species

There is potential for a negative impact on the surrounding environment through the introduction of invasive species during Operational Phase landscaping and maintenance activities.

5.5.4 Potential Cumulative Impacts

5.5.4.1 Existing planning applications

A search of planning applications located within 500m of the Proposed Development was conducted using online planning resources including the National Planning Application Database (NPAD) (MyPlan.ie). Any planning applications listed as granted, application registered or decision pending from within the last five years were assessed for their potential to act in-combination with the Proposed Development and cause likely significant effects on local biodiversity. Long-term developments granted outside of this time period were also considered where applicable. The larger-scale developments identified within the vicinity of the Proposed Development are identified below and the potential for possible in combination effects with the Proposed Development were assessed.

Table 5-17 Assessment of potential in-combination effects of the Proposed Development and other developments pending or granted permission in the last 5 years (2017-2022) within 500m of the Site.

Planning Application	Development Description	Distance to Proposed Development	Potential for in-Combination Effects
<p>Athena Private Assets Ltd</p> <p>Planning Application Reference:196065</p> <p>Conditional (28/02/2020)</p>	<p>Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.</p>	<p>260m south</p>	<p>Yes: No Appropriate Assessment screening report or Natura Impact Statement was submitted for this Development. However as noted in the Planners report dated 02/03/2020, the Ecology Office Planner expressed “satisfaction that the proposed development will not have significant effects on the qualifying interest of the Cork Harbour Special Protection Area. Surface water proposals are not considered to pose a risk of having significant effects on the Cork Harbour SPA. In accordance with Section 177U of the Planning and Development Act 2000 (as amended), it is concluded beyond reasonable scientific doubt that the proposed works, individually or in combination with other plans / projects are not likely to have a significant effect a European / Natura 2000</p>

			<p><i>site and a Stage 2 Appropriate Assessment under Section 177V is not required”.</i></p> <p>However, surface waters from this development are connected to an existing surface water sewer (SWGM1014963) which discharges into the Owenboy Estuary. Therefore, there is potential for in-combination effects between this Development and the Proposed Development as a result of surface water run-off during both the Construction and/or Operational Phases.</p>
<p>Pilton Properties Ltd</p> <p>Planning Application Reference:194642</p> <p>Conditional (17/07/2019)</p>	<p>Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application</p>	<p>Within Site Boundary</p>	<p>No: A Natura Impact Statement was submitted with this application outlining several measures to mitigate against the emissions of environmental nuisances such as noise and dust as well as surface water pollution on European Sites within the vicinity. The construction works associated with this project are largely complete and will not overlap with works for the Proposed Development. The mitigation measures outlined would also have applied to the protection of local environmental features. Therefore, there is no potential for in-combination effects.</p>
<p>Ruden Homes Ltd</p> <p>Planning Application Reference:214818</p> <p>Extension of duration (28/04/2021)</p>	<p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank,</p>	<p>378m north-west</p>	<p>No: An Appropriate Assessment Screening report was submitted as part of this application which concluded that the construction and Operational Phase of this development did not have the potential to result in any likely significant effects on any</p>

	welfare kiosk/building, control kiosk/building and fencing. Access to the proposed development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262-		European Site. Due to the lack of a source-receptor-pathway, there will be no in-combination effects between this development and the Proposed Development on local environmental features.
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On examination of the above, it is considered that there is potential for the Proposed Development to act in-combination with other developments in the vicinity that may cause likely significant effects on local environmental features due to surface water run-off. In particular, surface water run-off from the above project and the Proposed Development which may contain silt, sediments or other pollutants have the potential to reduce water quality in the receiving waterbody which could have negative effects on local biodiversity.

Plans and Policies:

The following policies and plans were reviewed and considered for possible in-combination effects with the Proposed Development.

- Cork County Development Plan (2022-2028)
- Cork Biodiversity Action Plan (2009-Present)
- Biodiversity Action Plan for Carrigaline Tidy Towns (2019-2023)

The Cork County Development Plan 2022-2028 includes several objectives and policies to ensure the protection of local biodiversity (BE 15-1(a), BE 15-2, BE 15-5, BE 15-6, BE 15-10(b), BE 15-13 (A, B and D) and BE 15-8) and European Sites (MCI 7-5, MCI 7-6, RP 5-19, TO 10-2, EC 8-13, TO 10-7 and TO 10-9). The Cork County Biodiversity Action (2009-Present) and the Biodiversity Action Plan for Carrigaline (2019-2023) are set out to protect and improve biodiversity, and as such will not result in negative in-combination effects with the Proposed Development.

On examination of the above it is considered that there are no means for the Proposed Development to act in-combination with any plans or projects that would cause any likely significant effects on local biodiversity or European Sites.

5.5.5 “Do Nothing” Impact

Should the Proposed Development not take place, there will be no disturbance to any aspect of local landscape or biodiversity. Under a do-nothing scenario, significant changes would occur to biodiversity over time as the Site transitions to a more natural state. In particular, the dominant rank agricultural grassland would transition to dry meadows and grassy verges over time. Similarly, the dry meadows and grassy verge habitat would transition to semi-natural scrub which depending on species and stage of development would be of some value to common bird species as a winter feeding area and possibly for nesting. Population of small mammals would likely increase and continue to use the Site.

5.6 Avoidance, Remedial & Mitigation Measures

5.6.1 Mitigation by Design

5.6.1.1 Landscape Plan

5.6.1.1.1 Tree Retention

As part of the proposed landscape plan, the majority of the trees present on Site will be retained and incorporated into the final landscape design. In total, there are 19 trees on-site of which 11 will be retained. The trees to be felled were identified in the arborists report as being in “*poor*” condition, suffering from disease, having poor structure, or posing a health and safety risk. Species which will be felled are Sycamore, Ash and Alder.

5.6.1.1.2 Additional tree planting and habitat creation

While the loss of the 8 no. felled trees will have an initial impact on canopy cover, visual appearance and biodiversity value, the landscaping strategy for the Proposed Development has taken into consideration loss of existing trees and includes new tree planting which will mitigate the initial loss and have a positive impact on the visual appearance, amenity and biodiversity value of the Proposed Development. In total, 252 trees of six different species will be planted across the Site (Table 5-18). The majority of planting will occur in the amenity area to the north of the Site and along the Owenboy River. This will mitigate for the trees lost during the Construction Phase and result in a net gain in tree cover at the Site. The landscape plan also compensates for the loss of native tree species (Ash and Alder) during the Construction Phase by replacement planting with native tree species including Oak (*Quercus petraea*), Mountain Ash (*Sorbus aucuparia*) and Alder (*Alnus glutinosa*).

The riparian zone immediately to the south of the Owenboy River comprised of existing trees and riverbank vegetation will be retained in its natural condition and supplemented with additional native tree planting. This will provide a buffer zone between the water’s edge and the river walkway. The river walkway will also be set back a minimum of 7m from the edge of the riverbank to protect and help safeguard the sensitive riparian zone as a biodiversity corridor and reduce visual and noise disturbance to river fauna (Figure 5-16). Groups of native trees will be planted within the zone in consultation with the project ecologist to help stabilise the bank and increase its habitat value. A native wildflower meadow and temporary pond will be included in the amenity area to the north of the Site. These habitats are designed to support and enrich the biodiversity and habitat value of the Site. Several, mostly non-native shrub species are to be included on-site. These shrubs, particularly English Lavender and Giant Allium will be of value to pollinators.

Table 5-18 Species to be planted on Site.

Vegetation Type	Species
Trees	Sessile Oak (<i>Quercus petraea</i>)
	<i>Prunus</i> sp.
	Ulmus ‘Lobel’
	Field Maple (<i>Acer campestre</i>)
	Small leaf lime (<i>Tilia cordata</i>)
	Silver Birch (<i>Betula pendula</i>)
Shrubs	Boston Ivy (<i>Parthenocissus tricuspidata</i>)

	English Lavender (<i>Lavanula 'Hidcote'</i>)
	Shrubby Veronica (<i>Hebe Rakaiensis</i>)
	Big Ears (<i>Stachys byzantine</i>)
	Green Carpet (<i>Pachysandra terminalis</i>)
	<i>Clematis armandii</i>
	Dwarf Russian Almond (<i>Prunus tenella</i>)
	Bowles Mauve (<i>Erysimum bicolor</i>)
	Japanese Skimmia (<i>Skimmia japonica</i>)
	Shrubby cinquefoil (<i>Potentilla fruticosa</i>)
	Giant Allium (<i>Allium giganteum</i>)
	Common honeysuckle (<i>Lonicera periclymenum</i>)
	Rosemary (<i>Rosmarius offiialis</i>)
Wild flowers	Black Meddick (<i>Medicago lupulina</i>)
	Centauray (<i>Centaureum erythraea</i>)
	Cornflower (<i>Centaurea cyanus</i>)
	Cowslip (<i>Primula veris</i>)
	Devil's Bit Scabious (<i>Succisa pratensis</i>)
	Eyebright (<i>Euphrasia</i>)
	Kidney Vetch (<i>Anthyllis vulneraria</i>)
	Lady's Bedstraw (<i>Galium verum</i>)
	Marjoram (<i>Origanum majorana</i>)
	Oxeye Daisy (<i>Leucanthemum vulgare</i>)
	Yarrow (<i>Achillea millefolium</i>)
	Yellow Rattle (<i>Rhinanthus minor</i>)
	Red Bartsia (<i>Odontites vernus</i>)



Figure 5-16 Proposed Landscape Plan

5.6.1.2 Sustainable Urban Drainage Systems

The Proposed Development will be designed to incorporate best drainage practice. It is proposed to use a sustainable urban drainage system (SuDS) approach to stormwater management throughout the Site. The overall strategy aims to provide an effective system to mitigate the adverse effects of urban stormwater run-off on the environment by reducing run-off rates, volumes and frequency, reducing pollutant concentrations in stormwater, contributing to amenity, aesthetics and biodiversity enhancement and allow for the maximum collection of rainwater for re-use where possible. In addition, SuDS features aim to replicate the natural characteristics of rainfall run-off for any site by providing control of run-off at source and this has been achieved by the proposed SuDS features.

SuDS are a requirement under the 'Regional Code of Practice for Drainage Works'. Additionally, these systems are recommended under the 2009 guidelines, 'The Planning System and Flood Risk Management'. The incorporation of SUDS measures in the Proposed Development also aligns with the objectives of Cork County Development Plan 2022-2028 (Objective PL 3-1).

There are a number of SuDS features proposed which will be designed in accordance with CIRIA documents C753, C697 and C609 as follows:

- A detention basin / temporary pond and swale system designed and managed to attenuate floodwater whilst simultaneously supporting and enriching the biodiversity and habitat value of the Site.

- Sedum carpet to apartment block rooftops to capture, and attenuate stormwater run-off whilst providing a source of food/foraging for pollinating and nectar-feeding insects.
- A proprietary petrol interceptor which prevents petroleum products from entering watercourses and public sewers is included in the design.
- A proprietary modular block attenuation system with a maintenance/inspection tunnel for providing underground surface water attenuation storage and can infiltrate run-off is included in the design.

This will reduce the flow rate of surface water run-off and largely eliminate the risk of pollution to waterbodies arising from surface water run-off during the Operational Phase of the Proposed Development.

5.6.1.3 Lighting Plan

To protect bats and other wildlife from night-time lighting associated with the Operational Phase of the Proposed Development, the following Bat Conservation Trust (BCT) Lighting Guidelines (BCT, 2018) are incorporated in the lighting plan.

- *All luminaires used will lack UV/IR elements to reduce impact.*
- *LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.*
- *A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).*
- *Column heights will be carefully considered to minimise light spill. The shortest column height allowed will be used where possible.*
- *Only luminaires with an upward light ratio of 0% and with good optical control will be used.*
- *Luminaires will be mounted on the horizontal, i.e., no upward tilt.*
- *Accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed if deemed necessary by a suitable qualified bat ecologist.*

The lighting along the Owenboy River walkway will be composed of low level (950mm) lighting bollards. These bollards comply with the above BCT guidelines and have an asymmetric light output to light the pathway area only. This will prevent excessive lighting of the Owenboy River and adjacent treelines which is important foraging and commuting habitat for bats and other wildlife.

5.6.2 Construction Phase Mitigation

5.6.2.1 Tree Protection

Several protection measures will be implemented for the 11 trees that are to be retained including:

Protective barriers: which are 2.3m high and comprise a vertical and horizontal framework of scaffolding (BS 5837:2012), well braced to resist impacts and securely supporting weldmesh panels will be erected around the base of all trees to be retained on-site. This barrier will be clearly identified on-site by the attachment of all – weather signs of suitable dimension stating: ‘*CONSTRUCTION EXCLUSION ZONE – NO ACCESS*’. The line of this fence will be

at least the distance defined in the Root Protection Area. No construction traffic, materials or debris will be permitted within this zone of protection.

Access facilitation pruning: If it is deemed appropriate to trim back retained trees to provide adequate access to approved construction works, all such tree works will be undertaken by a competent and suitably qualified tree surgeon. Such works will remedy any tree related conflict with proposed structures or access in a way that ensure that not less than 70% of live buds are retained within the tree canopy. The aim of the tree works will be to retain the general form of the tree by a combination of crown thinning, reduction of end weight and the re-forming of the trees crown to create a pleasing and balanced crown. No branch, limb or trunk greater than 100mm diameter will be cut in the process of reducing end weight.

Demolition within the zone of protection: If it is deemed necessary to carry out demolition works within a construction exclusion zone surrounding retained trees, for example to remove existing paths or kerbs, only pedestrian operated plant or low ground pressure plant that is less than 2 tonnes gross weight fully loaded will be permitted. Such plant will only be operated on existing hard surfaces, or where temporary surfaces have been established. No excavations within the root protection zone of these retained trees will be permitted, except only under supervision or a suitably qualified arborist, with the use of an air spade or by careful use of hand tools in a way that retains, without damage, all exposed roots with a diameter greater than 25mm.

Scaffolding within zone of protection: Where scaffolding is to be established within the 'zone of protection' surrounding retained trees, the existing undisturbed ground surface will be protected by a layer of sharp sand, approximately 50mm thick, overlaid with a geotextile membrane. Stout planks, such as closely side butted scaffold boards, will be laid over the geotextile membrane and scaffolding will be constructed on these planks with additional stays as directed by a competent person. Adequate protection fencing will be maintained between scaffolding and adjacent trees.

Construction of hard surfaces close to retained trees: Where permanent surfaces are to be constructed close to retained trees, within the zone of protection as defined by BS 5837 : 2012, carefully remove accumulated organic material and loose soil, leaving existing topsoil in situ. Protect the root zone with a layer of sharp sand and geotextile membrane and a three-dimensional cell product as defined by a competent Civil or Structural Engineer. Construct the paved area on this sub-base using established design guidelines and a no fines granular material with a porous surface finish such as pavers or porous bitmac.

Alterations of levels on lands adjoining construction exclusion zones: Where it is deemed appropriate to lower ground levels on land adjoining a root protection zone established around a retained tree, all excavations and the subsequent construction supporting structures will be managed in a way that excludes access by construction traffic to the construction exclusion zone. Where such alterations result in the lowering of existing surfaces, the existing ground water environment within the root protection zone will be maintained by the insertion of a root barrier behind proposed supporting structures. This will consist of a non-porous barrier carefully inserted in a way that maintains the existing soil moisture regime surrounding the retained tree. Where alterations result in the raising of levels, these will be designed and detailed by a competent Civil or Structural Engineer to ensure no alterations to ground conditions within the root protection zones.

Landscaping within the root protection zone: If it is deemed necessary to carry out landscaping, planting or re-instatement works within a construction exclusion zone surrounding retained trees, only pedestrian operated plant, or low ground pressure plant that is less than 2 tonnes gross weight fully loaded, will be permitted. Such works will be supervised by a competent Horticulturalist and be timed and designed to ensure that no soil compaction occurs. No excavations within the root protection zone of these trees will be permitted, except under supervision using an air spade or by careful use of hand tools in a way that retains, without damage, all exposed roots with a diameter greater than 25mm.

Temporary surfaces within zone of protection: Where temporary access is to be established within the 'zone of protection' surrounding retained trees, ground surfaces will be protected by a layer of sharp sand, approx. 50mm thick, overlaid with a geotextile membrane on which temporary surface of no fines granular material (compression resistant for example woodchip) at least 150mm thick is laid. Where traffic is turning on this surface, stout planks will be laid over the geotextile membrane and below the granular material.

5.6.2.2 Surface water mitigation

The following measures set out below will protect surface waters throughout the Construction Phase:

All works carried out as part of the Proposed Development will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990.

Personnel working on the Site will be trained in the implementation of environmental control and emergency procedures. Procedures and relevant documents produced will be formulated in consideration of standard best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004;
- Construction Industry Research and Information Association CIRIA C648: Control of water pollution from linear construction projects: Technical guidance (Murnane *et al.*, 2006);
- CIRIA C648: Control of water pollution from linear construction projects: Site guide (Murnane *et al.*, 2006); and
- Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.

The following standard operational measures will protect surface water and groundwater during the Construction Phase of the Proposed Development:

- Discharge water generated during placement of concrete will be stored and removed off-site for treatment and disposal.

- There will be no washing out of any concrete trucks on-site.
- Specific areas for storage, delivery, loading/unloading of materials will be designated, which will have appropriate containment/spill protection measures where required.
- Leachate generation from stockpiles or waste receptacles will be prevented from entering groundwaters or surface waters by using waterproof covers.
- If contaminated soils are encountered during construction works or if material becomes contaminated by, for example a fuel spill or hydraulic fluid leak the contaminated materials will be segregated, placed on an impermeable membrane so as to prevent contamination of the underlying ground and covered to prevent contaminants being mobilised by rainwater run-off. The materials will remain covered until such time as they can be compliantly removed from site by appropriately authorised waste management contractors.
- Prolonged exposure of contaminated soils or groundwater to the atmosphere will be avoided where practical or unnecessary.
- A regular review of weather forecasts of heavy rainfall will be conducted, and a contingency plan will be prepared for before and after such events to minimise any potential nuisances.
- Refuelling of plant during the Construction Phase will only be carried out at designated refuelling station locations on-site. Each station will be fully equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed before the commencement of works on-site.
- Appropriate bunding, storage and signage arrangements for all deleterious substances will be used.
- Robust and appropriate Spill Response Plan and Environmental Emergency Plans will be implemented for the duration of the works.
- Control measures and spill clean-up equipment adequate to treat spills at the Site will be available and staff will be trained and experienced in using said equipment.
- A register will be kept of all hazardous substances either used on-site or expected to be present. The register will be available at all times and will include as a minimum: valid safety sheets; Health & Safety, environmental controls to be implemented when storing, handling, using and in the event of spillage of materials; emergency response procedures/precautions for each material; the Personal Protective Equipment (PPE) required when using the material.
- All existing services will be mapped, and a plan will be put in place to decommission/divert and manage any drains or sewers which are associated with the Site.
- A plan for dealing with any unknown drains or services which may be encountered during the works will be set out in the CEMP and implemented.
- Any drains or sewers which could act as pathways for contamination from the Site will be blocked where required. Alternatively, storm drain inlets which could receive stormwater from the project will be protected throughout the Construction Phase. Inlet protection will be installed before soil-disturbing activities begin

Direct Watercourse Protection

To prevent direct surface water run-off containing sediment/pollutants entering the Owenboy River, silt trapping measures will be implemented. This will be achieved by the construction of a filter berm along the northern Site boundary adjacent to the Owenboy River. A filter berm is designed to control erosion and sedimentation by reducing the rate of surface water run-off. The berm will be constructed using aggregate and geotextiles to the specifications (Clean Water Services, 2020) outlined below:

- Use 6 inch. maximum washed and well-graded gravel or crushed rock with less than 5% fines.
- Height and side slopes: 1 foot high with 3:1 side slopes.
- Length: 8 foot per 1 cubic foot per second flow, based on the peak flow for the 10-year storm.
- Use primarily as a base measure (toe of slope)

The berm will **not** be constructed immediately adjacent to the Owenboy River but instead an appropriate buffer zone will be maintained so that the natural riparian vegetation of the watercourse remains intact (IFI, 2016). The berm will be constructed at least 10m from the edge of the watercourse (IFI, 2020). In the case where a 10m buffer zone is not practicable as part of the proposed works, a suitably qualified ecologist will be consulted regarding the positioning of the berm prior to its construction to ensure appropriate protection of the riparian zone of the Owenboy River.

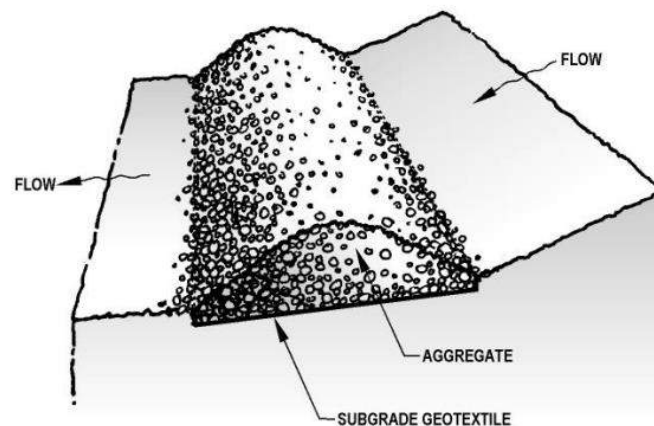


Figure 5-17 Example of filter berm construction (Clean Water Services, 2020)

5.6.2.3 Noise mitigation

Short-term increases in disturbance levels as a direct result of human activity and through increased generation of noise during the Construction Phase can have a range of effects depending upon the sensitivity of the ecological receptor, the nature and duration of the disturbance and its timing.

To ensure no significant effects occur on the fauna in the vicinity of the Proposed Development, the Contractor undertaking the construction works will implement specific noise

abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001. These measures will ensure that:

- No plant used on Site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on-site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools will be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- Any plant, such as generators or pumps that is required to operate outside of normal permitted working hours will be surrounded by an acoustic enclosure or portable screen;

BS 5228-1:2009+A1:2014 includes guidance on several aspects of construction site practices, which include, but are not limited to:

- Selection of quiet plant
- Control of noise sources
- Screening
- Hours of work
- Liaison with the public

The contractor will be required to conduct construction noise predictions prior to works taking place and put in place the most appropriate noise control measures depending on the level of noise reduction required at any one location. Noise control audits will be conducted at regular intervals through the Construction Phase of the Proposed Development. The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions.

5.6.2.4 Dust mitigation

A potential effect from the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m.

Dust deposition effects on biodiversity can occur due to chemical or physical effects. These include reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as pH changes in the soil. Often effects will be reversible once the works are completed, and dust deposition ceases.

The potential for dust to be emitted will depend on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction. As indicated, dust generation rates depend on the site activity, particle size (in particular the silt content, defined as particles smaller than 75 microns in size), the moisture content of the material and weather conditions. Dust emissions are dramatically reduced where rainfall has occurred, due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under “wet day” conditions where rainfall greater than 0.2mm has fallen. Information collected from Cork Airport Meteorological Station identified that typically 146 days per annum are “wet” which would indicate that for approximately half of the year, conditions are favourable to dust suppression.

Large particle sizes (greater than 75 microns) fall rapidly out of atmospheric suspension and are subsequently deposited in close proximity to the source. Particle sizes of less than 75 microns are of interest as they can remain airborne for greater distances and can give rise to the potential dust nuisance at the sensitive receptors. This size range is broadly described as silt. Emission rates are normally predicted on a site-specific particle size distribution for each dust emission source.

The dust minimisation measures detailed below will ensure that fugitive emissions of dust from the Site will be insignificant and pose no nuisance at nearby receptors.

Dust Minimisation Plan

The objective of dust control at the Site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (BRE 2003), (The Scottish Office 1996) (UK Office of Deputy Prime Minister 2002) and the USA (USEPA 1997), (USEPA 1986).

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on-site.
- Display the name and contact details of person accountable for air quality and dust issues on the Site boundary.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the measures in this document. The desirable measures will be included as appropriate for the Site. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.

Site Management

- Regular inspections of the Site and boundary will be carried out to monitor dust, records and notes on these inspections will be logged.

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook.
- Hold regular liaison meetings with other high risk construction sites within 500m of the Site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of Site boundary, with cleaning to be provided if necessary.
- Carry out regular Site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of Site inspections by the person accountable for air quality and dust issues on Site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on Site or before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Preparing and Maintaining the Site

- Plan Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the Site boundary that are at least as high as any stockpiles on-site.
- Fully enclose specific operations where there is a high potential for dust production and the Site is active for an extensive period.
- Avoid Site run-off of water or mud.
- Keep Site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used on Site. If they are being re-used on-site cover as described below.
- Covered stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 20 km/hr haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (e.g. cycling, walking)

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on-site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian or mulches where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Track Out

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%.

- A speed restriction of 15 km/hr will be applied as an effective control measure for dust for on-site vehicles.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a Site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the Site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the Site exit, wherever Site size and layout permits.
- Access gates to be located at least 10m from receptors where possible.

Dust Control – Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures.

- Vehicles delivering material with potential for dust emissions to an off-site location will be enclosed or covered with tarpaulin always to restrict the escape of dust;

- Public roads outside the Site will be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- If practicable, a wheel wash facility will be employed at the exit of the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.

5.6.2.5 Visual Disturbance

An increase in visual stimuli associated with increased activity on Site (i.e. movement of machinery and site operatives during the Construction Phase) has the potential to cause disturbance to aquatic species of birds and mammals utilising the Owenboy River to the north of the Site.

Sections of screening along the northern Site boundary will be erected to shield the site-works from the view of any aquatic species of birds and mammals utilising the Owenboy River. The screening will be kept back a minimum of 10m from the riverbank to prevent damage to the riparian zone. The design and installation of this screening will be approved and overseen by a suitably qualified ecologist.

5.6.2.6 Construction Phase Lighting

To protect wildlife from excess night-time lighting associated Construction Phase of the Proposed Development, the following wildlife friendly lighting guidelines from Bat Conservation Trust (BCT) (BCT, 2018) will be followed when choosing flood lighting and are incorporated into the CEMP:

- *All luminaires used will lack UV/IR elements to reduce impact.*
- *LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.*
- *A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).*
- *Column heights will be carefully considered to minimise light spill. The shortest column height allowed will be used where possible.*
- *Only luminaires with an upward light ratio of 0% and with good optical control will be used.*
- *Luminaires will be mounted on the horizontal, i.e., no upward tilt.*
- *As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed if deemed necessary by a suitable qualified bat ecologist.*

5.6.2.7 Protection of Bats

In order to reduce the potential negative impact of the Proposed Development on local bat populations, the following mitigation measures will be fully implemented.

5.6.2.7.1 Pre-Pruning & Tree Felling survey

The arborists report recommends pruning of the mature Turkey Oak (*Quercus cerris*) tree on the southern boundary which was identified as being a PBR during Enviroguide Consulting

bat surveys. Pruning works will involve clearing the crown of any dead or cracked branches which is potential bat roost habitat. Therefore, the following measures will be followed.

- A 2nd assessment of the trees proposed to be pruned or removed will be undertaken prior to the commencement of the works to determine if there are any active bat roosts present. This will be undertaken in consultation with the tree surgeons. If bats are encountered during this assessment the NPWS will be consulted.
- Where possible, trees, which are to be removed, will be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active).

5.6.2.7.2 External Lighting

To protect bats, all lighting on Site during the Construction and Operational Phase will follow the guidelines in section 5.6.2.6 which are incorporated into the CEMP and lighting plan.

5.6.2.8 *Protection of Birds*

Any clearance of vegetation will be carried out outside the main breeding season, i.e. 1st of March to 31st of August, in compliance with the Wildlife Act 1976 (as amended). Should any vegetation removal be required during this period, this vegetation will be checked for birds or nests by a suitably qualified ecologist. If encountered, the precise location within the hedgerow/trees/buildings, the species of bird present will be recorded, the area will be protected and the NPWS will be consulted prior to any works commencing in this area. The Site manager will be informed of the presence of nesting birds and advised that no works can commence in this area until further notice. Appropriate protection measures will be implemented in consultation with the project ecologist.

5.6.2.9 *Protection of mammals*

Hedgehog and Pygmy Shrew

As noted in the British Hedgehog Preservation Society's publication *Hedgehogs and development*, during the Construction Phase of the Proposed Development Hedgehogs have the potential to be impacted through the loss of suitable foraging sites in the form of dry meadows and grassy verges on-site.

Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., Hedgehog).

Hedgehog also frequent long grass for foraging and daytime nesting sites so caution when strimming/ mowing these areas of the Site is advised.

As best-practice, all construction-related rubbish on-site e.g., plastic sheeting, netting etc. should be kept in a designated area on-site and kept off ground level so as to protect Hedgehogs from entrapment and death. The above measures will also act to mitigate potential negative impacts on other small mammal species potentially found on-site e.g., Pygmy Shrew.

Work likely to cause disturbance during hibernation – for example removal of hibernation habitats such as log piles and dense scrub – **will not take place during November to March.**

Otter

Otters, along with their breeding and resting places, are protected under the provisions of the Wildlife Act 1976 (as amended). No holts will be directly affected by the Proposed Development, however if any works are likely to cause disturbance to active breeding holts (when present within c.150m of a scheme) (NRA, 2008), the NPWS will be consulted on how best to proceed. According to the NRA guidelines (2008) “No works should be undertaken within 150m of any holts at which breeding females or cubs are present. Following consultation with NPWS, works closer to such breeding holts may take place – provided appropriate mitigation measures are in place, e.g. screening and/or restricted working hours on-site.”

As such, the following measures will be implemented to protect the Otter during the Construction Phase

- A pre-construction survey for Otter will be undertaken by a suitably qualified ecologist, to assess Otter activity within 150m of the Site and to determine whether active holts and/or breeding females or pups are present. This will be undertaken as early as possible but no later than 2-3 weeks before works commence.

If Otter holts or couches are found within 150m of the Site during pre-construction surveys, the precise location of the holt or couch will be recorded, the area will be protected and the NPWS will be consulted prior to any works commencing in this area. The Site manager will be immediately informed of the presence of otter holts or couches and advised that no works can commence in this area until further notice. Appropriate protection measures will be implemented in consultation with the project ecologist and the NPWS.

Protection of aquatic species

The mitigation measures outlined in section 5.6.2.2 above will serve to protect aquatic species during the Construction Phase.

Invasive Species

Butterfly bush

To prevent the spread of Butterfly Bush within and outside the Site boundary management options for its removal are provided below:

The Butterfly Bush is a member of the Buddlejaceae family. It is very fast growing and can reach 2m in its first year, producing flowers and setting seed. As Butterfly Bush tolerates very poor soils, it can grow on walls, rock outcrops or sub-soils (NRA, 2010). The following is based on NRA (2010) guidelines:

Management methods such as digging it out are applicable only to minor infestations at the initial stage of invasion. Hand-picking of young plants is feasible but will be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedling. Grubbing of mature stands as a sole attempt at control is not recommended for the same reason. After uprooting, it is essential to plant the ground in order to prevent a flush of new seedling growth. When it is cut, Buddleia grows back from the stump very vigorously. Mowing of young plants does not provide control as they re-sprout with vigour. Where removal of mature plants is not feasible in the short term, the flower heads will be cut off in June before seed set. Chemical control 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 approved herbicides may be adequate for limited infestations of younger plants but will be followed up at 6 monthly intervals. At this point it must be stressed that all Plant Protection Products must be used in accordance with the product label and with Good Plant Protection Practice as prescribed in the European Communities (Authorisation, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003). Again, it should be noted that it is an offence to use Plant Protection Products in a manner other than that specified on the label. The methods outlined are not in accordance with the product label and so it will be necessary to discuss the use of such methods with the Pesticides Control Service with a view to seeking approval under the derogation procedures provided under the Plant Protection Regulations.

Sycamore

Manual removal of sycamore seedlings and saplings is recommended, i.e. hand pulling and digging up, but the roots must be completely removed, or cut stumps must be treated with herbicide in order to prevent regeneration, however this should be a last resort (Weber, 2003; Cross & Collins, 2017).

Himalayan Honeysuckle

This species originates from western China and spreads mostly by bird dispersed seeds, and vegetatively when dislodged stem pieces are in contact with moist soil and form roots. This plant can be removed via physical or chemical approaches. Seedlings and smaller plants of Himalayan Honeysuckle can be hand pulled or dug out. A range of treatments can be used on larger plants, including cutting stems back to near ground level and painting the cut stem with a suitable herbicide (the cut-paint method) or injection of a suitable herbicide into drill holes at the base of the plant (the drill-fill method). Plants can also be sprayed with selective or non-selective herbicides. Herbicide treatments will be used in late spring before the plants produce flowers and fruits. Follow-up treatments may be needed, as larger plants often re-shoot. Dense infestations can be slashed in winter before they bear fruit, the cut material disposed of safely and the regrowth sprayed in spring (Muyt, 2001).

5.6.2.10 Timing of Vegetation Clearance

The following table provides guidance for when vegetation clearance is permissible. Information sources include The Bat Survey Report, and *The Wildlife Act 1976 (as amended)*.

Table 5-19. Seasonal restrictions on vegetation removal. Red boxes indicate periods when clearance/works are not permissible.

Ecological Feature	January	February	March	April	May	June	July	August	September	October	November	December
Breeding Birds	Vegetation clearance permissible	<u>Nesting bird season</u> No clearance of vegetation or works to relevant structures permitted unless confirmed to be devoid of nesting birds by an ecologist.						Vegetation clearance permissible				
Hibernating/reproducing mammals (namely Hedgehog, Pygmy Shew)	<u>Mammal hibernation season</u> No clearance of vegetation or works to relevant structures permitted (January-March) unless confirmed to be devoid of hibernating mammals by an ecologist.		Vegetation clearance permissible						<u>Mammal hibernation season</u> No clearance of vegetation or works to relevant structures permitted unless confirmed to be devoid of hibernating mammals by an ecologist.			
Bats	Tree felling to be avoided							Preferred period for tree-felling		Tree felling to be avoided		

The preferred period for vegetation clearance is within the month of October (Table 5-19). Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present. Vegetation clearance will take place under the supervision of an ecologist to avoid any potential impact on bats, mammals or breeding birds.

5.6.2.11 Biosecurity

In addition, the following will be adhered to, to avoid the introduction of invasive species to the Proposed Development Site during both the Construction and Operational Phases.

- The contractor will be aware of biosecurity issues and will inform sub-contractors through the induction process. Any vehicles which have been used in the management of invasive species are required to be cleaned before leaving the Site of contamination, thereby not introducing the risk of cross contamination to other sites.
- Any material required on the Site will be sourced from a stock that has been screened for the presence of any invasive species by a suitably qualified ecologist and where it is confirmed that none are present.
- Personnel working on contaminated sites will be made aware of their responsibilities in cleaning equipment and PPE before visiting Site.

5.6.3 Operational Phase

5.6.3.1 Bat Box Scheme

To compensate for the loss of potential bat roost habitat during the Construction Phase, 6 no. Rocket Bat Boxes⁶ will be installed on-site. Rocket Bat Boxes provides an alternative roost habitat in locations where there are no suitable buildings or trees available on which to mount a bat box. They are often used as an alternative roost near to building sites during construction works.

The bat box scheme will be sited at the most suitable location as deemed by the bat specialist, and this will be undertaken by a suitably qualified bat specialist. Bat boxes will be erected prior to construction works. Additional bat boxes may be installed if recommended by the suitably qualified bat ecologist. The bat specialist will oversee the erection of the bat boxes with assistance from the contractor. Some general points that will be followed include:

- Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.
- Bat boxes will be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.
- Locations for bat boxes will be selected to ensure that the lighting plan for the proposed Site does not impact on the bat boxes.

5.6.3.2 Increased Human Presence

Although the proposed river walkway and riparian buffer zone will be set back a minimum of 7m from the banks of the Owenboy River, there is still potential for increased human presence to cause disturbance to river fauna.

To reduce the potential for disturbance, permanent signage and information displays will be erected along the river walkway and access path from Carrigaline main street to educate residents and walkers of river fauna (Otter, Grey Wagtail, Dipper, Grey Heron, Mute Swan, Mallard etc.) common to the area and their sensitivities. This signage will encourage the public to keep their dogs on leads and to refrain from entering the riparian buffer zone to avoid disturbance. The exact text to be included on signs and information displays will be determined in consultation with a suitably qualified ecologist and Cork County Council.

5.6.4 “Worst Case” Scenario

Regarding water quality, the worst-case scenario could potentially occur during the Construction Phase if surface water run-off containing sediments, fuels or other pollutants enter the surface water drainage network which flow into the Owenboy River and ultimately Cork Harbour leading to their contamination and pollution. Significant negative impacts could also occur if trees or other vegetation are removed during the nesting season or if trees which contain active bat roosts are felled or pruned.

⁶ <https://www.nhbs.com/eco-rocket-bat-box>

5.7 Residual Impacts

Residual impacts are impacts that remain once mitigation has been implemented or impacts that cannot be mitigated. Table 5-20 provides a summary of the impact assessment for the identified Key Ecological Resources (KERs) and details the nature of the impacts identified, mitigation proposed and the classification of any residual impacts.

All mitigation measures detailed in this Chapter will be implemented in full and will remain effective throughout the lifetime of the Proposed Development. Therefore, no significant negative residual impacts on the local ecology or on any designated nature conservation sites will result from the Proposed Development.

Table 5-20 Summary of potential impacts on KER(s), mitigation measures/mitigating factors and residual impacts resulting from the Proposed Development.

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation/ Mitigating Factors	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Designated Sites								
Owenboy River pNHA	National importance/International importance	Potential for surface water run-off containing silt and/or pollutants from the Site to negatively impact these Sites during the Construction Phase	Negative	Local	Short-term	Moderate	Protection of surface waters during the Construction Phase	Neutral
Lough Beg (Cork) pNHA		Potential for surface water run-off containing silt and/or pollutants from the Site to negatively impact these Sites during the Operational Phase	Negative	Local	Permanent	Moderate	SuDS measures incorporated into project design.	Neutral
Cork Harbour SPA								
Habitats								
Treelines (WL2)	Local importance (higher value)	Loss of 6 trees from treelines across the Site Construction Phase.	Negative	Local	Permanent	Moderate	Substitute planting of 252 trees of 6 different species. "Like for like"	Neutral

							planting to be implemented for the native tree species (ash and alder) lost.	
Depositing Lowland Rivers (FW2)	Local importance (higher value)	Potential for surface water run-off containing silt and/or pollutants from the Site to negatively impact this habitat during the Construction Phase	Negative	Local	Short-term	Moderate	Protection of surface waters during the Construction Phase	Neutral
		Potential for surface water run-off containing silt and/or pollutants from the Site to negatively impact this habitat during the Operational Phase	Negative	Local	Permanent	Moderate	SuDS measures incorporated into project design.	Neutral
Mammals								
Bat Assemblage	Local importance (higher value)	Potential loss and/or damage to sections of roosting, foraging and commuting habitat during construction or pruning works.	Negative	Local	Short term	Slight	Several tree protection measures to be implemented and pre-pruning bat survey to be undertaken on PBR. Rocket bat boxes to be installed as compensatory/additional habitat	Neutral

		Disturbance due to increased Construction Phase lighting.	Negative	Local	Short-term	Moderate	A suite of bat friendly lighting measures will be implemented during the Construction and Operational Phases	Negative, Short-term Slight
		Disturbance due to increased Operational Phase lighting	Negative	Local	Permanent	Moderate		Negative, Permanent Slight
Birds								
Bird Assemblages	Local Importance (Higher Value)	Disturbance due to increased levels of noise, dust, human presence and lighting during Construction Phase.	Negative	Local	Short-term	Slight	A suite of noise, dust visual screening and lighting control measures is to be included in the CMP/CEMP which will be in place for the duration of the Construction Phase.	Neutral
		Direct harm and destruction of nests should vegetation clearance be carried out within the breeding bird season (March 1 st to August 31 st).	Negative	Local	Permanent	Significant		
		Loss of snipe foraging habitat in the form rank grassland.	Negative	Local	Permanent	Slight	NA	Negative Local Permanent Slight

		Increased disturbance due to lighting and human presence during the Operational Phase	Negative	Local	Permanent	Moderate	Wildlife friendly lighting will be measures will be implemented during the Operational Phase. Signage and information displays will be erected along the river walkway and access path from Carrigaline main street to educate residents and walkers of river birds (Grey Wagtail, Dipper, Grey Heron, Mute Swan, Mallard etc.) common to the area and their sensitivities. This signage will encourage the public to keep their dogs on leads and to refrain from entering the riparian buffer zone to avoid disturbance.	
Aquatic Species								
Aquatic Species (European eel, lamprey, Atlantic Salmon)	Local Importance (Higher Value)	Potential for surface water run-off containing silt and/or pollutants from the Site to negatively impact surface water quality during the Construction Phase Potential for surface water run-off containing silt and/or pollutants from the	Negative Negative	Local Local	Short-term Permanent	Significant Slight	Protection of surface waters during the Construction Phase	Negligible

		Site to negatively impact surface water quality during the Operational Phase					SuDS measures incorporated into project design.	
Otter								
Otter	Local Importance (Higher Value)	Increased levels of noise, dust, human presence and night-time lighting during the Construction Phase.	Negative	Local	Short-term	Moderate	A suite of noise, dust visual screening and lighting control measures is to be included in the CEMP which will be in place for the duration of the Construction Phase.	Negative, Local, Short-term, Slight
		Disturbance due to increased lighting and human presence during the Operational Phase	Negative	Local	Permanent	Moderate	Wildlife friendly lighting will be measures will be implemented during the Operational Phase. Signage will be erected along the river walkway and access path from Carrigaline main street to educate residents and walkers of river mammals (otter) common to the area and their sensitivities. This signage will encourage the public to keep their dogs on leads and to refrain from entering the riparian buffer zone to avoid disturbance.	Negative, Local, Permanent, Slight

Small Mammals								
Small mammals (hedgehog, Pygmy Shrew)	Local importance (higher value)	Disturbance or mortality as a result of vegetation clearance.	Negative	Local	Short-term	Moderate	Vegetation removal measures to be included in CEMP.	Neutral
		Possible mortality due to construction site hazards (entanglement in plastic sheeting etc.).	Negative	Local	Short-term	Moderate	Incorporation of protective mitigation measures to reduce impact of Construction Phase.	

5.8 Monitoring

5.8.1 Construction Phase

Daily on-site and off-site inspections will be undertaken where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of the Site boundary, with cleaning to be provided if necessary.

Carry out regular Site inspections to monitor compliance with the Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked, increase the frequency of Site inspections by the person accountable for air quality and dust issues on-site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

5.9 Interactions

This Chapter pertaining to the ecological and biodiversity aspects of the Proposed Development, has the potential to interact with aspects of the following Chapters of this EIAR:

- Chapter 6: Land, Soil & Geology
- Chapter 7: Hydrology
- Chapter 9 - Noise and Vibration

5.9.1 Land & Soil

An assessment of the potential impact of the Proposed Development on the existing land, soils and geological environment, with emphasis on the extraction and infilling of material; and the potential accidental release of contaminated materials to ground during Operational Phase of the Proposed Development, is included in Chapter 6 Land, Soil and Geology. Measures for the mitigation of these impacts are also set out in Chapter 6.

5.9.2 Hydrology

An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is included in Chapter 7 of this EIAR. Procedures for dealing with silt laden runoff at the Site; potential spills/leakages of fuels/contaminants; and the protection of nearby watercourses are outlined in Chapter 7.

5.9.3 Noise and Vibration

An assessment of the potential impact of the Proposed Development in the form of excess noise and vibrations associated with the proposed works are laid out in Chapter 9 - Noise and Vibration. These impacts are relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Biodiversity Chapter.

5.10 Difficulties Encountered When Compiling

Winter bird surveys for the Proposed Development took place between December 2021 and April 2022. During this time, construction works for a pumping station, emergency storage tank, control kiosk, welfare kiosk and rising mains (Planning Application Reference:194642)

had encroached considerably onto the Site. Therefore, a large portion of the survey area was an active construction site with increased human presence.

5.11 References

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6 LAND AND SOIL

6.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the land, soils and geology within and immediately surrounding the areas of the Proposed Development Site and an assessment of the potential impacts of the Proposed Development Site on land, soils and geology and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

- Land, soils, and geological characteristics at the Proposed Development Site;
- Potential impacts that the Proposed Development Site may have on land, soils and geology including “worst case” scenario assessment;
- Potential constraints that the environmental attributes may place on the Proposed Development Site;
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development Site; and
- Evaluate the significance of any residual impacts.

6.1.1 Quality Assurance and Competence

This EIAR Chapter was written by Fionnuala Joyce BSc., MSc., Hydrogeologist with Enviroguide Consulting and Claire Clifford BSc., MSc., PGeo., EurGeol who is Technical Director - Contaminated Land and Hydrogeology with Enviroguide Consulting and is a Professional Geologist with the Institute of Geologists of Ireland and has extensive experience in preparing hydrogeological and environmental assessments for a range of project types and geological and hydrogeological site settings.

6.1.2 Description of the Proposed Development

The Proposed Development Site consists of the following:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units;
- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about area, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including:

- Understorey car parking at ground and first floor ;
- Vehicular access on to the Kilmoney Road Lower;
- A cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river),
- Lighting;
- Drainage,
- roads boundary treatments,
- ESB Substation; and
- bicycle & car parking and bin storage.

Specific features of the Proposed Development which are relevant to Land and Soil

- Raising of the ground level of the Site up to 4meters above Ordnance Datum (mOD).

6.2 Study Methodology

6.2.1 Regulations and Guidance

The methodology adopted for the assessment takes cognisance of the relevant guidelines in particular the following:

- S.I. No. 92 of 2011- European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment including amendments S.I. No. 52 of 2014.;
- S.I. No. 98 of 2008- European Parliament and of the Council on waste and repealing certain Directives.
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- Environmental Protection Agency, 2003. Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Institute of Geologists of Ireland Guidelines, 2002. Geology in Environmental Impact Statements, A Guide (IGI, 2002);
- Institute of Geologists of Ireland Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013); and

- National Roads Authority, 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009).

6.2.2 Phased Approach

A phased approach was adopted for this EIAR in accordance with Environmental Protection Agency (EPA) and Institute of Geologists of Ireland (IGI) guidelines as set out above and is described in the following sections.

Element 1: An Initial Assessment and Impact Determination stage was carried out by Enviroguide Consulting to establish the project location, type and scale of the Proposed Development, the baseline conditions, and the type of land, soil, geological environment, to establish the activities associated with the Proposed Development Site and to undertake an initial assessment and impact determination.

This stage of the assessment included a desk top study that comprised a review of published environmental information for the Proposed Development Site, information provided by the Applicant and a site walkover survey. The study area, for the purposes of assessing the baseline conditions for the Land, Soil and Geology Chapter of the EIAR, extends beyond the Proposed Development Site boundaries and includes potential receptors within a 2.0km radius of the Proposed Development Site. The extent of the wider study area was based on the Institute of Geologists of Ireland Guidelines (IGI, 2013) which recommend a minimum distance of 2.0km radius from the Proposed Development Site.

This stage of the assessment included the review of the following sources of information:

- Environmental Protection Agency (EPA) webmapping 2022;
- Cork County Council (CCC) planning webmapping 2022;
- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater webmapping 2022;
- Ordnance Survey Ireland (OSI) webmapping 2022; and
- Information provided by the Applicant including:
 - S.I. Ltd., 2007 Site Investigation for Road at Carrigaline, Co. Cork Factual Report (Contract No. 4404C); and
 - Henry J Lyons, 2022. Existing Site Survey

Site walkover surveys were undertaken by Enviroguide Consulting on the 17th September 2021 and 29th March 2022 to establish the environmental site setting and baseline conditions at the Proposed Development Site relevant to the land soil and geology environment.

Element 2: Based on a review of the information compiled and reviewed in Element 1, it was determined that there was sufficient information including site investigation data regarding the Proposed Development and the subsurface and geological conditions at the Site to inform the impact assessment of the Proposed Development Site on the receiving land, soil, and geology environment.

Element 3: Mitigation Measures, Residual Impacts and Final Impact Assessment were based on the outcome of the information gathered in Element 1 of the assessment. Mitigation measures to address all identified adverse impacts that were identified in Element 1 of the assessment were considered. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

Element 4: Completion of the Land, Soils and Geology Section of the EIAR in this Chapter which includes all the associated figures and documents.

6.2.3 Description and Assessment of the Receiving Environment

The Transport Infrastructure Ireland (TII) criteria for rating of the importance of geological features at the Proposed Development Site as documented in the National Roads Authority Guidelines (NRA, 2009), are summarised in Table 6-1.

Table 6-1: Criteria for Rating Site Importance of Geological Features

Importance	Criteria	Typical Example
Very High	<p>Attribute has a high quality, significance or value on a regional or national scale.</p> <p>Degree or extent of soil contamination is significant on a national or regional scale.</p> <p>Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.</p>	<p>Geological feature rare on a regional or national scale (NHA).</p> <p>Large existing quarry or pit.</p> <p>Proven economically extractable mineral resource.</p>
High	<p>Attribute has a high quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is significant on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is significant on a local scale.</p>	<p>Contaminated soil on-site with previous heavy industrial usage.</p> <p>Large recent landfill site for mixed wastes.</p> <p>Geological feature of high value on a local scale (County Geological Site).</p> <p>Well drained and/or high fertility soils.</p> <p>Moderately sized existing quarry or pit.</p> <p>Marginally economic extractable mineral resource.</p>
Medium	<p>Attribute has a medium quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is moderate on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is moderate on a local scale.</p>	<p>Contaminated soil on-site with previous light industrial usage.</p> <p>Small recent landfill site for mixed wastes.</p> <p>Moderately drained and/or moderate fertility soils.</p> <p>Small existing quarry or pit.</p> <p>Sub-economic extractable mineral resource.</p>
Low	<p>Attribute has a low quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is minor on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is small on a local scale.</p>	<p>Large historical and/or recent site for construction and demolition wastes.</p> <p>Small historical and/or recent landfill site for construction and demolition wastes.</p> <p>Poorly drained and/or low fertility soils.</p> <p>Uneconomically extractable mineral resource.</p>

6.2.4 Description and Assessment of the Potential Impact

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology

and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this Chapter is described in Table 6-2.

Table 6-2: Assessment of Potential Impacts Terminology and Methodology

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	Definition
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	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 baseline 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 a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

6.3 The Existing and Receiving Environment (Baseline Situation)

6.3.1 Site Location

The Proposed Development consists of a total landtake of 3.7hectares (Ha) at Kilmoney Road, Carrigaline, Co. Cork with an overall net developable area of 1.9 ha.

The Proposed Development Site location is presented in Figure 6-1.

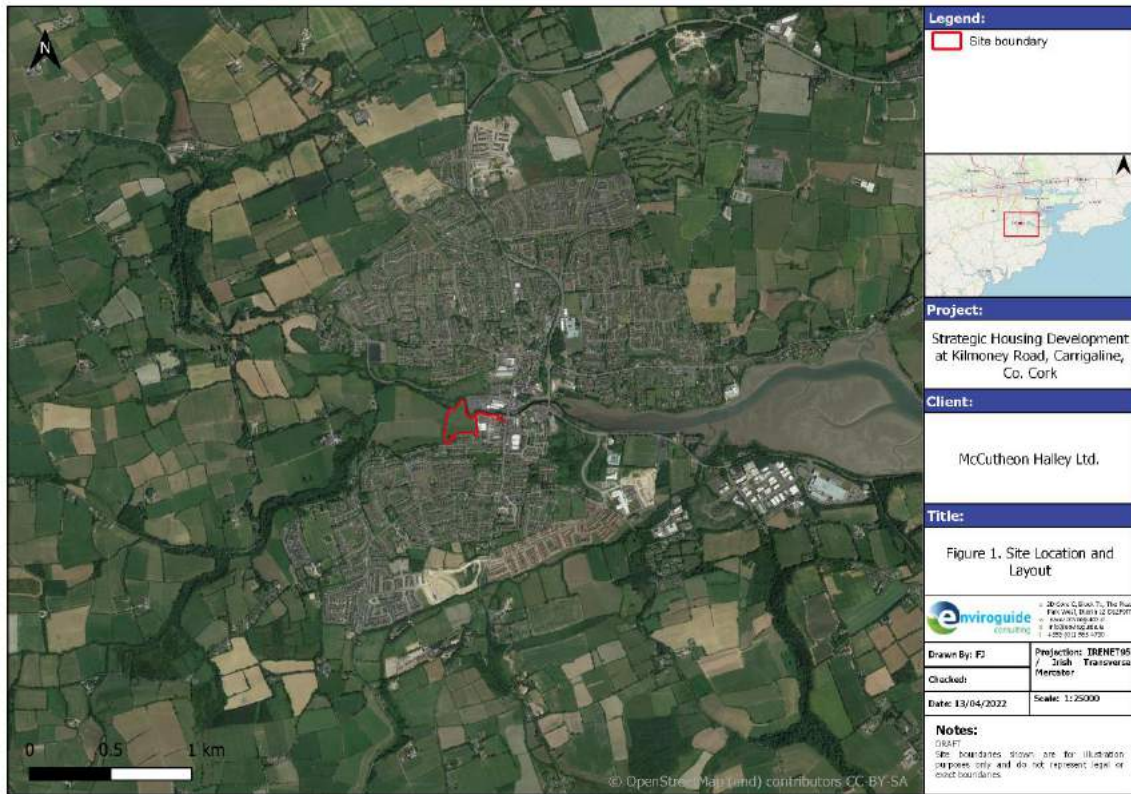


Figure 6-1: Proposed Site Location

6.3.2 Current and Historical Landuse

Historical mapping and aerial photography available from the Ordnance Survey of Ireland website (OSI, 2022) and Google Earth (Google Earth, 2022) were reviewed and key observations on-site and off-site are summarised in Table 6-3.

Table 6-3: Historical mapping and photography for the Proposed Development Site

Date	Information Source	Description
1837-1842	OSI map 6inch	<p>On-site: The Proposed Development Site is shown as open fields which are divided by field boundaries. The Owenboy River is mapped bounding the northern boundary of the Proposed Development Site and a local roadway is shown bounding the southern site boundary and another local roadway bounding the eastern site entrance.</p> <p>Off-site: The surrounding land-use is shown as open fields divided by field boundaries to the south, north and west of the Proposed Development Site. A number of residential buildings are mapped located immediately east of the Proposed Development Site.</p>
1888-1913	OSI map 25inch	<p>On-site: No significant change</p> <p>Off-site: Two quarries, which are mapped as “disused” are shown approximately 0.44km and 0.55km north of Proposed Developmentsite.</p>
1830-1930	OSI Cassini map 6inch	<p>On-site: No significant change</p> <p>Off-site: Lands located immediately south-east of the Proposed Developmentsite are mapped as “Brick Buildings”.</p>
1995	OSI Aerial photography	<p>On-site: The site is shown as an undeveloped field with no field boundaries.</p> <p>Off-site: Lands located north of the Owenboy River and to the east and south of the Proposed Development Site have been developed with several buildings.</p>
2000	OSI Aerial photography	<p>On-site: No significant change</p> <p>Off-site: No significant change</p>
2005	OSI Aerial photography	<p>On-site: No significant change</p> <p>Off-site: No significant change</p>
2011-2013	OSI Aerial photography	<p>On-site: No significant change</p> <p>Off-site: No significant change</p>
2022	Google Earth photography	<p>On-site:</p> <p>Off-site:</p>

The Proposed Development Site is greenfield/ undeveloped land which is located in an area of mixed land use including agriculture.

Land use within 2km of the Proposed Development Site has had mixed land use with agricultural, residential and commercial with some historical quarrying activity identified within a 2km radius of the Proposed Development Site.

There are no licensed sites or waste facilities mapped within a 2km radius of the Proposed Development Site (EPA, 2022).

A Site walkover carried out by Enviroguide Consulting on the 17th September 2021 confirmed that the Proposed Development Site is greenfield but that some development of a local access road had commenced in lands bounding the western Site boundary and some stockpiled gravel and soil associated with this work had been identified towards the central portion of the Proposed Development Site.

The lands of the Proposed Development Site and to the north and east of the Proposed Development Site are zoned as “Town Centre/ Neighbourhood Centre” under the Cork County Council Development Plan 2015-2021 and Cork Council Development Plan 2022- 2028 Lands bounding the western site boundary are zoned as “ Green Infrastructure” while lands located bounding the southern boundary are zoned as within “Existing Residential/ Mixed Residential and Other Uses” under the Cork County Council Development Plan 2022-2028 (CCC, 2022).

6.3.3 Topography

The topography of the Proposed Development Site generally falls towards the Owenboy River adjoining the northern Site boundary with elevations ranging from 11.0mOD in the southern portion of the Proposed Development Site to 1.8 metres above Ordnance Datum (mOD) at the northern boundary of the Proposed Development Site.

The regional topography surrounding the Proposed Development Site comprises gently undulating lands with elevations between 0 and 10mOD (GSI, 2022).

6.3.4 Soils

The following soils are mapped by the GSI (GSI, 2022) beneath the Proposed Development Site:

- Alluvium (AlluvMIN) described as Mineral alluvium underlying the northern portion of the Proposed Development Site;
- Surface Water Gleys, Ground Water Gleys (AminPD) described as derived from mainly non-calcareous parent material underlying the majority of the southern portion of the Proposed Development Site; and
- Made/ Built Land (Made) across small portions of the southeastern and southwestern portion of the Proposed Development Site.

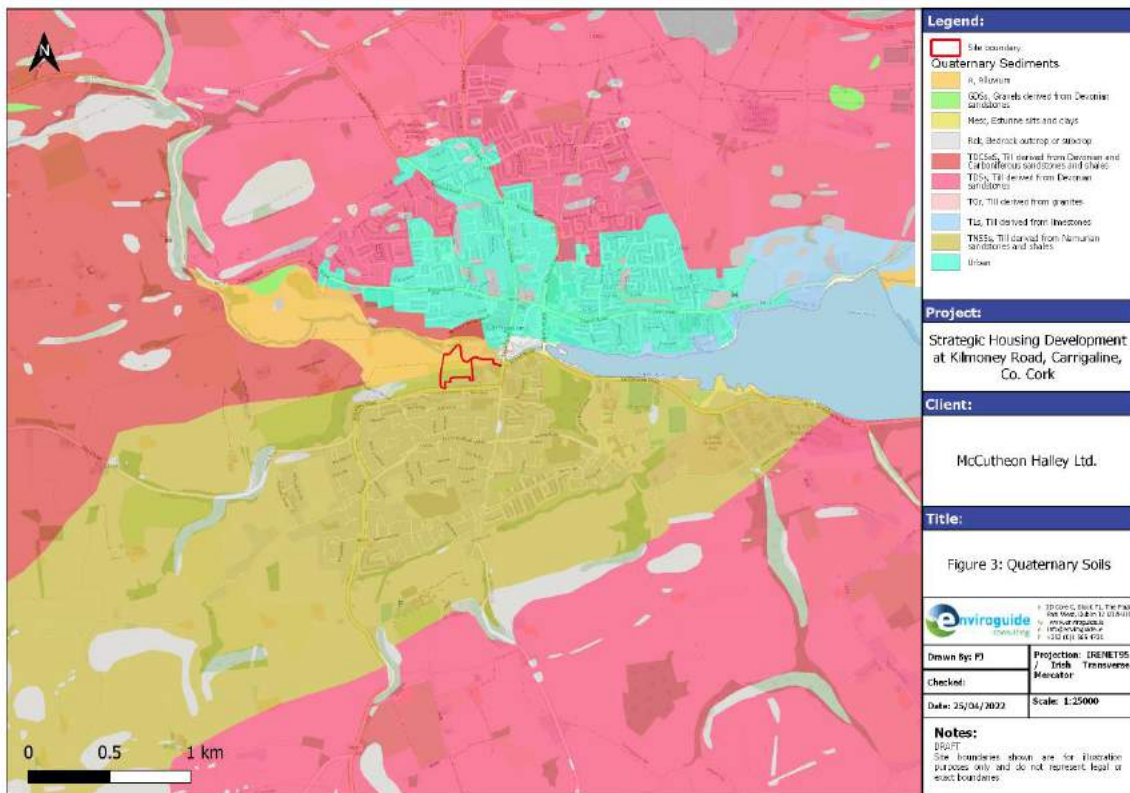


Figure 6-3: Quaternary Soils

6.3.6 Quaternary Geomorphology

There are no quaternary features mapped by the GSI within the Proposed Development Site (GSI, 2022).

The closest quaternary features to the Proposed Development Site are mapped as undifferentiated meltwater channel which is located approximately 0.55km west of the Proposed Development Site and is orientated in a southwest to northeast direction (GSI, 2022).

6.3.7 Bedrock Geology

The bedrock beneath the Proposed Development Site is mapped by the GSI as the White Strand Formation (Stratigraphic Code: WS) and is described as “Sandstones interbedded with brittle commonly pyritic grey to black mudstones” (GSI, 2022).

There are no mapped karst features located within the Proposed Development Site or within a 2km radius of the Proposed Development Site (GSI, 2022).

The bedrock geology underlying the Proposed Development Site is presented in Figure 6-4.

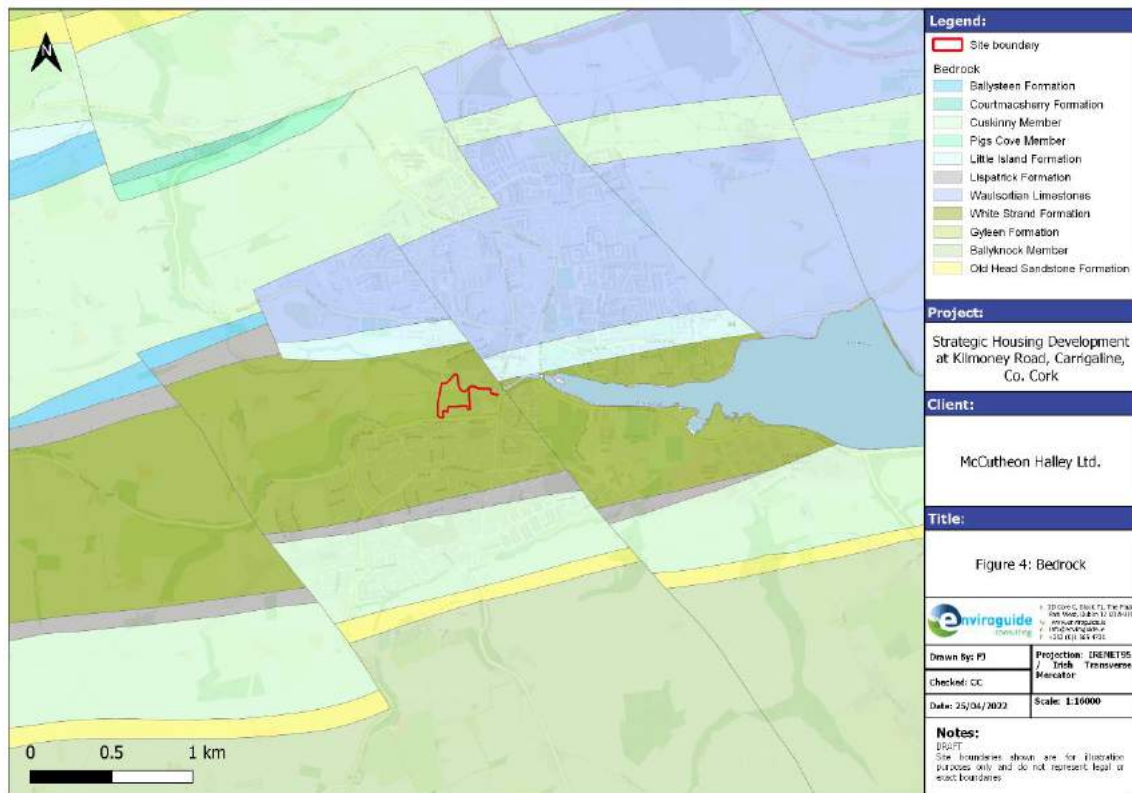


Figure 6-4: Bedrock

6.3.8 Site Investigation Results

A site investigation was carried out along the western portion of the Proposed Development Site as part of a survey for development to the west and north of the immediate Proposed Development Site. The site investigation included excavation of three (3 No.) trial pits (CTP08, CTP09 and CTP10) and three (3 No.) boreholes (CBH05, CBH06 and CBH07) along the western boundary of the Proposed Development Site.

No lab testing was carried out for the investigation locations within the Proposed Development Site.

6.3.8.1 Ground Conditions and Geology

The soils and bedrock encountered during the site investigation at the six site investigation locations at the western portion of the Proposed Development Site are described below and detailed logs are provided in the site investigation report (S.I Ltd, 2007) (see Appendix A of the Site Investigation Report which is included in Appendix B).

- Soils at ground surface underlain by brown/ red SAND and GRAVEL to a maximum depth of 2.9mbGL;
- The underlying soils comprised of orange/ brown sandy, gravelly CLAY to between 1.0mbGL (CTP08) and 2.7mbGL (CBH07);
- Grey/ brown slightly sandy, clayey GRAVEL with occasional cobbles underlying clays to between 3mbGL and 8.5; and

- Bedrock described as weathered, dark grey SILTSTONE was encountered at depths below 7.5mbGL.

No olfactory or visual evidence including inclusions of made material was reported at any of the site investigation locations within the Proposed Development Site.

6.3.9 Radon

The Proposed Development Site is within an area mapped by the EPA (EPA, 2022) to be in an area where between five% and ten% of the homes in a 10km grid square are estimated to be above the reference level for Radon.

6.3.10 Geological Heritage

A review of the GSI Geological Heritage Database (GSI, 2022) indicates no geological heritage sites are located within 2km radius of the Proposed Development Site. The closest geological heritage site to the Proposed Development Site is mapped as the Ballygarvan Quarry (Site Code: IGH 8) which is located approximately 3.26km north-west of the Proposed Development Site and is described as a quarry (GSI, 2022).

6.3.11 Economic Geology

The potential for granular aggregate is mapped by the GSI as having “Low potential” across the northern portion of the Proposed Development Site which was also mapped as being underlain by Alluvium quaternary sediments while the southern portion of the Proposed Development Site was mapped as having “High potential” where the GSI had also mapped quaternary sediments as Till derived from Namurian sandstones and shales (GSI, 2022).

The potential for bedrock for crushed rock aggregate beneath the Proposed Development Site has been identified by the GSI as having “Moderate potential” within the northern portion of the Proposed Development Site and as having “Low potential” across the southern portion of the Proposed Development Site (GSI, 2022).

There are a number of historical pits and quarries mapped by the GSI (GSI, 2022) located within a 2km radius of the Proposed Development Site which are listed in Table 6-5. These pits and quarries have also been recorded on the OSI 25 inch historical map (for the period of 1888-1913) (OSI, 2022).

Table 6-4: Historical Pits and quarries located within 2km of the Proposed Development Site

Name/ Type	Status	Distance from the Site (km)	Location from Site
Pit	Historic	1.95	North-west
Quarry	Historic	0.44	North-east
Quarry	Historic	0.55	North-east

6.3.12 Geological Hazards

The GSI database indicates that the Proposed Development Site is located within an area of ‘Low’ susceptibility to landslides (GSI, 2022).

The Irish National Seismic Network (INSN) has no recorded earthquake activities within a 2km radius of the Proposed Development and the closest recorded seismic activity recorded is 154km north-east of the Proposed Development Site at Ferns in Co. Wexford which is recorded as being associated with quarry blast activity (INSN, 2022).

The Proposed Development Site is not located within an area associated with karst geology and therefore there are no identified geological hazards associated with karst features.

6.3.13 Summary of the Baseline Environment

In accordance with the TII Guidance as documented by the NRA (NRA, 2009) and as outlined in Table 6-1 the soil and geology underlying the Proposed Development Site would be rated as attributes of 'medium' importance, given that the northern portion of the Proposed Development is located within an area of 'high' potential for gravel aggregate the economic extraction of granular aggregate would not be feasible and in addition, there are no sites of geological importance or quarries within the immediate vicinity of the Proposed Development.

6.4 Characteristics of the Proposed Development

The Proposed Development will consist of the following main features of the Proposed Development are described as follows:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units;
- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about area, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

Specific features of the Proposed Development which are relevant to Land and Soil:

- Raising of the ground level of the site up to 4meters above Ordnance Datum (mOD).

The Proposed Development will include the requirement for bulk excavation of soil and bedrock for the construction of the apartment blocks and basement as well as the installation of subsurface drainage infrastructure including for a storm water attenuation tank and other infrastructure, foundations and ancillary works.

Excavation of up to 2.0mBGL will be required to achieve the proposed levels for the underground utilities and the attenuation tank (Invert level 2.7mOD).

Suitable excavated material (soils and bedrock) will be reused within the Proposed Development Site as fill and for landscaping.

6.5 Potential Impacts of the Proposed Development

6.5.1 Construction Phase

6.5.1.1 Land Take and Land Use

The total Site, located at at Kilmoney Road, Carrigaline, Co. Cork, comprises 3.7 hectares. There is a net developable area of 1.9 hectares

The existing land use will change from undeveloped / greenfield lands to mixed residential land use. The proposed land use is in accordance with the current “Town Centre/ Neighbourhood Centre” zoning objective for the Proposed Development Site.

6.5.1.2 Excavation and Removal of Soil and Bedrock

Excavation of soil and subsoils will be required to an anticipated maximum depth of 2.0mbGL at the Proposed Development Site.

It is anticipated that there will be no requirement for removal or excavation of bedrock during the Construction Phase of the Proposed Development based on the requirement of excavation to 2.0mbGL and bedrock was encountered at the Proposed Development Site at 7.5mbGL (S.I. Ltd, 2007).

It is anticipated that the soil generated during excavation will be reused where deemed appropriate for landscaping and fill at the Proposed Development Site therefore preventing the loss soil resource from the Site. The soils underlying the Proposed Development Site are considered to be of ‘low to moderate’ importance based the existing crushed rock aggregate potential (NRA, 2009). Accordingly, there will be ‘negative’, ‘slight’ and ‘permanent’ impact associated with removal and soil and subsoil at the Proposed Development Site.

The removal of surplus soil offsite will be undertaken in accordance with applicable statutory requirements. The potential impact with removal offsite of surplus soil and other material as wastes is assessed in Chapter 12 Material Assets of this EIAR.

6.5.1.3 Importation of Aggregates

Aggregates will be required during the Construction Phase of the Proposed Development for haul roads and set down areas. Aggregates will also be required as construction materials and fill, in accordance with the design specification. It is expected that any required aggregates for the design will be imported virgin soil from borrow sites.

It is considered that the potential for importation of contaminated or uncertified materials will not occur. However, in the unlikely ‘worst event that such materials are imported there would be a ‘direct’, ‘negative’, ‘moderate to significant’ and ‘long term’ at the Proposed Development Site.

The potential indirect impacts associated with importation of aggregates include loss of attribute and changes in the geological attributes at the source or borrow site. Therefore, there will be an 'indirect', 'neutral', 'imperceptible' and 'permanent' impact on the source site.

6.5.1.4 Geological Hazards

Earthquakes are not likely to occur in the vicinity of the Proposed Development Site at a sufficient intensity to pose a risk for the Proposed Development.

The GSI database indicates that the Proposed Development Site is located within an area of 'Low' susceptibility to landslides.

The Proposed Development Site is not located within an area associated with karst geology and therefore there are no identified risks associated with karst features.

6.5.1.5 Soil Structure

Topsoil and subsoil will be exposed and subject to potential impact from weather and construction traffic at various stages of the Construction Phase. Topsoil will be stockpiled in a controlled manner and retained for future reuse in landscaping with a potential for impact on soil structure described as 'direct', 'long-term', 'moderate', 'negative' impact on the natural strength of the soils.

6.5.1.6 Soil Quality and Contamination

There is no available information regarding the existing quality of the Proposed Development Site including any potential existing contamination at the Proposed Development Site. There is a potential risk of contamination of soil and bedrock and an impact on soil quality during the Construction Phase during the excavation of the Proposed Development and construction works.

Where the use of cementitious materials is required during where case in-situ is required during piling and the construction of the basement, attenuation tank and underground utilities and other in-ground works, this could result in a potential 'negative', 'slight' and 'medium term' impact on localised areas of the existing soil and bedrock quality underlying the Site.

The potential accidental release of hazardous material including fuels and materials being used on-site, through the failure of secondary containment or a materials handling accident on the Proposed Development Site is considered to potentially result in a 'negative', 'moderate to significant', 'long-term' impact on the receiving geological environment depending on the nature of the incident.

6.5.1.7 Human Health

The Proposed Development Site is identified as not being located within a High Radon Area as a High Radon Area is any area where it is predicted that 10% or more of homes will exceed the Reference Level of 200 Becquerel per cubic metre (Bq/m³). Therefore, the Proposed Development Site is not considered to be within a High Radon Area. However, as a high radon level can be found in any area, in any part of the country, standard design measures including

appropriate radon membranes will be incorporated into the design of buildings in accordance with relevant Building Regulations.

There are no other public health issues associated with the land, soil or geology conditions at the Proposed Development Site for the Construction Phase of the Proposed Development.

Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers. The necessary measures will also be implemented to address any nuisance issues associated with dust dispersion during construction works including the offsite removal of surplus soil. Operational Phase. Any residual potential impacts to human health are discussed in Chapter 4 Population & Human Health of this EIAR.

6.5.2 Operational Phase

Design measures taken during the Construction Phase will limit any potential for any direct adverse impact on the receiving land, soil, geological environment during the operational phase of the Proposed Development Site. The design and construction of the Proposed Development will take place in accordance with current Building Regulations and will ensure that the Proposed Development site will be suitable for use for the Operational Phase as a residential development with childcare and outdoor amenities taking account of the geological site setting including the identified potential geological hazards.

Surface water runoff from the Proposed Development Site will be directed to the proposed storm water drainage network (i.e. Upvc pipes) and discharged via the attenuation storage tank and Class 1 Bypass interceptor (Klargestor or similar) to the Owenboy River downstream of the Proposed Development Site. The proposed surface water drainage network at the Proposed Development Site will incorporate treatment of solids and hydrocarbons via a Klargestor interceptor prior to discharge of the attenuation tank. Therefore, there will be a 'neutral', 'imperceptible' and 'Permanent' impact on the receiving geological environment for the duration of the Operational Phase.

There will be no bulk storage of petroleum hydrocarbon-based fuels used during the Operational Phase and the Site will be connected to mains electricity and natural gas. Using such a system removes any potential contaminant sources associated with fuels. All trafficked areas will be connected to the surface water drainage network therefore in the unlikely scenario of an accidental spill from a vehicle there will be no discharge and potential impact to ground and the receiving land, soil and geology environment.

There will be no direct impacts associated with the Operational Phase of the Proposed Development and therefore the potential impacts on land, soil and geology associated will be 'neutral', 'imperceptible' and 'permanent'.

6.5.3 Potential Cumulative Impacts

Excavated soils and other surplus materials and wastes from the Proposed Development Site could potentially be directed to the same authorised destination locations (sites or facilities) as materials from other permitted developments in the vicinity of the Proposed Development and greater catchment for the nominated destination locations.

The following granted developments, which are located within a 2km radius of the Proposed Development Site were considered in the assessment of potential cumulative impacts:

- Residential Development at Church Hill, Carrigaline, Co. Cork (Ref.: 196065). Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the Site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.
- Store development at Main Street, Carrigaline, West Carrigaline, Co. Cork (ref.: 205230). Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.
- Store development at Main Street, Carrigaline, West Carrigaline, Co. Cork (Ref.: 194698) The demolition of two vacant residential properties and construction of a new building for retail use which will be amalgamated into the existing Newsagents and Deli area of the adjoining retail building on the northern side with associated seating area, signage and all associated site works
- Carrigaline Western Relief Road – southern Pumping Station & Rising Main (Ref.: 194642). Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works.

There will be a potential cumulative loss of soil and bedrock from the area taking account of the Proposed Development Site and the above granted developments. All surplus materials including excavated soils and bedrock from the Proposed Development Site will be managed in compliance with relevant legislation. Where feasible, soil will be reused at the Proposed Development Site to prevent loss of soil resource. Surplus soil by-product will only be directed to other development sites for reuse under Article 27 By-Product Notification of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended, when it can be demonstrated that all tests for Article 27 compliance are met. Accordingly, it is considered that any cumulative impact on land, soils and geology associated with the Proposed Development Site including in combination with other developments would be 'neutral', 'imperceptible' and 'permanent'. A comprehensive list of proposed planning applications in the vicinity of the Proposed Development is present in Table 6-5.

Contract and procurement procedures will ensure that all aggregates and fill material originating from quarry sources that will be required for construction are sourced from reputable authorised suppliers operating in a sustainable manner and in accordance with the necessary statutory consents. Therefore, regardless of the number of other projects and developments using aggregates from the same source sites, there will be an 'indirect', 'neutral', 'imperceptible' and 'permanent' impact on the geological environmental at the source site.

There are no other identified cumulative impacts on land, soil and geology associated with the Proposed Development.

Table 6-5: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part 8 Planning	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	<p>The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence.</p> <p>The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians, cyclists and vehicular traffic).</p>

<p>217464</p>	<p>Aldi Stores (Ireland) Ltd</p>	<p>On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.</p>	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>
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<p>214818</p>	<p>Ruden Homes Ltd</p>	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIA. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
<p>205230</p>	<p>Barry Collins (Supermarket) Ltd</p>	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIA. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

<p>196065</p>	<p>Athena Private Assets Ltd</p>	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
<p>194642</p>	<p>Piton Properties Ltd</p>	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

6.5.4 “Do Nothing” Impact

The Proposed Development Site would continue to be an undeveloped/ greenfield site and there would be no requirement for land-take or loss of soil and subsoil from the Proposed

Development Site, however the land-use zoning objective for 'Town Centre/ Neighbourhood Centre would not be achieved.

6.6 Avoidance, Remedial & Mitigation Measures

6.6.1 Construction Phase

6.6.1.1 Soil Structure

The extent of the required work area and the bulk excavation at the Proposed Development Site will be minimised where appropriate to prevent unnecessary excavation of soil and tracking over soil and subsoil outside of the excavation work areas as a result of compaction and rutting from construction traffic.

Dedicated internal haul routes will be established and maintained by the contractor to prevent tracking over unprotected soils.

Exclusion zones will be established where soft landscaping is proposed in particular along Site boundaries and the Owenboy River which are outside of the excavation areas to ensure soil structure is maintained.

6.6.1.2 Management of Stockpiles (soils)

Soils intended for reuse onsite or for off-site removal and disposal will be segregated and temporarily stored on-site (pending removal or for reuse on-site).

Any reuse of excavated soil and bedrock at the Proposed Development Site will be undertaken in accordance with the engineered design and landscape plan for the Proposed Development Site. Soil including topsoil and subsoil will be segregated and stored appropriately to prevent deterioration of soil structure and quality to ensure the material will be suitable for reuse onsite. Surplus onsite materials will be segregated and stockpiled appropriately for removal offsite in accordance with the resource and management plan.

For any excavated material identified for removal offsite, while assessment and approval of acceptance at a destination reuse, recovery site or waste facility is pending, excavated soil for recovery/disposal will be stockpiled as follows:

- A suitable temporary storage area will be identified and designated.
- All stockpiles will be assigned a stockpile number.
- Material identified for reuse on Site, off site and waste materials will be individually segregated; and all segregation, storage and stockpiling locations will be clearly delineated on the site drawings.
- Soil stockpiles will be sealed to prevent run-off from the stockpiled material generation and/or the generation of dust.
- Any waste that will be temporarily stored / stockpiled will be stored on impermeable surface high-grade polythene sheeting, hardstand areas or skips to prevent cross-contamination of the soil below or cross contamination with soil.

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Proposed Development Site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.
- Stockpiles will not be located near site boundaries or sensitive receptors and a set-back of will be established and maintained from any boundary with offsite receptors.

When a stockpile has been sampled for classification purposes, it will be considered to be complete and no more soil will be added to that stockpile prior to removal off site. An excavation/stockpile register will be maintained on-site.

Waste will be stored on-site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bundled and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent reuse, recycling and recovery; and
- Prevent hazards to site workers and the general public during construction phase (largely noise, vibration and dust).

6.6.1.3 Handling of Chemicals and Fuels

Fuel, oils and chemicals used during construction are classified as hazardous.

Storage of fuel hazardous will be undertaken with a view to protecting any essential services (electricity, water etc.) and the receiving water environment.

Bulk quantities of fuel will not be stored at the Proposed Development Site and fuel required for plant and equipment will be delivered directly from a delivery tanker. Fuel will only be stored in the quantities required for emergency use.

Oils and chemicals used and stored on-site will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas to prevent any seepage to ground. There will be clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.

All drums will be quality approved and manufactured to a recognised standard. If drums are to be moved around the Proposed Development Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

- Bunds will comply with the requirements of Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum

storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:

- 110% of the capacity of the largest tank or drum within the bunded area;
- 25% of the total volume of substance that could be stored within the bunded area;
- Vehicle or equipment maintenance work will take place in a designated impermeable area within the Proposed Development Site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Proposed Development Site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines;
- Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages;
- All staff on-site will be fully trained on the use of equipment to be used on-site; and
- Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds.

Refuelling of plant and vehicles during the Construction Phase will only be permitted at designated refuelling station locations onsite. Each station will be fully contained and equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed by the Contractor before the commencement of works on-site.

A procedure will be prepared by the appointed contractor which will be adhered to during refuelling of on-site vehicles and plant. This will include the following:

- Fuel will be delivered to plant on-site by dedicated tanker;
- All deliveries to on-site vehicles will be supervised and records will be kept and retained onsite of delivery dates and volumes;
- The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur;
- Where the nozzle of a fuel pump cannot be placed into the tank of a machine then a funnel will be used; and
- All re-fuelling will take place in a designated impermeable area to be specified by the contractor. In addition, oil absorbent materials will be kept on-site in close proximity to the re-fuelling area.

6.6.1.4 Export of Resource (soil and stone)

All surplus materials and any waste will be removed off-site in accordance with the requirements outlined in the Construction Environmental Management Plan (CEMP) (*Horganlynch, 2021*) and will be managed in accordance with all legal obligations. It will be the contractor's responsibility to either obtain a waste collection permit or to engage specialist

waste service contractors who will possess the requisite authorisations for the collection and movement of waste off-site.

The reuse of soil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate reuse as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended.

Any surplus soil not suitable for reuse as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Any waste soils will be transported under a valid waste collection permit issued under the Waste Management (Collection Permit) Regulations 2007, as amended and will be delivered to an appropriately authorised waste management facility.

Materials and waste will be documented prior to leaving the Proposed Development Site. All information will be entered into a waste management register kept on the Proposed Development Site.

Vehicles transporting material with potential for dust emissions to an off-site location will be enclosed or covered with a tarpaulin at all times to restrict the escape of dust.

Public roads outside the Proposed Development Site will be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. The wheels of all lorries will be cleaned prior to leaving the Proposed Development Site so that traffic leaving the site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain. A wheel-wash will be installed at the egress point if required and a road sweeper will be deployed to ensure that public roads are kept free of debris.

6.6.1.5 Import of Aggregates

In order to minimise the requirement to import virgin quarried materials, recycled aggregates will be used where available and subject to meeting specified design requirements and all construction and environmental legislation. This will include where suitable, by-products that meet the legislative requirements of Article 27 of the European Communities (Waste Directive) Regulations, 2011 and other applicable statutory requirements.

Contract and procurement procedures will ensure that all imported aggregates required for the Proposed Development Site will be sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations. The importation of aggregates will be subject to management and control procedures which will include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development. Therefore, any unsuitable material will be identified prior to unloading / placement onsite.

6.6.1.6 Concrete Works

The cementitious grout and other concrete works during the Construction Phase, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards (e.g., Guidance for Consultants and Contractors, CIRIA - C532', CIRIA, 2001).

All ready-mixed concrete will be delivered to the Proposed Development Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be emptied into a skip. A suitable risk assessment for wet concreting will be completed prior to works being carried out.

6.6.2 Operational Phase

There is no requirement for mitigation measures for the Operational Phase of the Proposed Development.

6.6.3 “Worst Case” Scenario

The potential accidental release of hazardous material including fuels or other hazardous materials being used on-site during the Construction Phase could potentially impact on the receiving land, soil and geology environment. This scenario would only occur through the failure of secondary containment or a major incident at the Proposed Development Site. The potential for or inadvertent import of contaminated materials during the Construction Phase could also result in an impact in the absence of the quality control measures. However, taking account of the mitigation measures any environmental harm would be avoided. There would therefore be a 'neutral', 'imperceptible' and 'short-term' impact on the receiving environment. These worst-case scenarios are deemed to be unlikely to occur.

6.7 Residual Impacts

Residual Impacts are defined as 'effects that are predicted to remain after all assessments and mitigation measures'. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts.

The predicted impacts of the Construction and Operational Phases are described in Table 6-6 in terms of quality, significance, extent, likelihood and duration. The relevant mitigation measures are detailed, and the residual impacts are determined which take account of the avoidance, remedial and mitigation.

Table 6-6: Summary of Residual Impacts

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Construction of the Proposed Development.	Land-use	The land-use at the Site of the Proposed Development will be changed from greenfield/ undeveloped land use to mixed residential land use.	Negative	Significant	Permanent	Direct	The Proposed Development is within lands zoned and is permitted under the current 'Town Centre/ Neighbourhood' zoning objective and will be upgraded to this use as part of the Proposed Development	Positive
Excavation and removal of soil and stone	Soil Quality	The excavation and removal off-site of surplus soil and stone during the Construction Phase of the Proposed Development will result in the removal of a 'low to high' potential for aggregate resource (NRA, 2009) at the Proposed Development Site.	Negative	Slight	Permanent	Direct	There will be an unavoidable impact on the underlying soils with the removal of resource within a localised area at the Proposed Development Site. There is no mitigation for this activity.	Slight
Importation of Aggregate to the Proposed Development Site	Land, Soil and Geology	In the unlikely event that aggregate materials are sourced from unlicensed or unauthorised sources, it may result in the importation of contaminated materials, uncertified or material not suitable for use at the Proposed Development Site.	Negative	Moderate to Significant	Long-term	Direct	The importation of aggregates will be subject to management and control procedures which will include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in	Slight to imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
		Potential impacts may include contamination of land, soil, geology at the Proposed Development.					accordance with engineering and environmental specifications for the Proposed Development. Therefore, any unsuitable material will be identified prior to unloading / placement on-site.	
Excavation and Removal of Surplus Soil and Stone off-site	Soil Structure	Topsoil and subsoil will be exposed and subject to potential impact from weather and construction traffic at various stages of the Construction Phase. Topsoil will be stockpiled in a controlled manner and retained for future reuse in landscaping with a potential for impact on soil structure.	Negative	Moderate	Long-term	Direct	Soils will be stockpiled in a controlled manner. The extent of the required work area and the bulk excavation at the Proposed Development Site will be minimised to prevent unnecessary excavation and tracking over of soil and subsoil outside of the excavation work areas as a result of compaction and rutting. Exclusion zones will be established where soft landscaping is proposed outside of the excavation areas to ensure soil structure is maintained.	Imperceptible
Use of cementitious materials.	Soil Quality	Potential release of cementitious material during the Construction Phase including the construction of	Negative	Slight	Medium Term	Direct	All work will be carried out to avoid any contamination of the receiving geological	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
		development foundations, footpaths and other in-ground works.					environment through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.	
Accidental release of deleterious materials including fuel and other materials being used on-site.	Land, Soil and Geology	Potential for uncontrolled release of deleterious materials including fuels and other materials being used on-site, through the failure of secondary containment or a materials handling accident.	Negative	Moderate to significant	Long Term	Direct	Mitigation measures as detailed in the CMP (Horganlynch, 2021) and the CEMP prepared by Enviroguide Consulting that will be developed will be implemented across the Proposed Development Site. Refuelling of plant during the Construction Phase will only be carried out at designated refuelling station locations onsite. Any other diesel, fuel or hydraulic oils stored on-site or within fuel containing equipment will be stored in bunded storage tanks / drip trays. Emergency procedures will be developed, and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
							for in the event of accidental fuel spillages.	
Excavation and Removal of Surplus Soil and Stone off-site.	Land, Soil and Geology at the destination site / facility/ Proposed Development Site	The excavation and removal off-site of surplus soil and stone during the Construction Phase of the Proposed Development has the potential to impact on the receiving land, soil and geology at the destination site / facility.	Neutral	Imperceptible	Permanent	Indirect	None required. Limited surplus material to be removed off-site will be reused as a by-product under Article 27 by-product notification or sent for recovery / disposal at a suitable authorised facility in accordance with the CMP (Horganlynch, 2021), the CEMP and all statutory obligations.	Imperceptible
Excavation and Removal of Waste Materials	Land, Soil and Geology at the destination site / facility/ Proposed Development Site	Excavated soils and the movement of the materials from the Proposed Development Site could potentially be directed to the same receiving waste facilities for recovery, reuse or disposal as excavated materials from the permitted development immediately north of the Proposed Development Site.	Neutral	Imperceptible	Permanent	Cumulative	None required. All surplus soil and stone from the Proposed Development Site will be directed to appropriately permitted/licensed waste facilities operated in compliance with the relevant statutory consents for the facility.	Imperceptible
Operational Phase								
Infiltration of Surface Water Runoff to Ground.	Soil Quality	Given the low permeability rate of the underlying soils (GII, 2020) it is considered that there is limited potential for infiltration to ground via the storm water drainage	Neutral	Imperceptible	Long Term	Direct	None required.	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
		network (i.e. perforated pipes within filter drains and the underground infiltration area within carparking areas).						

6.8 Monitoring

There are no monitoring requirements for the land, soil and geology related to the Proposed Development Site.

6.9 Interactions

6.9.1 Hydrology and Hydrogeology

An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is included in Chapter 7 of this EIAR. Procedures for protection of receiving water environment are set out in Chapter 7 of this EIAR.

6.9.2 Material Assets

An assessment of the potential impact of the Proposed Development on the material assets including built services, infrastructure, traffic, and waste management is included in Chapter 12 of this EIAR.

6.9.3 Archaeology and Cultural Heritage

While there was no definitive evidence identified for the presence of unrecorded archaeological sites or features within the Proposed Development Site, the Archaeological Impact Assessment (*John Cronin & Associates Ltd., 2022*) identifies that the undisturbed portions of the Proposed Development Site possess a moderate to high archaeological potential. An assessment of the potential impact of the Proposed Development on archaeology is included in Chapter 11 of this EIAR.

6.9.4 Biodiversity

An assessment of the potential impacts of the Proposed Development on the Biodiversity of the Proposed Development Site, with emphasis on habitats, flora and fauna which may be impacted a result of the Proposed Development are included in Chapter 5 of this EIAR. It also provides an assessment of the impacts of the Proposed Development on habitats and species, particularly those protected by national and international legislation or considered to be of particular conservation importance and proposes measures for the mitigation of these impacts.

6.9.5 Landscape and Visual

During the construction phase the site landscape will undergo a change from greenfield/undeveloped land to a residential development with extensive landscaping. An assessment of the potential impact of the Proposed Development on the receiving landscape is included in Chapter 10 of this EIAR.

6.9.6 Population & Human Health

No public health issues associated with the land, soil, geology conditions at the site have been identified for the Construction Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers. The necessary measures will also be implemented to address any nuisance issues associated with dust dispersion during construction works including the off-site removal of surplus soil.

The impacts of the Proposed Development to Population & Human Health is included in Chapter 4 of this EIAR.

6.10 Difficulties Encountered

There were no difficulties encountered in compiling this Chapter of the EIAR assessment.

6.11 References

Construction Industry Research and Information Association, 2001. Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA – C532).

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S.I. Ltd., 2007. Site Investigation for a Road at Carrigaline, Co. Cork Factual Report (Contract No. 4404C)

7 HYDROLOGY AND HYDROGEOLOGY

7.2 Hydrology

7.2.1 Introduction

This first section of this Chapter of the Environmental Impact Assessment Report (EIAR) relates to the hydrological impact assessment of the Strategic Housing Development (SHD) by Reside Investments Limited consisting of 202 no. apartment units and 22 no. townhouses/duplex units and at Kilmoney Road, Carrigaline, Co. Cork. (hereafter the 'Proposed Development'), on surface water receptors during Construction and Operational phases. The following attributes of the surface waterbodies (receptors) are considered: hydrology, hydromorphology and water quality.

During Construction, the potential surface water impacts associated with the development of the Proposed Development are assessed in Section 7.1.5.1. It includes impacts from construction runoff during stripping of the existing ground, operation of machinery, use of chemicals and concrete, etc.

During Operation, the potential surface water impacts are associated with changes in surface water runoff quality and quantity due to the increased impermeable surfaces, accidental spills, and the Proposed Development discharges. This is presented in Section 7.1.5.2

The assessment is carried out in accordance with the best practice and guidelines relating to surface water assessment and has taken account of experience in assessment of similar large-scale SHDs.

Flooding was assessed within a dedicated Flood Risk Assessment (FRA) report which is included with other planning documents. The conclusions of the FRA are summarised in Sections 7.1.5.4.

The primary objective of the Proposed Development is to avail the much-needed housing for at least 224 no. families in Carrigaline. The design of the Proposed Development has evolved through the application of a comprehensive design iteration process with particular emphasis on minimising the potential for environmental impacts where practicable whilst ensuring the objectives of the Proposed Development are maintained.

The details of the Proposed Development are described elsewhere in the EIAR (Proposed Project Description) and has been used to inform this Hydrology Chapter.

7.2.1.1 Quality Assurance and Competence

This Chapter was compiled by Mesfin Desta, PhD FIEI, Arup. Mesfin Desta is a Principal Hydrologist with Arup and has over 16 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 since 2006. He was responsible for the preparation of Water/Hydrology Chapters of EIAR's for various projects including Strategic Housing Developments, transport infrastructures, wind farms, etc.

7.2.2 Study Methodology

This Chapter of the EIAR outlines the potential impacts of the Proposed Development as set out in the *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022). Every effort is made to provide the Competent Authority (CA) the most relevant environmental effects of the Proposed Development to enable determine if consent should be granted or not. The information in the EIAR is also intended for use by other parties to evaluate the acceptability of the Proposed Development t and its effects and to inform their submissions to the CA.

7.2.2.1 Study Area

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. It is deemed that the 250m distance from the study area boundary (Figure 7-1) will capture all those waterbodies that will have direct hydrological connection to the works.

Therefore, any identified surface waterbodies within that area have been considered as receptors including those classified under 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 referred to as 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 existing Sustainable Drainage Systems (SUDS) have not been considered as receptors within the assessment.



Figure 7-1: Study Area

7.2.2.2 Relevant Guidelines, Policy and Legislation

7.2.2.2.1 Water Framework Directive (WFD)

The WFD established a framework for the protection of both surface and groundwater bodies. The WFD provides a vehicle for establishing a system to improve and / or maintain the quality of waterbodies across the European Communities (EC). It requires all waterbodies (river, lakes, groundwater, transitional, and coastal) to attain 'Good Status' (qualitative and quantitative) by 2027.

The WFD Regulations, S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 9/2010 govern the shape of the WFD characterisation, monitoring and status assessment programmes in terms of assigning responsibilities for the monitoring of different water categories, determining the quality elements, and undertaking the characterisation and classification assessments.

The WFD Regulations (2003) require the assessment of permanent impacts of a project on WFD waterbodies, (rivers, lakes, estuaries, coastal waters, and groundwater). Typically, the permanent impacts include all operational impacts, but can also include impacts from construction depending on the programme (i.e., length and / or nature of the works, etc.) of the Proposed Development as some could be considered permanent if they cannot be mitigated.

An assessment of the compliance of the Proposed Development with the Water Framework Directive (WFD) requirements for the water bodies within the Study Area is provided in Section 7.1.5.3.

7.2.2.2.2 River Basin Management Plans

River Basin Management Plans (RBMPs) provide the mechanism for ensuring an integrated approach to the protection, improvement and sustainable management of the water environment and are published every six years.

The second cycle RBMP 2018 - 2021 was published by the Department of Housing, Planning and Local Government (DHPLG) in April 2018 and covers the entire country (DHPLG 2018). For the second cycle, the original (2009) Eastern, South-Eastern, South-Western, Western and Shannon River Basin Districts were merged to form one national River Basin District (RBD) which covers the whole of Ireland.

The draft third cycle RBMP (2022-2027) was launched for public consultation in September 2021, with a closing date of 31 March 2022. The final plan of the third cycle RBMP is due for publication 2022.

The River Owenboy is within the Southwestern River Basin District (SWRBD), Hydrometric Area 19 (Lee, Cork Harbour and Youghal Bay) and Owenboy sub-catchment and managed by Cork County Council. The Proposed Development Site is currently green open space and drains overland towards the Owenboy River.

7.2.2.2.3 Other Relevant Legislation

Table 7-1 details of other legislation and policy relevant to this assessment and which informed the preparation of this Chapter where required.

Table 7-1: Other Relevant Legislation

Legislation	Title
European Legislation	<ul style="list-style-type: none"> • Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment, • Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, • Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks, and • Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the impacts of certain public and private projects on the environment (hereafter referred to as the Environmental Impact Assessment (EIA) Directive).
Primary Legislation	<ul style="list-style-type: none"> • Number 1 of 1977 - The Local Government (Water Pollution) Act. • Number 21 of 1990 - Local Government (Water Pollution) (Amendment) Act, 1990, and • S.I. No. 92/2020 - Planning and Development Act 2000 (Exempted Development) (No. 2) Regulations 2020.
Secondary Legislation	<ul style="list-style-type: none"> • S.I. No. 108/1978 - Local Government (Water Pollution) Regulations, 1978, • S.I. No. 81/1988 - European Communities (Quality of Water Intended for Human Consumption) Regulations 1988, • S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988, • S.I. No. 722/2003 - European Communities (Water Policy) Regulations 2003, as amended, • S.I. No. 268/2006 - European Communities (Quality of Shellfish Waters) Regulations, 2006, • S.I. No. 278/2007 - European Communities (Drinking Water) (No. 2) Regulations 2007, • S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations, 2009, • S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations, 2010, • S.I. No. 122/2010 - European Communities (Assessment and Management of Flood Risks) Regulations, 2010, • S.I. No. 351/2011 - Bathing Water Quality (Amendment) Regulations, 2011, • S.I. No. 122/2014 - European Union (Drinking Water) Regulations 2014, • S.I. No. 350/2014 - European Union (Water Policy) Regulations 2014, • S.I. No. 495/2015 - European Communities (Assessment and Management of Flood Risks) (Amendment) Regulations 2015, and • S.I. No. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

7.2.2.2.4 Guidelines

The assessment has been undertaken in accordance with the Guidelines on the information to be contained in Environmental Impact Assessment Reports (referred to as the EPA Guidelines) (EPA 2022). The following additional guidance detailed in Table 7-2 has also been consulted during the preparation of this Chapter, where relevant. These additional guidance documents are derived from the WFD and aim at satisfying the requirements relevant to the Proposed Development.

Table 7-2: Relevant Guidelines

EIA Topic	Guidance
Water	The Department of the Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning System and Flood Risk Management Guidelines for Planning Authorities (referred to as the FRM Guidelines) (DEHLG and OPW 2009).

7.2.2.3 Field Survey

The Owenboy River and the site topography of the site was visited on April 12th, 2022, to inform the assessment of baseline conditions and pathways that may be impacted by the Proposed Development. Specifically, flow conditions of the river, signs of erosion of the banks, indications of poor water quality, etc. were noted and documented in Table 7-3

Table 7-3: Field Survey Notes

Item	Record
Flow Conditions	Clear and homogenous flow, low flow condition
Riverbed	Overall, no deposition or erosion. Debris (tree branches) noted at some sections.
Water quality	Construction of the Western Relief Road ongoing. No other signs of pollution.
Bank stability	Signs of bank erosion on south side of the river. Stone rip rap provided adjacent to Supervalu car park.
Natural and manmade features of the river	New bridge built upstream of the site as part of the Western Relief Road
Runoff pathway and runoff risk	Site topography sloping towards the river. Low lying area close the riverbank showing possible extent of floodplain.
Riparian vegetation	The site is entirely grassed. North side of the riverbank heavily vegetated. No vegetation on the south side.
Existing Outfalls and discharges	No existing outfall or discharges to the river is observed. No visit was made to the newly built Western Relief Road discharges locations.

7.2.3 The Existing and Receiving Environment (Baseline Situation)

The main hydrological receptor within the zone of influence of the Proposed Development is the Owenboy River. The Owenboy River flows into the Cork Harbour Special Protection Area (SPA) at Owenboy Estuary before entering the main harbour at Crosshaven. The Cork Harbour SPA is located approximately 0.5km (by land) west of the Proposed Development and encompasses the Owenboy estuary, which has hydrological connectivity to the Proposed Development via the Owenboy River and the underlying groundwater body. Thus, Cork Harbour SPA is potentially within the zone of influence of the Proposed Development. The

Owenboy estuary downstream of the site is also designated as a proposed Natural Heritage Area (pNHA) with primary interests as a habitat for birds.

7.2.3.1 Hydrology

The River Owenboy is within the Southwestern River Basin District (SWRBD) under the EU Water Framework Directive (WFD). The SWRBD covers an area of over 11,106 km² and 4000m² of marine waters. The main river catchments within the RBD are the Blackwater, the Lee, the Bandon, the Ilen, the Inny, the Maine, the Laune, and other small coastal catchments. The CFRAM Study further divides the SWRBD into 5no. units of Management (18 to 22) (UoM). UoM 19, which is entirely within County Cork, contains the Lee, Owenboy and Womanagh Rivers.

The River Owenboy is 22 km long, has a catchment area of approximately 116km², and S1085 (slope) of 2.7m/km. The mean annual rainfall of the at the nearby Cork Airport weather station, approximately 7km from the Proposed Development Site , is 1,215 mm. The Proposed Development Site is bordered to the north by the Owenboy River which discharges to the Cork Harbour. There are no other notable rivers or drainage lines adjacent to or crossing the site. The Owenboy catchment is predominantly agricultural with a very small percentage of forestry and urban settlements. The catchment responds to rainfall relatively quickly (in a matter of hours) and tends to bring relatively large quantity of suspended sediment due to its steep catchment hill slopes.

OPW has been recording water levels at Ballea Bridge Lower (Strn. No. 19001) since 1956 but statistical values are reported for the period 1972 - 2013. Accordingly, the 95%ile flow is reported as 0.265m³/sec (or 11.466m OD Poolbeg). The highest median annual maximum discharge on record is 31.68m³/sec. The highest annual maximum event on record is 64.7m³/sec that occurred on 20 Nov 2009 which is twice the highest median event.

7.2.3.2 Water Quality

The River Owenboy, at the Proposed Development , is classified under the WFD as being of Moderate status (2013-2018) (Figure 7-2), under pressure from hydromorphological/anthropogenic sources and of being at risk of not meeting WFD objectives.



Figure 7-2: Water Quality Status

7.2.4 Characteristics of the Proposed Development

The Proposed Development is Strategic Housing Development on a greenfield site bordered to the north by the River Owenboy, to the east by Dairygold Co-Op Superstore, to the south by Kilmoney Road and to the west by the Western Relief Road.

The Proposed Development will consist of:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units;
- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;

- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage. The topography of the Proposed Development Site is generally falls towards the River Owenboy ranging from 11.0m OD in the south to 1.8m OD to the north along the river.

The proposed surface water drainage system collects surface runoff from roofs and hard standing areas and discharges to the proposed attenuation pond for a controlled release to the River Owenboy. The attenuation pond is designed as per the SuDs Manual (753) (Bridge et al., 2015) to cater for the 1-in-100-year storm event and release at controlled greenfield runoff rate by means of a hydrobrake.

Sewage from the Proposed Development will be collected via a network of pipes and discharges into a sump northwest of the site which will be pumped off site.

7.2.5 Potential Impact of the Proposed Development

This section outlines project specific, direct, and indirect impacts the Proposed Development may have on the hydrological environment during construction and operational phases. Avoidance, remedial and mitigation measures are set out in Section 7.1.6.

7.2.5.1 Construction Phase

There are several potential construction-related impacts which may occur during the construction of the Proposed Development in relation to hydrology, water quality and hydromorphology. The potential for any of these types of impacts are considered for different construction activities within the study area. These include but are not limited to the following:

- Change in the natural hydrological regime of the River Owenboy due to an increase in discharge because of dewatering activities (if required) during construction. This may alter the groundwater regime and affect the baseflow of the river,
- Potential for disrupting local drainage system due to diversions required to accommodate the works,
- Modifications to the hydraulic characteristics of the river through modifications to the channel dimensions during construction of outfalls and culverts, where required,
- Potential for temporary increase in hard standing areas and / or soil compaction during construction works which could result in temporary increased runoff rates.
- Silty water runoff containing high loads of suspended solids from construction activities. This includes the stripping of topsoil and the dewatering of excavations and the storage of excavated material.
- Contamination of the river with anthropogenic substances such as oil, chemicals, or concrete washings. This could occur because of a spillage or leakage of oils and fuels stored on site or direct from construction machinery; and the storage of materials or waste near waterbodies or drains connected to the waterbodies.

- Increased sediment loading because of silty water runoff or dewatering activities, introducing a sediment plume, potentially leading to the smothering of bed substrate and changes to existing morphological features,

The potential impact from the construction phase on River Owenboy is likely to be short term and moderate without mitigation measures in place. However, an outline Construction and Environmental Management Plan (CEMP) which provides details of the proposed mitigation measures regarding surface water management is prepared by Enviroguide Consulting as part of this planning application.

7.2.5.2 Operational Phase

Predicted impacts for the Operational Phase are mainly related to water quality and hydromorphology. No changes to hydrology are expected as the design includes a compensatory storage to mitigate against any loss of floodplain. Runoff from roof and hard standing areas will also be attenuated before discharge to the river.

Potential Operational Phase impacts may include:

- Increased impermeable surface area can and potentially increase surface water runoff and flooding downstream. It is unlikely that this activity would cause any impact on the environment as the design has imbedded attenuation storage to offset any increase in the runoff rate.
- Accidental spillage of oil and chemicals may leak into the drainage system and subsequently to the River Owenboy. The likely impact from accidental spills is considered as temporary and imperceptible as the mitigation measure imbedded in the design ensures interception of the spill prior to discharge to the river.
- Contamination risks arising from the Proposed Development discharges, leaking pipes (sewer), contaminated water, etc. The impact from such events is temporary and imperceptible as there is no direct discharge to the River Owenboy.

There is a surface water outfall to River Owenboy, discharging from the attenuation storage at greenfield runoff rates. It is proposed to provide a petrol interceptor at the outlet before discharging to the river.

7.2.5.3 WFD Assessment

Table 7-4 provides a screening appraisal of the water bodies that are hydrologically connected to the Proposed Development.

Table 7-4: WFD Assessment Screening Exercise

Water Body Name	Type	Description	Screening Outcome	Justification
Owenboy (Cork)_040	River	Overall water body status: Moderate (2013-2018), High nitrate concentration. At Risk of not meeting its water quality objectives in the 2010-2015 and 2013-2018 monitoring periods.	Screened Out	Screened out on the basis that there are no physical works within this water body and activities relating to the Proposed Development are buffered at 10m from the nearest bank of the river.
Owenboy River pNHA (Site Code: 001990)	Transitional	Habitat for wintering birds	Screened Out	The Proposed Development Site located upstream of the pNHA and no instream work proposed that will affect habitat for the qualifying interest.
Cork Harbour SPA (Site Code: 004030)	Transitional	Ecological Status: Moderate (2016-2018). Deteriorated from Good status (2010-2015). At Risk of not meeting its water quality objectives in the 2013-2018) period.	Screened Out	Screened out because the works are approximately 0.5km west of the Proposed Development Site and the mitigation measures imbedded in the design and best construction method expected to maintain the baseline conditions in terms of discharge to the Owenboy River.

Taking into consideration the anticipated impacts of the Proposed Development on the biological, physico-chemical and hydromorphological quality elements and following the implementation of design and mitigation measures, it is concluded that the construction and operational phases of the Proposed Development will not compromise progress towards achieving “Good” Status or cause a deterioration of the overall GEP of the River Owenboy and other water bodies that are in scope. Also, the Proposed Development does not require assessment under Article 4.7 as outlined in Table 7-4 as appraised in Table 7-5.

Table 7-5: Appraisal for Article 4.7 of the WFD

Environmental Objective	Proposed Scheme	Compliance with the WFD Directive
No changes affecting high status sites	No waterbodies identified as high status.	Yes
No changes that will cause failure to meet surface water Good Ecological Status (GES) or Good Ecological Potential (GEP) or result in a deterioration of surface water GES or GEP	After consideration as part of the assessment, the Proposed Development will not cause deterioration in the status of the water bodies during construction following the implementation of mitigation measures. No significant impacts are predicted during operation.	Yes
No changes which will permanently prevent or compromise the Environmental Objectives being met in other water bodies	The Proposed Development will not cause a permanent exclusion or compromise achieving the WFD objectives in any other bodies of water within the River Basin District.	Yes

7.2.5.4 Flood Risk

A site-specific Flood Risk Assessment was completed as per 'The Planning System and Flood Risk Management' Guidelines for Planning Authorities (2009). The site is at risk of flooding from fluvial and tidal sources and is partially located within Flood Zone A and B. The updated Strategic Flood Risk Assessment for the Cork County Development Plan (2022-2028) identifies the Proposed Development area as "premature" as it is within Flood Zone A and B and sequential approach and avoidance cannot be achieved.

However, a hydraulic modelling was developed to assess if the risk can be removed from the development footprint by providing a level-for-level compensatory storage. Based on the analysis, it was determined that the Proposed Development won't be at significant risk and the impact elsewhere is negligible.

The Proposed Development was subjected to a Justification Test in accordance with the Guidelines and it is demonstrated that the Proposed Development satisfies the criteria of the development management Justification Test.

7.2.5.5 Potential Cumulative Impacts

The Proposed Development was assessed for cumulative impacts with other proposed developments in proximity to the Study Area, a comprehensive list of proposed planning applications in the vicinity of the Proposed Development is presented in Table 7-6. Development proposals outlined in the Cork County Development Plan and Local Area include, a standard, surface water management strategies in the form of SUDs to mitigate against impacts on the receiving waters. Therefore, the cumulative impacts on hydrology of

the Proposed Development and various others included in developments plans are considered imperceptible.

Other major development proposals reviewed include:

- The Western Relief Road,
- Wastewater Pumping Station and Emergency Storage Tank, and
- The Carrigaline Transportation and Public Realm Enhancement Plan (CTPRP)

7.2.5.5.1 The Western Relief Road and Wastewater Pumping Station

One of the major development proposals currently underway is the Western Relief Road. The project includes construction of a 750m long 9.5m wide single carriageway between Ballea Road and Kilmoney Road. The road crosses the Owenboy River south of Soccer Club Road and the development includes construction of a bridge over the River Owenboy. There are also two proposed pumping stations one on each side of the Owenboy River. The pumping station south of the river is in proximity to the Proposed Development Site.

The Western Relief Road scheme has a potential cumulative impact with the Proposed Development Site at least in one of the following ways:

- The Scheme, in combination with the Proposed Development, has the potential to alter the hydrologic regime of the area as they both involve construction on floodplain, and
- Wastewater Pumping Station and Emergency Storage Tank

The Natura Impact Statement (NIS) prepared for the foul pumping station (JBA, 2019) identified the risk of surface water runoff to the River Owenboy impacting on the Cork Harbour SPA and proposed best practice construction methods as mitigation measures that will prevent any potential pollution to the SPA.

7.2.5.5.2 The CTPRP

Another major development proposal is the Carrigaline Transportation and Public Realm Enhancement Plan (CTPRP). The development involves the redevelopment of the current road, pedestrian, and public realm infrastructure on Cork Road, Church Hill, Church Road, Crosshaven Road, Ballea Rd, Kilmoney Road. The Proposed Development is in keeping with the existing road profile and does not increase the surface area and hence the risk of flooding and water pollution is not expected to increase from the baseline conditions.

Table 7-6: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part 8 Planning	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	<p>The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence.</p> <p>The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians, cyclists and vehicular traffic).</p>

<p>217464</p>	<p>Aldi Stores (Ireland) Ltd</p>	<p>On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.</p>	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>
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<p>214818</p>	<p>Ruden Homes Ltd</p>	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
<p>205230</p>	<p>Barry Collins (Supermarket) Ltd</p>	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

<p>196065</p>	<p>Athena Private Assets Ltd</p>	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
<p>194642</p>	<p>Piton Properties Ltd</p>	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

7.2.5.6 “Do Nothing” Impact

In this EIAR, the ‘evolution of the baseline without the development’ is described as the ‘Do Nothing’ scenario.

The Baseline (Section 7.1.3) describes the existing pressures on the waterbodies within the study area. These are identified and categorised under the RBMP for Ireland 2018-2021 process under baseline conditions (i.e., what is there at present) and reported by the EPA. The RBMP categorises significant pressures impacting waterbodies in Ireland into 14 categories, and identifies measures and actions aimed at addressing each pressure. This supports the analysis of future trends expected in the water environment to determine the 'evolution of the baseline without the development'. Future trends will be more noticeable, predictable, and measurable in the short to medium-term in relation to water quality, whereas hydrological and hydromorphological changes are subject to more long-term trends.

Future trends are determined based on the significant pressures identified under the RBMP, and the measures and actions in relation to policy and monitoring identified for the waterbodies to meet the requirements of the WFD Directive and any information available detailing progress on those measures or actions.

The most significant waterbody 'At Risk' of achieving "Good" status close to the Proposed Development Site is the Owenboy [Cork]_040 (Status 2013-2018: Moderate) where hydromorphology and anthropogenic (channelisation) sources were identified significant pressures. Hydromorphological pressures include modification to the physical conditions via dredging or straightening, dams or weirs while anthropological pressures can include abstractions, agriculture, use of fertiliser, etc. The Proposed Development does not involve any of the activities identified and therefore, in the absence of the Proposed Development, there would be no hydromorphological impact on the receiving surface water environment (River Owenboy). The current rate of surface water run-off would continue to operate at its current state. The flood risk will also continue as they have historically been in this area.

7.2.6 Avoidance, Remedial & Mitigation Measures

It is not anticipated that any of the activities of the Proposed Development will result in a specific risk that requires mitigation measures, other than those embedded in the design as a good practice measure. This section sets out these measures which are envisaged to avoid, prevent, or reduce any residual significant adverse effects on the aquatic environment identified and, where appropriate, identify any proposed monitoring arrangements. It covers both the Construction and Operational Phases. Construction works will take place in accordance with the Construction Environmental Management Plan (CEMP) which will be developed by the appointed contractor.

7.2.6.1 Construction Phase

The Proposed Development will be designed to avoid/mitigate as much as possible any potential water pollution causing scenarios during construction. Some of the mitigation measures that will be implemented during construction include:

- Avoid working on floodplains and/or sequence construction to avoid temporary increase in flood risk and water pollution incidents,
- The compensatory and attenuation storages will be constructed in advance of constructing the buildings and the car park,
- The Site Compound will be located outside of the floodplain,

- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses.
- The CEMP will be implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the CEMP.
- Surface water runoff from work areas and construction dewatering water will be directed to on-site settlement ponds will be discharge at controlled rate.
- Any works in or adjacent to the River Owenboy will be carried out after consultation with Inland Fisheries Ireland (IFI) and the Office of Public Works (OPW).
- Washing of trucks and other construction equipment will take place off site. If within the site, the discharge from this area must be directed to on-site settlement ponds.
- Oil and fuel will be stored in designated bunded areas and away from surface water drainage features.
- Refuelling of construction machinery will be undertaken in designated areas away from surface water drainage to minimise potential contamination of the water environment. Spill kits will be kept in these areas in the event of spillages.
- Hazardous construction materials will be stored appropriately to prevent contamination of the river or groundwater.
- Spill kits will be kept in designated areas for re-fuelling of construction machinery.
- A 10m riparian buffer corridor is created along the Owenboy River by erection of 1m high barrier prior to site clearance with relevant signage to notify site users no construction activity or discharge of any kind is permitted in this exclusion zone.

7.2.6.2 Operational Phase

Predicted impacts for the Operational Phase are mitigated by means of imbedded design solutions that and hence the operational phase impact is deemed imperceptible. As such no changes to hydrology are expected as the drainage design includes a storage solution to compensate for loss of floodplain and attenuation pond to mitigate against any potential increase in surface runoff rates. There are 1no. surface water outfall to the River Owenboy from the Site. Direct discharge to this outfall is avoided by controlling the runoff rate from the attenuation pond.

Accidental spills are also controlled in a similar manner as direct discharge to the river is avoided by means of the attenuation pond. It is therefore considered that the likely impact is imperceptible and temporary in the absence of mitigation measures.

7.2.6.3 “Worst Case” Scenario

The ‘worst-case’ scenario is when the proposed mitigation measures (designed or imbedded) fail resulting in the release of contaminated water from (storm or foul) sewers to the River Owenboy and the general environment. This may be caused by extreme flooding event preventing drainage or heavy rain overwhelming the drainage system. It is proposed to seal manholes in the floodplain to prevent flood water entering the system and cause overflow of contaminated water.

7.2.7 Residual Impacts

It is anticipated that implementation of the measures imbedded in the design and those in the proposed mitigation measures will ensure the potential impacts of the Proposed Development on the receiving hydrological environment will be imperceptible. These measures will be included in the Construction and Environmental Management Plan which will be developed by the appointed Contractor.

The design of the Proposed Development incorporates a compensatory storage and an attenuation pond. Outflow from these storages to the Owenboy River will be controlled by means of a flow control structure to prevent the risk of flooding. These flow control structures will be inspected and maintained to ensure good working order.

7.2.8 Monitoring

7.2.8.1 Construction Phase

No routine monitoring requirement is anticipated during construction phase. However, it may be necessary to deploy sondes upstream/downstream of the works to monitor water quality before discharging to receiving waters during construction.

7.2.8.2 Operational Phase

It is not anticipated that any of the Operational phases of the Proposed Development will result in a specific impact that requires mitigation measures, other than those embedded in the design. Therefore, no routine monitoring requirement is required during Operational Phase.

7.2.9 Interactions

7.2.9.1 Population and Human Health

No public health issues associated with the water (hydrology and hydrogeology) conditions at the Proposed Development Site have been identified for the Construction Phase or Operational Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

It is noted that specific issues relating to Public Health associated with the Proposed Development are set out in Chapter 4 of this EIAR.

7.2.9.2 Land and Soils

An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is included in Chapter 7 of this EIAR. Procedures for protection of receiving water environment are set out in Chapter 7 of this EIAR.

7.2.9.3 Biodiversity

Removal of soil/subsoils can increase sediment discharge to the Owenboy River and groundwater vulnerability. A number of mitigation measures have been detailed in the CEMP and NIS (Enviroguide Consulting, 2022) and Chapter 5 Biodiversity of this EIAR to ensure there will be no significant impacts in relation to Hydrology and Biodiversity.

7.2.10 Difficulties Encountered

No difficulties were encountered in compiling this chapter.

7.2.11 References

Bridget Woods B. et al. (2015). The SuDs Manual (C753), CIRIA.

Department of Housing, Planning and Local Government (2018). River Basin Management Plan for Ireland 2018 – 2021, Government of Ireland.

Department of Housing, Planning and Local Government (2022). Draft for a third Cycle River Basin Management Plan for Ireland 2022-2027 (due for publication 2022).

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EU Directive 2007/60/EC of 23 October 2007 on the assessment and management of flood risks.

EU Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment.

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JBA Consulting (2019). Southern Pumping Station and Rising Main at the Carrigaline Western Relief Road: Natura Impact Statement. Submitted to Cork. Co. Co. as part of the Planning Application, Cork.

OPW (2020) National Flood Information Portal - Flood Maps: Home - Floodinfo.ie. Accessed April 2022.

7.3 Hydrogeology

7.3.1 Introduction

This second section of this Chapter of the Environmental Impact Assessment Report (EIAR) considers and assesses the likely significant impacts regarding hydrogeology associated with both the construction phase and operational phase of the Proposed Development. Measures to mitigate any likely significant adverse impacts of the Proposed Development on the hydrogeology in the vicinity of the Proposed Development are proposed within this Chapter.

An assessment is made of the likely significant effects associated with the construction and operation of the Proposed Development on these resources. Measures are presented to mitigate or eliminate the effects of the Proposed Development on the hydrogeology.

Chapter 2 provides a full description of the Proposed Development.

7.3.1.1 Quality Assurance and Competence

This Chapter is compiled by Gerry Baker, MSc, BA, PGeo, EurGeol, Arup. Gerry Baker is an Associate Hydrogeologist with Arup and has over 20 years of experience as a consulting hydrogeologist. Gerry holds an MSc in Sustainable Management of the Water Environment from University of Newcastle-Upon-Tyne and BA(mod. Geography) from TCD. He is a professional member of the Institute of Geologists of Ireland and the European Federation of Geologists since 2007. He was responsible for the preparation of Hydrogeology Chapters of EIAR's for various projects including Strategic Housing Developments, transport infrastructures, wind farms, etc.

7.3.2 Study Methodology

7.3.2.1 General

This Chapter of the EIAR outlines the potential impacts of the Proposed Development as set out in the Guidelines on Information to be Contained in an Environmental Impact Statement (EPA, 2022). Every effort is made to provide the Competent Authority (CA) the most relevant environmental effects of the Proposed Development to enable determine if consent should be granted or not. The information in the EIAR is also intended for use by other parties to evaluate the acceptability of the project and its effects and to inform their submissions to the CA.

The following section outlines the legislation and guidelines considered, and the adopted methodology for preparing this Chapter and undertaking the hydrogeology assessment.

The potential effects of the Proposed Development on hydrogeology have been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any effect on these attributes.

7.3.2.2 Guidelines and Legislation

This Chapter has been prepared using the following guidelines:

- Environmental Protection Agency (EPA 2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports

- Environmental Protection Agency (EPA, 2017). Guidelines on the Information to be contained in Environmental Impact Assessment Reports. Draft;
- 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);
- Institute of Geologists of Ireland (IGI, 2013). Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- National Roads Authority (NRA, 2008). Environmental Impact Assessment of National Road Schemes – A Practical Guide;
- National Roads Authority (NRA, 2008). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- The EU Water Framework Directive (WFD), 2000/60/EC;
- The Groundwater Directive, 2006/118/EC;
- Water Services Acts (2007 – 2017).

7.3.2.3 Impact Assessment Methodology

The likely significant effects have been assessed by classifying the importance of the relevant attributes and quantifying the magnitude of any likely significant effects on these attributes. This has been undertaken in accordance with the IGI guidance which outlines a 13-step methodology that is divided across four distinct elements:

- Initial Assessment;
- Direct and Indirect Site Investigation;
- Mitigation Measures, Residual Impacts and Final Impact Assessment; and
- Completion of the Soils, Geological and Hydrogeological Sections of the EIAR.

The 'Initial Assessment' presents a description of the past and present uses of the land across the route which may have a bearing on the Proposed Development. This includes a detailed description of the nature of the ground conditions beneath the route based on existing literature as well as site specific and neighbouring site investigation data.

Section 7.2.2.9 provides discussion on the data available from a site investigations carried out in 2006-2007. The information gathered on the baseline environment during the site investigation corresponds to the second element of the methodology, 'Direct and Indirect Site Investigation and Studies'.

The outcome from examining this available data is a Conceptual Site Model (CSM). The CSM is a summary of geological conditions beneath the Proposed Development Site that considers the likely significant effects of the Proposed Development. Based on the derived CSM, the area across the Proposed Development is classified as generally a Type B environment which is described as a naturally dynamic hydrogeological environment by the IGI guidelines.

A 'Feature Importance ranking' is then assigned to each feature (likely to be affected by the Proposed Development based on guidance from the TII and IGI). This facilitates the assessment of likely significant effects which has been undertaken in accordance with the guidance outlined TII and IGI guidance.

Section 7.2.6 outlines the "Avoidance, Remedial and Mitigation Measures" associated with the works in accordance with the above methodology.

7.3.2.4 Study Area

The hydrogeology study area for the Proposed Development extends to a radius of 2km around the Proposed Development Site boundary, as shown on Figure 7-3.

7.3.2.5 Categorisation of the Baseline Environment

In order to identify and quantify the potential impact of the construction phase and operational phase of the Proposed Development, it is first necessary to undertake a detailed study of the (baseline) hydrogeological environment of the study area. The existing hydrogeology conditions in the area have been interpreted from both desk study information and from project specific site investigations.

7.3.2.6 Site Walkover

A site walkover was carried out by Arup on the 12th of April 2022. The aim of this site visit was to:

- Survey the site and the surrounding area;
- Determine the hydrological regime in the vicinity of the site; and
- Determine the current uses of the site.

The Proposed Development Site is overgrown with mainly grass but also vegetation is indicative of poor drainage or shallow groundwater.

Works on the Western relief road are well progressed with the bridge structure and embankment in place and it is understood that the bridge will be complete by the middle of 2022.

No signs of contaminated land or water contamination were identified.

7.3.2.7 Desk Study Information

As part of the desk study that was undertaken to establish the baseline conditions (i.e. soils, geological and hydrogeological environment), the following sources of information were reviewed:

- Google, Aerial photography (2019) [online], Google maps, accessed 25/04/2022;
- Bing, Aerial photography (2019) [online], Bing maps, accessed 25/04/2022;
- Historic maps [online], <http://map.geohive.ie/mapviewer.html>, accessed 25/04/2022;
- Historic 6 inch;
- Historic 25 inch; and
- Aerial 1995-2019.
- GSI, geological maps of the site area produced by the Geological Survey of Ireland [online], GSI Geohive, available at: <http://map.geohive.ie/mapviewer.html>, accessed 25/04/2022, including;
- Quaternary Maps (GSI);
- Bedrock Mapping;
- Groundwater Mapping;
- National Landslide Database (GSI);
- Karst Database (GSI);
- Historic Mine Sites - Inventory and Risk Classification;
- Previous geotechnical ground investigations [online] Available at: <https://dcenr.maps.arcgis.com/apps/MapSeries/>, Accessed on 25/04/2022;

- Teagasc and the Environmental Protection Agency Irish Soil Information System [online], available at: <http://gis.teagasc.ie/soils/index.php>, accessed 25/04/2022;
- EPA, Historic Mine Sites - Inventory and Risk Classification, [online], Available at: <https://gis.epa.ie/EPAMaps> accessed 25/04/2022;
- National Parks and Wildlife Service, Proposed / Designated NHA, SPA, SAC Sites, [online], Available at: <http://webgis.npws.ie/npwsviewer/>, accessed 25/04/2022; and
- National Monuments, [online], Available at: <http://webgis.archaeology.ie/historicenvironment/>, accessed 25/04/2022.

7.3.2.8 Project Specific Information

No project specific ground investigations (GI) were undertaken for this EIA report.

There is information available from a site investigation that was carried out for a development of the Western Relief Road to the west of the site. Information as follows:

- Site Investigations Ltd, 2007. Site Investigation for a Road at Carrigaline, Co. Cork. Factual Report. S.I. Ltd Contract No: 4404C

7.3.2.9 Technical Limitations

The baseline data described and considered in this assessment includes existing data from publicly available sources of information, a site walkover, as well as a site investigation carried out for the adjacent road development.

There is no site investigation data for the Proposed Development, thus, there is no groundwater monitoring information available.

The baseline data available provides information on the existing hydrogeological environment at point locations adjacent to the study area. Between each point, the baseline data has been assessed by conservative interpretation.

7.3.3 The Existing and Receiving Environment (Baseline Situation)

7.3.3.1 Introduction

This section describes the existing hydrogeology within the study area. A regional overview is provided in terms of the geomorphology, topography, hydrogeology, soils and solid geology of the local area followed by sub sections identifying the feature importance ranking, in accordance with the IGI guidelines, of the karst solution features, hydrogeological features and protected sites within the study area.

When examining the receiving environment of the study area, the site investigation carried out by Site Investigations Ltd, 2007 has been considered.

7.3.3.2 Regional Overview

The Proposed Development is located at Kilmoney Road, Carrigaline, County Cork, approximately 300m to the west of Main Street, from the centre of the site. The site is bounded by the Owenboy River to the north, Dairygold Co-Op Superstore to the east, housing

developments along Kilmoney Road to the south and a green field for the development of the Western Relief Road to the west, Figure 7-3.

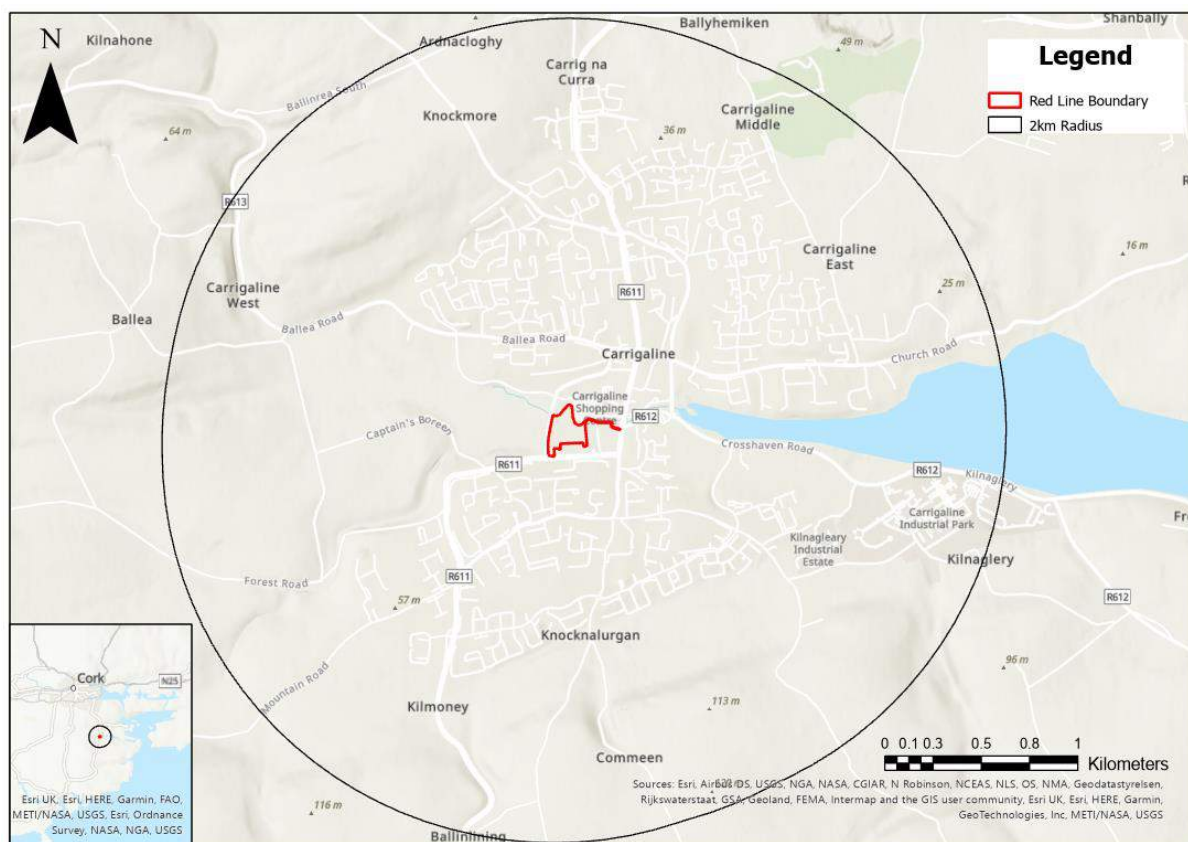


Figure 7-3 : Site location map

7.3.3.2.1 Regional Topography

The topography of the surrounding area is relatively low lying, along the Owenboy River, with the higher topography of the catchment to the north and the west. The Owenboy River discharges to the east into Cork Harbour, which further drains into the Celtic Sea.

The topography of the site generally falls from south to north, towards the Owenboy River, ranging from 11.0mOD in the south to 1.8mOD to the north along the river.

7.3.3.2.2 Regional Hydrogeology

7.3.3.2.2.1 Aquifer Type

The Geological Survey Ireland (GSI) has devised a system for classifying both bedrock and gravel aquifers in Ireland based on the hydrogeological characteristics, size and productivity of the groundwater resource. The three main classifications are Regionally Important Aquifers, Locally Important Aquifers and Poor Aquifers. These are then further subdivided by their general characteristics.

The bedrock in the vicinity of the Proposed Development comprises sandstone and mudstone with limestone to the north of the study area. The groundwater bedrock geology in the study

area comprises: Dinantian Pure Unbedded Limestones, Namurian Sandstones, Dinantian Mudstones and Sandstones (Cork Group), Dinantian Lower Impure Limestones and Devonian Old Red Sandstones. The area is highly faulted with 10 faults mapped in the 1km radius from the centre of the site. The faults are predominantly situated to the north of the site with the closest fault mapped approximately 216m to the northeast.

The White Strand Formation underlies the site which is described as sandstone & interbedded pyritic mudstone. This has been classified by the GSI as Namurian undifferentiated which is a Locally Important Aquifer (LI) bedrock which is moderately productive in local zones. The limestone to the north of the study area, Dinantian Pure Unbedded Limestones, is described as a Locally Important Aquifer (Lk) which is Karstified.

The GSI have not designated any gravel aquifers beneath or in the vicinity of the Proposed Development. The GSI have not recorded any karst features in the 2km study area of the Proposed Development. The bedrock aquifer classification is presented on Figure 7-4.

This bedrock aquifer under the site is part of the Ballinhassig East groundwater body with the north of the study area part of the Ringaskiddy karstic groundwater body.

The Ballinhassig East groundwater body, which underlies the site, is noted by the GSI as having low transmissivity and storativity, although localised zones of enhanced permeability occur along fault zones. Flow occurs along fractures, joints and faults. The GSI report that most groundwater flow occurs within the top 15-20 m of the aquifer, in the layer that comprises a weathered zone of a few metres and a connected fractured zone below this. Deeper flows occur along generally isolated faults or significant fractures.

The Ringaskiddy karstic groundwater body, which is situated to the north of the study area, is reported by the GSI as having groundwater flow through the faults and joints formed by deformation that were subsequently enlarged by karstification. Most groundwater flow occurs in an upper shallow highly karstified weathered zone of a few metres thick in which groundwater moves quickly in rapid response to recharge.

Groundwater discharges to the numerous streams and rivers crossing the aquifer and to small springs and seeps and ultimately to the Celtic Sea in the east.

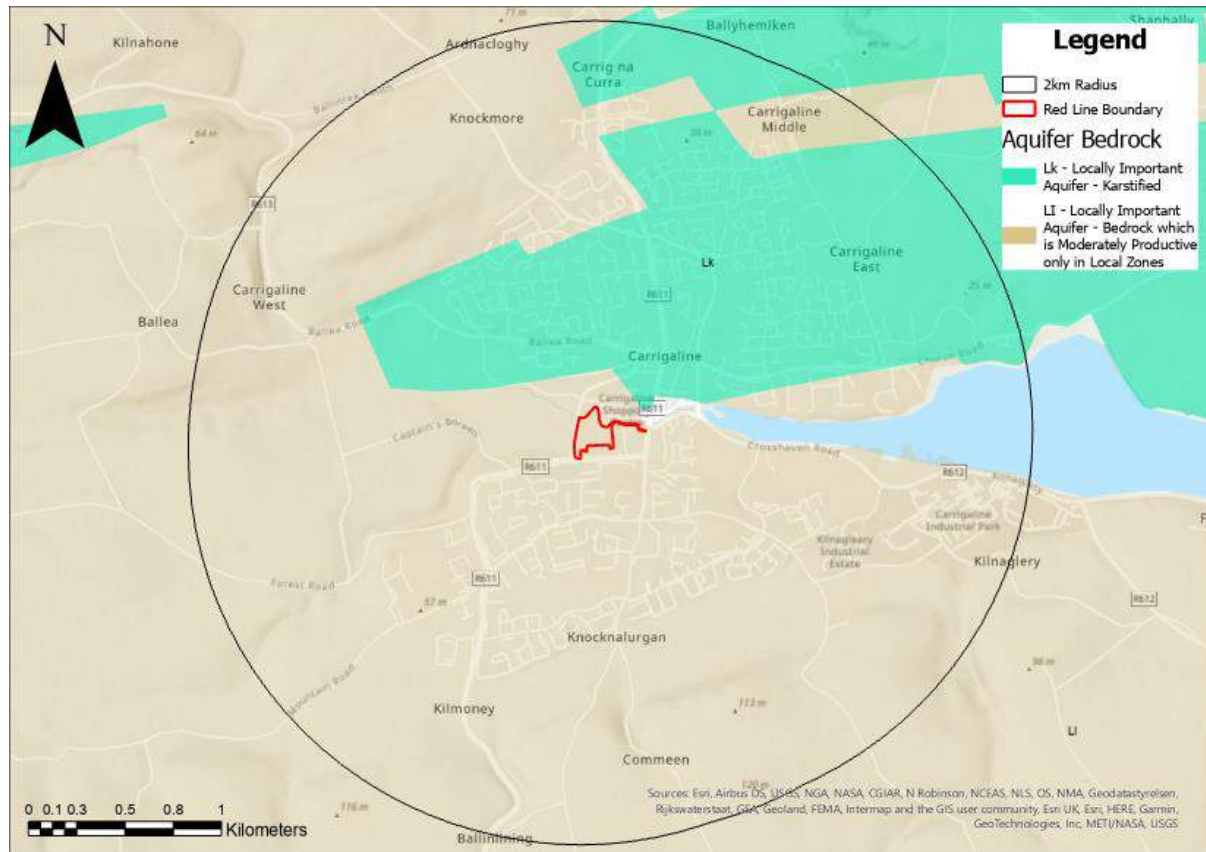


Figure 7-4: Aquifer bedrock map

7.3.3.2.2.2 Groundwater Vulnerability

Groundwater vulnerability is a relative measure of the ease with which groundwater may be contaminated by human activity. It is based on the aquifer's intrinsic geological and hydrogeological characteristics. The vulnerability is determined by the thickness and permeability of overlying deposits and the depth to groundwater. For example, bedrock with a thick, low permeability, clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, gravelly overburden.

The groundwater vulnerability in the study area of the Proposed Development is presented on Figure 7-5. According to the GSI database, the groundwater vulnerability for the study area ranges from moderate to rock at or near surface or karst. The site is described as high vulnerability with moderate permeability subsoil overlain by poorly drained (gley) soil.

The groundwater vulnerability rating is relevant to groundwater in the bedrock aquifer rather than the subsoil (drift). Where the cover over the subsoil is thin the groundwater will be more vulnerable.

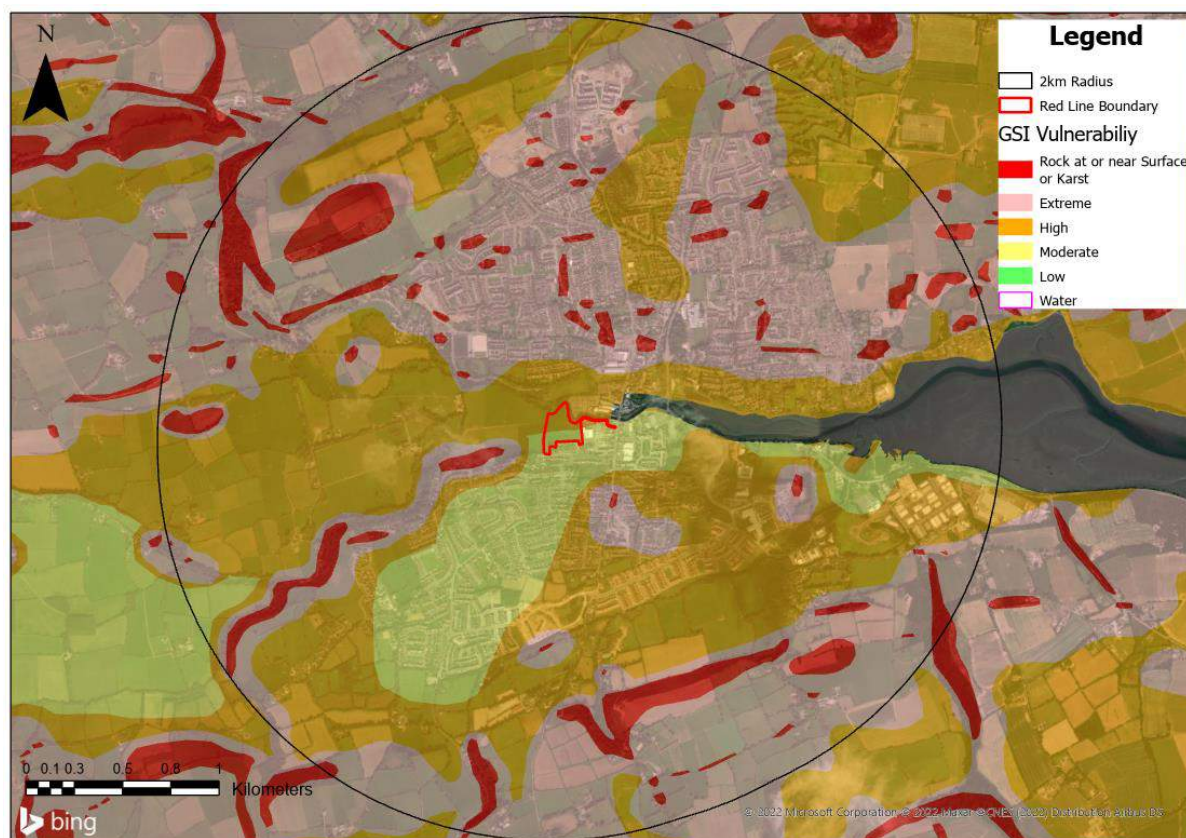


Figure 7-5: Vulnerability Map

7.3.3.2.2.3 Recharge

Recharge is the amount of effective rainfall that replenishes the aquifer. It is a function of the effective rainfall (i.e. rainfall minus evaporation and run off), evapotranspiration (uptake by plants and evaporation) and the aquifer characteristics.

According to the GSI groundwater recharge database, the recharge to the area varies between 200mm/yr to 630mm/yr. The recharge in the area of the Proposed Development is shown on Figure 7-6. The site is recorded as having an annual recharge of 160mm/year which accounts for approximately 23% (22.50%) of the effective annual rainfall (712mm/yr) over the area.

This is a moderate rate of recharge which likely reflects both the relatively high effective rainfall value and the moderate permeability of the subsoil above the sandstone aquifer. This highlights that there is capacity for the rainwater to infiltrate into the underlying sandstone aquifer.

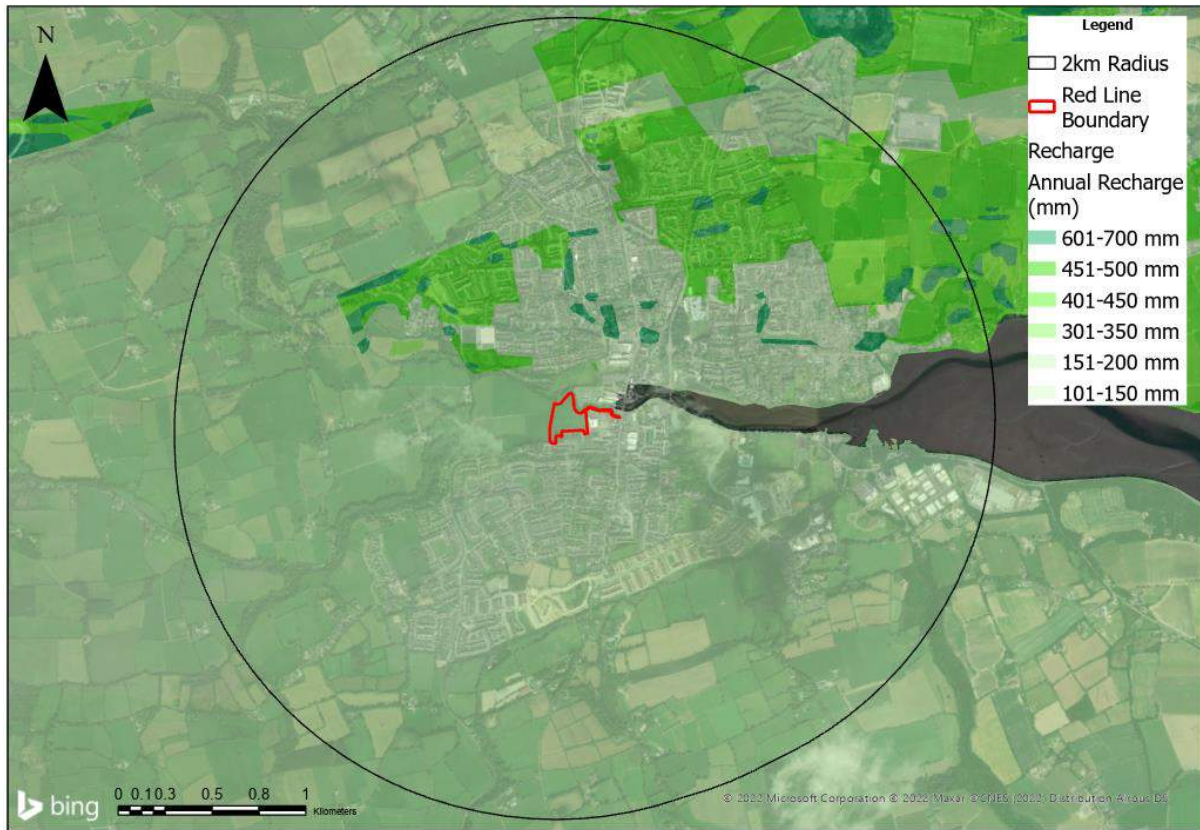


Figure 7-6 : Groundwater recharge

7.3.3.2.2.4 Groundwater Receptors – Groundwater Abstractions

Based on the GSI database there are no source protection zones or National Federation of Group Water Scheme (NFGWS) Zones of Contribution (ZoC) within 2km of the Proposed Development Site boundary. There are 18 groundwater wells on the GSI database within 2km of the site. These are described in Table 7-6 and are shown on Figure 7-7.

Based on the GSI database there are 4 wells listed within 1km of the centre of the site. The exact location is unclear as the well locations in the GSI database ranges in accuracy from 1km to 5km. All wells are noted as having poor yield class according to the GSI with unknown use. The depth to rock is between 3.1m to 3.7mbgl. As the location and usage of these well records is unclear they are assigned a low feature importance and are not considered further in the assessment.

Table 7-7: GSI Groundwater wells and springs located in the 2km study area

GSI Name	Well Type	Drill Date	Source Use	Yield (Source) (m3/day)
1405NEW176	Borehole	June 1, 1970	Unknown	28
1705NWW020	Borehole	January 1, 1966	Unknown	28

GSI Name	Well Type	Drill Date	Source Use	Yield (Source) (m3/day)
1705NWW024	Borehole	December 29, 1899	Unknown	21.8
1705NWW025	Borehole	March 1, 1972	Unknown	n/a
1705NWW026	Borehole	December 29, 1899	Unknown	65.5
1705NWW027	Borehole	September 1, 1963	Unknown	27.3
1705NWW028	Borehole	May 1, 1971	Unknown	32.7
1705NWW029	Borehole	May 1, 1971	Unknown	32.7
1705NWW088	Borehole	December 29, 1899	Domestic use only	38.2
1705NWW089	Borehole	December 29, 1899	n/a	n/a
1705NWW112	Borehole	December 29, 1899	Agri & domestic use	109
1705NWW117	Borehole	December 29, 1899	Agri & domestic use	54.5
1705SWW047	Borehole	April 1, 1963	Unknown	28
1705NWW070	Dug well	January 24, 1973	Unknown	n/a
1705NWW082	Borehole	May 22, 1986	Other	n/a
1705NWW083	Borehole	May 20, 1986	Other	n/a
1705NWW080	Borehole	May 1, 1986	Other	n/a
1705NWW081	Borehole	May 19, 1986	Other	n/a

7.3.3.2.2.5 *Groundwater Receptors – Discharge to Ground*

There are no Integrated Pollution Control (IPC), IPPC (Integrated Pollution Prevention Control) or Industrial Emissions Licensing (IEL) facilities in the 2km study area. There are no Section 4 discharge licences location within 2km of the site boundary.

7.3.3.2.2.6 *Groundwater Receptors – Groundwater Dependent Ecosystems*

Under to the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC), Member States are required to establish a Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites includes Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

According to the National Parks and Wildlife Service (NPWS) database, the Cork Harbour SPA (site code 004030) is situated within the 2km study area of the site, approximately 550m to the east from the centre of the site.

In Ireland, areas which have a nationally important habitat(s) or which have a habitat(s) that needs protection, are granted protection under the Wildlife (Amendment Act) 2000. Such areas may be designated Natural Heritage Areas (NHAs) or proposed NHAs (pNHAs). Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation. The Owenboy River is a pNHA and is situated approximately 500m to the east from the centre of the site. These are presented on Figure 7-7.

The Ballinhassig East groundwater body (GWB), which underlies the Proposed Development Site, is a very large groundwater body (1209km²) covering as far west as Macroom. The EPA note the GWB being a groundwater body supporting an SAC and SPA Habitats. The SACs associated with the GWB are The Geragh SAC (No. 000108, located near Macroom) and Great Island Channel SAC (No. 001058, located north of Great Island) both of which are located over 2km from the Proposed Development Site.



Figure 7-7 : Hydrogeological constraints – SPA, NHA, pNHA and Groundwater Wells and Springs

7.3.3.3 Site Specific Environment

7.3.3.3.1 Previous Site Investigation

A site investigation has been undertaken for the purposes of the adjacent Western Relief Road over the period 05/10/2006 to 04/01/2007. The scope of the site investigation was to investigate subsurface ground conditions by means of cable percussion boreholes with rotary follow-on, trial pits and lab testing. The locations of the boreholes and trial pits closer to the site are shown in Figure 7-8.

The trial pits closest to the site indicated that the subsoil is comprised of a mixture of alluvial clays, sands and gravels. Three boreholes are located very close to the site, CBH5, CBH6 and CBH7. Borehole CBH5 located closest to the river shows 8m of clay with a band of sand from 1.6-2.9mbgl (below ground level). CBH06 indicates gravels from 1.3-7.5mbgl. CBH07 indicates 8.5m of clay with a band of gravel from 2.7-5.7mbgl.

A falling head test was attempted to be completed at CBH5, however as the water level was at surface it could not be pumped sufficiently to get the water level down to do a test. This indicates high permeability artesian conditions.

A falling head test was carried out on CBH06, however, as the piezometer is screened in the clay underlying the gravels and not the gravel layer, the results are not representative of the gravel deposit.

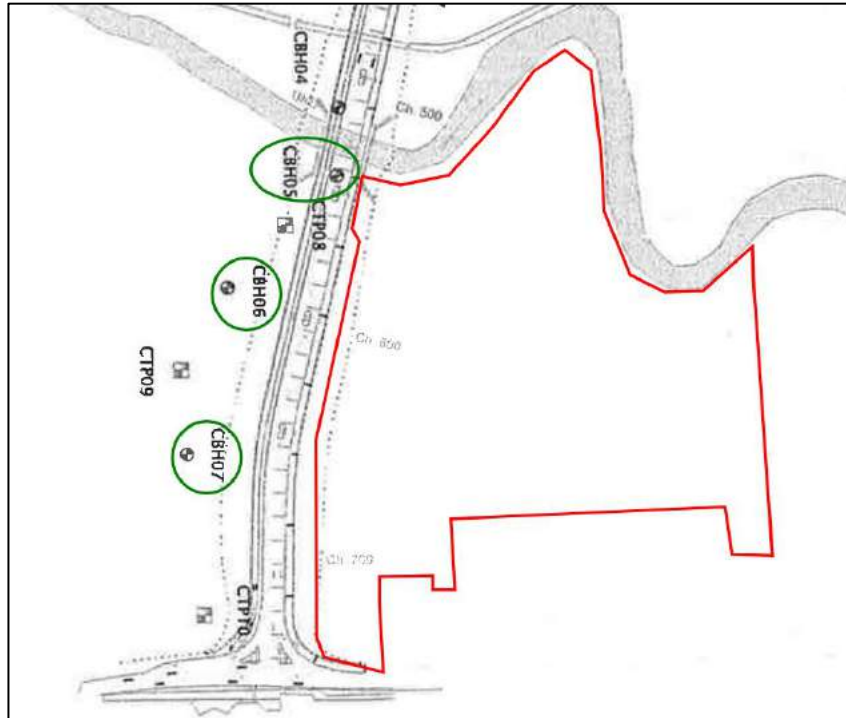


Figure 7-8: Location of boreholes and trial pits near the site (Site Investigations Ltd, 2007)

7.3.3.3.2 Site Hydrogeology

7.3.3.3.2.1 Groundwater Levels and Flow

There is no available information on groundwater levels and flow for the site. The site investigation for the adjacent development, Site Investigations Ltd 2007, was used to provide some understanding for the local groundwater levels and flow.

There are four boreholes with piezometers and groundwater level measurements available. These are presented in Table 7-7

Table 7-8: Groundwater levels from the Site Investigations Ltd, 2007 report

Borehole ID	Elevation (mOD)	Filter (top) (mbgl)	Filter (bottom) (mbgl)	Strata monitoring	Level (mOD) 23/12/2006 09:00	Level (mOD) 01/02/2007 11:00	Level (mOD) 16/04/2007 11:00
CBH1	10.48	4	5	Clay	5.99	5.62	Dry
CBH3	10.201	6	13	Clay	5.241	5.061	4.941
CBH5	3.243	2	3.5	Sand/Clay	3.243	3.243	3.093
CBH6	3.243	6.5	7.6	Clay	3.193	2.953	3.143

It is noted that CBH1 and CBH3 are on the opposite side of the Owenboy river. CBH5 and CBH6 are on the southern bank of the Owenboy river and are closest to the Proposed Development Site. These installations represent subsoil conditions and do not monitor the bedrock. There are no installations monitoring the bedrock.

Monitoring of groundwater was undertaken between 23/12/2006 to 16/04/2007 at CBH05 and CBH06. The monitoring indicates artesian conditions at CBH05 and very shallow groundwater (0.05-0.29mbgl) at CBH06. CBH06 is shown at 3.243mOD, indicating the groundwater levels could be at 3.193mOD (when groundwater levels are as high as 0.05mbgl). This level is higher than the average river level during normal conditions (recorded at 1.2mOD during river surveys in August 2021). While a standpipe was not installed in CBH7 water level monitoring during drilling the subsoil sections indicate the water level rose to within 1.2m of ground level.

Groundwater flow direction cannot accurately be determined due to the limited piezometers near the site. An approximate understanding can be made using CBH5 and CBH6. It can be seen from Table 7-7 that the groundwater flow direction between the two boreholes changes direction. With groundwater likely flowing from north to south on 23/12/2006 and 01/02/2007 and inversely south to north on 16/04/2007. This change in direction could be due to the fluctuations in water level in the Owenboy River, highlighting the connectivity between the groundwater and surface water at this location.

7.3.3.3.2.2 Groundwater Quality

There is no available information on groundwater quality for the site. There were no groundwater samples reported during the site investigation for the adjacent development, Site Investigations Ltd (2007).

7.3.3.3.2.3 Conceptual Site Model

The conceptual site model (CSM) is a summary of the geological and hydrogeological conditions at the site of the Proposed Development, which highlights the current site setting. The hydrogeology CSM is based on the topographic information available for the site, publicly available information, and the Site Investigations Ltd (2007) site investigation.

The CSM of the site in its current condition is presented in Figure 7-9, with Figure 7-10 showing the site with the Proposed Development and expected dewatering level during construction.

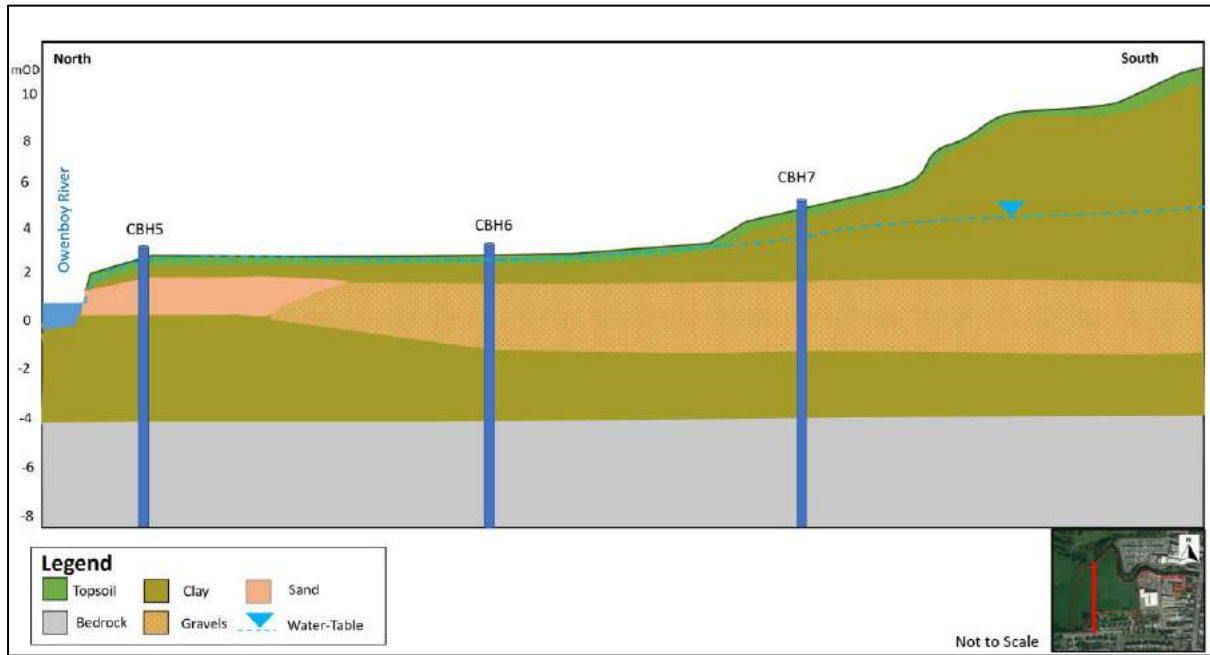


Figure 7-9 : Conceptual site model of the site at present

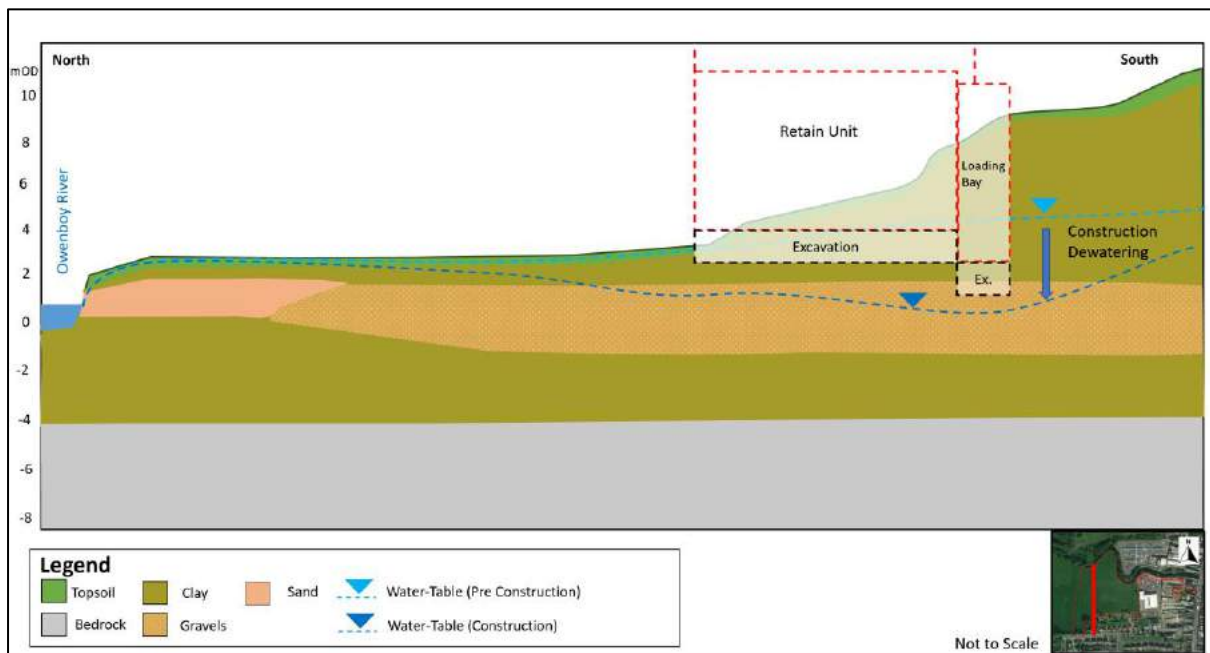


Figure 7-10 : Conceptual site model of the site with the Proposed Development

7.3.3.4 Importance of Features

A summary of the hydrogeological features found within the study area, are presented in Table 7-8. A feature importance ranking based on criteria for rating site importance of hydrogeological features (NRA 2008) from the Institute of Geologists of Ireland (IGI, 2013). Guidelines for the preparation of soil, geology and hydrogeology chapters of the environmental impact statements has been assigned to each feature.

Table 7-9 : Summary of Hydrogeological Features

ID	Feature	Description/ Location	Feature Importance Ranking	Criteria
Groundwater Resources/Receptors	Locally important groundwater aquifer	Moderately productive only in local zones	Medium	Attribute has a medium quality or value on a local scale
pNHA	Owenboy River (001990)	Presence of proposed national heritage area adjacent to site.	Very High	Attribute has a high quality or value on a regional or national scale
SPA	Cork Harbour SPA (004030)	Presence of wetland habitats approximately 0.5km down stream	Extremely High	Attribute has a high quality or value on an international scale

7.3.4 Characteristics of the Proposed Development

The main features of the Proposed Development are described as follows:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units:
- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about area, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

Specific features of the development which are relevant to hydrogeology and groundwater

- Building basements which are situated below ground level and potentially below the water-table.
- Flood attenuation storage void (crates) which is estimated to be 1,231m³ to be provided under 78m of the access road extending to 1.2mOD.

7.3.5 Potential Impact of the Proposed Development

7.3.5.1 Construction Phase

The potential hydrogeology impacts during the construction phase are presented in this section. Construction methodologies for the various elements of the Proposed Development are presented in Chapter 2: Development Description.

The proposed construction impacts of the Proposed Development on the hydrogeological attributes identified in the areas are listed below:

- Effects of dewatering;
- Pollution from construction activities;

7.3.5.1.1 Dewatering

Excavations are required to facilitate the following building floor levels drainage features:

- 4.0mOD for the car parks,
- 2.7mOD for the loading docks,
- 1.85mOD for storm water drainage along the eastern area of the site,
- 1.2mOD for the flood alleviation storage crates.

It is expected that the excavations will extend to least 1m below the finished floor level of the buildings and less than 0.5m below the storm drainage and flood alleviation features. The dewatering level for these excavations is expected to extend 0.5m below these excavation levels.

Borehole CBH7 from the western relief road is the closest borehole to these excavations. This borehole showed that alluvial clay extending from surface down to 1.83mOD, below which are located higher permeability gravel deposits to -1.17mOD. The water level in the borehole was recorded at 1.2mbgl (3.33mOD) during the drilling programme.

Therefore, the excavation for the apartment blocks, which will extend to 3.0mOD, may intercept in the lower permeability alluvial clays but will not extend down into the gravel deposits. Any dewatering required for the excavation of the basements will be readily managed with standard construction techniques such as sump pumping and is not expected to generate a significant quantity of groundwater.

The excavations for the loading docks may extend to 1.7mOD which is likely to intercept the gravel deposits in part and this will require dewatering from 3.33mOD to 1.2mOD. Further site-specific ground investigation and groundwater data will confirm if the gravel deposits are at the same elevation in this location. It is expected dewatering will be completed by shallow borehole pumping from the gravels in the vicinity of the excavation. The estimated dewatering rate for the loading bay area gravels is approximately 10m³/d.

Dewatering for the storm water drainage network along the eastern boundary of the site may not intercept the gravel aquifer and site-specific investigations will confirm the ground conditions prior to construction. Limited localised dewatering using well-points can be adjusted on site to provide the required dewatering along the service trench.

The excavation for the flood alleviation storage void will extend to 0.7mOD with dewatering to 0.2mOD. This will require lowering of the water-table from 3.33mOD. The estimated dewatering rate for this excavation is expected to be 35m³/d.

The estimated dewatering rates are relatively small, particularly in comparison to the Owenboy River where the median flow is 1.682m³/s (154,325m³/d). The expected extent of the cone of depression is less than 50m from the excavation. The gravel deposit is not classified as an aquifer, and it is expected the potential impact on the underlying bedrock aquifer will be a temporary, adverse slight impact.

7.3.5.1.2 Pollution from construction activities

There is potential for the contamination of groundwater as a result of certain activities during the construction phase. There are numerous substances likely to be used during the construction phase that have the potential to contaminate groundwater including fuel and hydrocarbons, lubricants and cement. The washing of construction vehicles also poses a risk due to the potential release of contaminated runoff into groundwater. The magnitude of this effect is small adverse as it may result in the requirement to excavate/remediate a small proportion of contamination or result in a low risk of pollution to the groundwater. As a result, its significance is imperceptible for all important features (refer to Table 7-9).

7.3.5.2 *Operational Phase*

The potential hydrogeology impacts during the operation phase are presented in this section.

7.3.5.2.1 Groundwater Flow

The loading bay and flood alleviation storage crates will be both positioned below the estimated water-table elevation. This will be confirmed with site specific ground investigation and groundwater monitoring. As a result, these features will act as local barriers to groundwater flow within the shallow gravel deposit. This may lead to a localised increase in groundwater levels in the upgradient area of these features once groundwater levels recover following the cessation of construction dewatering. This will however be balanced by a reduction in groundwater recharge (rainfall infiltration) over the area of the building's footprints. Therefore, it is expected there will only be a slight impact on the groundwater levels in the vicinity of the site. This will have no discernible impact on the down-gradient protected water dependant habitats such as the Owenboy river (pNHA) and the Cork Harbour SPA as the change in groundwater levels or recharge will be very small in comparison to the total river flow.

7.3.5.2.2 Groundwater Quality

There are no impacts on groundwater quality expected during the site operation. Foul water will be entirely contained within a foul water network and discharged to the Irish Water network. Storm water will be discharged back to the Owenboy River without any requirement for discharge to ground.

7.3.5.3 *Summary of Potential Impacts*

The potential impacts during construction and operation are summarised in Table 7-9. This illustrates there are no significant impacts on the hydrogeological environment.

Table 7-10 : Summary of Potential Impacts

Feature	Importance		Magnitude of Impact		Significance of Impact
	Ranking	Justification	Ranking	Justification	
Bedrock Aquifer	Medium	Attribute has a medium quality or value on a local scale	Small adverse	Results in minor impact on the integrity of the aquifer during dewatering and potential for localised accidental spillages during construction	Slight
Owenboy River (pNHA)	Very High	Attribute has a high quality or value on a regional or national scale	Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Imperceptible
Cork Harbour	Extremely High	Attribute has a high quality or value on an international scale	Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Imperceptible

7.3.5.4 Potential Cumulative Impacts

The Proposed Development was assessed for cumulative impacts with other proposed developments in proximity to the Study Area, a comprehensive list of the proposed planning applications in the vicinity of the Proposed Development is presented in Table 7-11.

Other major development proposals reviewed include:

- The Western Relief Road,
- Wastewater Pumping Station and Emergency Storage Tank, and
- The Carrigaline Transportation and Public Realm Enhancement Plan (CTPRP)

7.3.5.4.1 The Western Relief Road and Wastewater Pumping Station

One of the major development proposals currently underway is the Western Relief Road. The project includes construction of a 750m long 9.5m wide single carriageway between Ballea Road and Kilmoney Road. The road crosses the Owenboy River south of Soccer Club Road and the development includes construction of a bridge over the River Owenboy. There are also two proposed pumping stations one on each side of the Owenboy River. The pumping station south of the river is in proximity to the Proposed Development Site..

The Western Relief Road scheme has a potential cumulative impact with the Proposed Development as in combination with the Proposed Development has the potential to alter the

hydrogeologic regime of the area as they both involve construction on floodplain which is expected to intercept the water-table. The impacts on groundwater flow are considered to be very localised and confined to the shallow subsoil and therefore will not have any significant impact on the groundwater-surface water interactions between the underlying bedrock aquifer and the Owenboy River.

Table 7-11: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part 8 Planning	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	<p>The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence.</p> <p>The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians, cyclists and vehicular traffic).</p>

<p>217464</p>	<p>Aldi Stores (Ireland) Ltd</p>	<p>On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.</p>	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>
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<p>214818</p>	<p>Ruden Homes Ltd</p>	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
<p>205230</p>	<p>Barry Collins (Supermarket) Ltd</p>	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

<p>196065</p>	<p>Athena Private Assets Ltd</p>	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
<p>194642</p>	<p>Piton Properties Ltd</p>	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

7.3.5.4.2 The CTPRP

Another major development proposal is the Carrigaline Transportation and Public Realm Enhancement Plan (CTPRP). The development involves the redevelopment of the current road, pedestrian, and public realm infrastructure on Cork Road, Church Hill, Church Road, Crosshaven Road, Ballea Rd, Kilmoney Road. The Proposed Development is in keeping with

the existing road profile and does not include any significant interaction with the underlying aquifers or the water-table. Therefore they are expected to be no discernible cumulative impacts on the hydrogeological environment.

7.3.5.5 “Do Nothing” Impact

The “Do Nothing” impact is that the site remains undeveloped in which case there will be no impact on the underlying groundwater levels, flow regime or groundwater quality.

7.3.6 Avoidance, Remedial & Mitigation Measures

This section describes the mitigation measures to reduce or avoid potential impacts where possible, for both the construction and operational phases of the proposed project.

The mitigation strategy outlined in this section will be incorporated by the appointed contractor into future design proposals for the proposed project.

7.3.6.1 Construction Phase

7.3.6.1.1 General

As outlined in the Construction Environmental Management Plan (CEMP), prepared by Enviroguide Consulting, the adopted construction techniques will comply with the requirements of statutory bodies (e.g. Building Control Amendment Regulations, Health Service Executive inspections).

Precautionary measures will be taken to contain any areas within the planning boundary at risk of contaminated run-off including the following:

- Potential pollutants will be adequately secured against vandalism and will be provided with proper containment according to the relevant codes of practice. Any spillages will be immediately contained, and contaminated soil will be removed from the Proposed Development and properly disposed of in an appropriately licensed facility.
- Silt traps will be placed in gullies to capture any excess silt in the run-off from working areas.
- Soil and water pollution will be minimised by the implementation of good housekeeping (daily site clean-ups, use of disposal bins, etc.) and the proper use, storage and disposal of these substances and their containers as well as good construction practices.
- A contingency plan for pollution emergencies will also be developed by the contractor prior to the commencement of the works and regularly updated during construction. This contingency plan will identify the actions to be taken in the event of a pollution incident in accordance with the CIRIA Guidance 37 which requires the following to be addressed:
 - Containment measures;
 - Emergency discharge routes;
 - List of appropriate equipment and clean-up materials;

- Maintenance schedule for equipment;
- Details of trained staff, location and provision for 24-hour cover;
- Details of staff responsibilities;
- Notification procedures to inform the EPA or Environmental Department of Cork County Council;
- Audit and review schedule;
- Telephone numbers of statutory water consultees; and
- List of specialist pollution clean-up companies and their telephone numbers.

7.3.6.1.2 Existing Waterbodies

The CEMP to be prepared by the Contractor prior to construction commencing will outline a list of good construction management practices that will be employed to minimise the risk of pollution of existing water courses and water bodies due to the storage and transport of the excavated materials.

Examples of measures to be implemented include:

- Where feasible all excavated spoil will be treated to remove excess fluid prior to stockpiling and transportation;
- Where feasible transfer of excess soil materials from stockpile areas off-site will be undertaken during dry periods;
- Stockpile and transfer of excess soil material will be restricted to specified and impermeable areas that are isolated from the surrounding environment;
- Wheel washes will be provided at site entrances to clean vehicles prior to exiting the work site; and
- All staff will be trained and follow vehicle cleaning procedures. Details of these procedures will be posted in all work sites for easy reference.
- The implementation of the above measures will ensure that the risk of pollution of groundwater and nearby water bodies resulting from the construction activities will be minimised.
- Further details on specific construction mitigation measures for hydrogeology will be included in the CEMP that will be prepared by the Contractor prior to construction commencing.

7.3.6.1.3 Pollution from Construction Activities

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, adjacent watercourses and groundwater. The construction management of the site will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors

(Masters-Williams et al., 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Measures, as recommended in the guidance above, that will be implemented to minimise the risk of spills and contamination of soils and waters, include:

- Training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;
- Careful consideration will be given to the location of any fuel storage facilities. These will be designed in accordance with guidelines produced by CIRIA, and will be fully bunded;
- 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;
- Ensure that all areas where liquids are stored or where vehicle cleaning is carried out are in designated impermeable areas that are isolated from the surrounding area e.g. by a roll-over bund, raised kerb, ramps or stepped access;
- Minimise the use of cleaning chemicals; and
- Use trigger-operated spray guns, with automatic water-supply cut-off.

7.3.6.2 Operational Phase

No mitigation measures are considered necessary for the operational phase of the Proposed Development as no significant adverse effects are predicted.

7.3.6.3 “Worst Case” Scenario

The ‘worst case’ scenario is that the gravel deposit is significantly more permeable and extensive and more significant construction dewatering is required which could result in high dewatering rates and an impact on groundwater levels across a wider area. There are no sensitive groundwater receptors in the immediate vicinity of the site that could be impacted by increased dewatering and therefore even under the worst case scenario these temporary impacts will not result in significant effects on any receptors.

7.3.7 Residual Impacts

Upon application of the mitigation measures outlined in Section 7.2.6 the magnitude of any effects in the construction phase are negligible as detailed in Table 7-12. As a result, the significance of all the effects is imperceptible.

Table 7-12 : Residual impacts and their significance

Feature	Importance		Magnitude of Impact		Significance of Impact	Mitigation Measures	Residual Impact	Residual Significance of Impact
	Ranking	Justification	Ranking	Justification				
Bedrock Aquifer	Medium	Attribute has a medium quality or value on a local scale	Small adverse	Results in minor impact on the integrity of the aquifer during dewatering and potential for localised accidental spillages during construction	Slight	Standard mitigation measure contained within the CEMP and good construction practice will ensure potential impacts are removed or minimised.	Negligible	Imperceptible
Owenboy River (pNHA)	Very High	Attribute has a high quality or value on a regional or national scale	Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Imperceptible	No specific mitigation measures required in relation to hydrogeology.	Negligible	Imperceptible
Cork Harbour	Extremely High	Attribute has a high quality or value on an international scale	Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Imperceptible	No specific mitigation measures required in relation to hydrogeology.	Negligible	Imperceptible

7.3.8 Monitoring

7.3.8.1 Construction Phase

The works will be monitored by a Resident Engineer.

Visual monitoring will be undertaken as part of the regular site audits during the construction of the Proposed Development to ensure the groundwater resource is not impacted by the Proposed Development.

7.3.8.2 Operational Phase

No monitoring is proposed during operation of the Proposed Development.

7.3.9 Interactions

There is potential for the contamination of surface waters and groundwater as a result of certain activities during the construction phase. There are numerous substances likely to be used during the construction phase that have the potential to contaminate surface waters and groundwater including fuel and hydrocarbons, lubricants and cement. The washing of construction vehicles also poses a risk due to the potential release of contaminated runoff.

The design of the flood alleviation storage has been refined to take account of the shallow groundwater levels observed in the area. As this interaction between groundwater and surface water has been taken into account in the design there are no residual impacts as a result.

7.3.9.1 Population and Human Health

No public health issues associated with the water (hydrology and hydrogeology) conditions at the Proposed Development Site have been identified for the Construction Phase or Operational Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

It is noted that specific issues relating to Public Health associated with the Proposed Development are set out in Chapter 4 of this EIAR.

7.3.9.2 Land and Soils

An assessment of the potential impact of the Proposed Development on the land and soils is included in Chapter 6 of this EIAR. Procedures for protection of receiving water environment are set out in Chapter 7 of this EIAR.

7.3.9.3 Biodiversity

Removal of soil/subsoils can increase sediment discharge to the Owenboy River and groundwater vulnerability. A number of mitigation measures have been detailed in the CEMP and NIS (Enviroguide Consulting, 2022) and Chapter 5 Biodiversity of this EIAR to ensure there will be no significant impacts in relation to Hydrology and Biodiversity.

7.3.10 Difficulties Encountered

No difficulties were encountered during the preparation of this EIAR Chapter that limited the extent of the investigation or impacted significantly on the results of the assessment.

7.3.11 References

Environmental Protection Agency, May 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022);

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8 AIR QUALITY AND CLIMATE AND MICROCLIMATE

8.1 Air Quality and Climate

8.1.1 Introduction

This Chapter describes and assesses the potential impacts on air quality and climate associated with the Proposed Development at Kilmoney, Carrigaline, Co. Cork.

Taking into account Ambient Air Quality Standards, the baseline air quality is examined along with the potential for release of emissions to the atmosphere and associated effects prior to and following mitigation measures. This Chapter also describes and assesses the potential impacts on micro and macro-climate as a result of the Proposed Development. Attention will be focused on Ireland's obligations under the Kyoto Protocol and the Paris Agreement in the context of the overall climatic impact of the presence and absence of the Proposed Development.

The Chapter was prepared by Laura Griffin (BA Hons, MSc), Environmental Consultant, Enviroguide Consulting. Laura has experience working on a number of EIARs and EIA Screening Reports for SHD projects of a similar scale to the Proposed Development.

8.1.1.1 Ambient Air Quality Standards

For the protection of health and ecosystems, EU directives apply air quality standards in Ireland and other EU member states for a range of pollutants. These rules include requirements for monitoring, assessment and management of ambient air quality. The first major instrument in tackling air pollution was the Air Quality Framework Directive 96/62/EC and its four daughter Directives. Each of these instruments was repealed with the introduction of Directive 2008/50/EC on ambient air quality and cleaner air for Europe in 2008 (as amended by Decision 2011/850/EU and Directive 2015/1480/EC) (the CAFE Directive), save for the "Fourth Daughter Directive" (Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air).

The CAFE Directive lays down measures aimed at:

- 1) Defining and establishing objectives for ambient air quality designed to avoid, prevent or reduce harmful effects on human health and the environment as a whole;
- 2) Assessing the ambient air quality in Member States on the basis of common methods and criteria and, in particular, assessing concentrations in ambient air of certain pollutants;
- 3) Providing information on ambient air quality in order to help combat pollution and nuisance and to monitor long-term trends and improvements resulting from national and Community measures;
- 4) Ensuring that such information on ambient air quality is made available to the public;
- 5) Maintaining air quality where it is good and improve it in other cases;
- 6) Promoting increased cooperation between the Member States in reducing air pollution.

Ambient air quality monitoring and assessment in Ireland is carried out in accordance with the requirements of the CAFE Directive. The CAFE Directive has been transposed into Irish legislation by the Air Quality Standards Regulations (S.I. No. 180 of 2011). The CAFE Directive requires EU member states to designate 'Zones' reflective of population density for the purpose of managing air quality. Four zones were defined in the Air Quality Standards Regulations (2011) and subsequently amended in 2013 to account for 2011 census population counts and to align with coal restricted areas in the Air Pollution Act (Marketing, Sale, Distribution and Burning of Specified Fuels) Regulations 2012. (S.I. No. 326 of 2012) (the 2012 Regulations).

The main areas defined in each zone are:

- ❖ **Zone A:** Dublin Conurbation
- ❖ **Zone B:** Cork Conurbation
- ❖ **Zone C:** Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- ❖ **Zone D:** Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

The Site of the Proposed Development is located in Kilmoney, Carrigaline, Co. Cork and falls under the 'Zone B' category based on the EPA CAFE Directive.

The CAFE Directive outlines certain limit or target values specified by the five published directives that apply limits to specific air pollutants. These limits, outlined in Table 8-1, will be referred to as part of the Proposed Development assessment with respect to air quality.

Table 8-1: Limit Values of Cleaner Air for Europe (CAFE) Directive 2008/50/EC (Source: EPA, 2020)

Pollutant	Limit Value Objective	Averaging Period	Limit Value $\mu\text{g}/\text{m}^3$	Limit Value ppb	Basis of Application of the Limit Value	Limit Value Attainment Date
SO ₂	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a	1 Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value $\mu\text{g}/\text{m}^3$	Limit Value ppb	Basis of Application of the Limit Value	Limit Value Attainment Date
					calendar year	
SO ₂		24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1 Jan 2005
SO ₂	Protection of vegetation	Calendar year	20	7.5	Annual mean	19 July 2001
SO ₂		1 Oct to 31 Mar	20	7.5	Winter mean	19 July 2001
NO ₂	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1 Jan 2010
NO ₂		Calendar year	40	21	Annual mean	1 Jan 2010
NO + NO ₂	Protection of ecosystems	Calendar year	30	16	Annual mean	19 July 2001
PM10	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a	1 Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value $\mu\text{g}/\text{m}^3$	Limit Value ppb	Basis of Application of the Limit Value	Limit Value Attainment Date
					calendar year	
PM10		Calendar year	40	-	Annual mean	1 Jan 2005
PM2.5 - Stage 1		Calendar year	25	-	Annual mean	1 Jan 2015
PM2.5 - Stage 2		Calendar year	20	-	Annual mean	1 Jan 2020
Lead		Calendar year	0.5	-	Annual mean	1 Jan 2005
Carbon Monoxide		8 hours	10,000	8,620	Not to be exceeded	1 Jan 2005
Benzene		Calendar year	5	1.5	Annual mean	1 Jan 2010

The EPA is the competent authority for the purpose of the CAFE Directive and is required to send an annual report to the Minister for Environment and the European Commission. The regulations further provide for the distribution of public information. This includes information on any exceedances of target values, the reasons for exceedances, the area(s) in which they occurred, and the relevant information regarding effects on human health and environmental impacts.

8.1.1.2 Climate Agreements

Climate change is recognised as one of the most serious global environmental problems and arguably the greatest challenge facing humanity today. While natural variations in climate over time are normal, anthropogenic activities have interfered greatly with the global atmospheric system by emitting substantial amounts of greenhouse gases (GHGs). This has caused a discernible effect on our global climate system, with continued change expected due to current and predicted trends of GHG emissions. In Ireland this is demonstrated by rising sea levels, changes in the ecosystem, and extreme weather events.

In March 1994, the United Nations Framework Convention on Climate Change (UNFCCC) was established as an intergovernmental effort to tackle the challenges posed by climate change. The Convention membership is almost universal, with 197 countries having ratified. Under the Convention, governments gather and share information on GHG emissions,

national policies, and best practices. This information is then utilised to launch national strategies and international agreements to address GHG emissions. Following the formation of the UNFCCC, two major international climate change agreements were adopted: The Kyoto Protocol, and the Paris Agreement.

In April 1994, Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) and subsequently signed the Kyoto Protocol in 1997. The Kyoto Protocol is an international agreement linked to the UNFCCC which commits its parties to legally binding emission reduction targets. In order to ensure compliance with the protocol, the Intergovernmental Panel on Climate Change (IPCC) has outlined detailed guidelines on compiling National Greenhouse Gas Inventories. These are designed to estimate and report on national inventories of anthropogenic GHG emissions and removals. Under Article 4 of the Kyoto Protocol, Ireland agreed to limit the net anthropogenic growth of the six named GHGs to 13% above the 1990 level, spanning the period 2008 to 2012.

The second commitment period of the Kyoto Protocol was established by the Doha amendment which was adopted *in extremis* on the 8th of December 2012, to impose quantified emission limitation and reduction commitments (QELRCs) to Annex I (developed country) Parties during a commitment period from 2013 to 2020. 38 developed countries, inclusive of the EU and its 28 member states, are participating. Under the Doha amendment, participating countries have committed to an 18% reduction in emissions from 1990 levels. The EU has committed to reducing emissions in this period to 20% below 1990 levels. Ireland's QELRCs for the period 2013 to 2020 is 80% of its base year emissions. Ireland's compliance with the Doha amendment will be assessed based on the GHG inventory submission in 2022 for 1990-2020 data. As of October 2020, the Doha Amendment has received the required number of ratifications to enter into force. Once in force, the emission reduction commitments of participating developed countries and economies in transition (EITs) become legally binding.

In December 2015, the Paris Climate Change Conference (COP21) took place and was an important milestone in terms of international climate change agreements. The Paris Agreement sets out a global action plan to put the world on track to mitigate dangerous climate change by setting a global warming limit not to exceed 2°C above pre-industrial levels, with efforts to limit this to 1.5°C. As a contribution to the objectives of the agreement, countries have submitted comprehensive national climate action plans (nationally determined contributions, NDCs). Under this agreement, governments agreed to come together every 5 years to assess the collective progress towards the long-term goals and inform Parties in updating and enhancing their nationally determined contributions. Ireland will contribute to the Agreement through the NDC tabled by the EU on behalf of Member States in 2020, which commits to a 55% reduction in EU-wide emissions by 2030 compared to 1990. This is considered to be the current NDC maintained by the EU and its Member States under Article 4 of the Paris Agreement.

The EU has set itself targets for reducing its GHG emissions progressively up to 2050, these are outlined in the 2020 climate and energy package and the 2030 climate and energy policy framework. These targets are defined to assist the EU in transitioning to a low-carbon economy, as detailed in the 2050 low carbon roadmap. The 2020 package is a set of binding legislation to ensure that the EU meets its climate and energy targets for the year 2020. There

are three key targets outlined in the package which were set by the EU in 2007 and enacted in legislation in 2009:

- 20% reduction in GHG emissions from 1990 levels;
- 20% of EU energy to be from renewable sources;
- 20% improvement in energy efficiency.

The 2030 climate and energy framework builds on the 2020 climate energy package and was adopted by EU leaders in October 2014. The framework sets three key targets for the year 2030:

- At least 40% cuts in GHG emissions from 1990 levels;
- At least 32% share for renewable energy;
- At least 32.5% improvement in energy efficiency.

The EU has acted in several areas in order to meet these targets, including the introduction of the Emissions Trading System (ETS). The ETS is the key tool used by the EU in cutting GHG emissions from large-scale facilities in the power, industrial, and aviation sectors. Around 45% of the EU's GHG emissions are covered by the ETS.

As part of the European Green Deal, the Commission proposed in September 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990. The European Climate Law came into force in July 2021 and writes into law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

8.1.1.2.1 National Policy Position and Greenhouse Gas Emissions in Ireland

National climate policy in Ireland recognises the threat of climate change to humanity and supports mobilisation of a comprehensive international response to climate change, and global transition to a low-carbon future. A fundamental national objective aims to achieve transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050.

The Climate Action and Low Carbon Development (Amendment) Act 2021 was adopted in 2021 and sets Ireland on a legally binding path to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade. The Act provides the framework for Ireland to meet its international and EU climate commitments and to become a leader in addressing climate change.

The Irish Government published its Climate Action Plan (2021) which provides a detailed framework for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting Ireland on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021. The Plan lists the actions needed to deliver on national climate targets and sets indicative ranges of emissions reductions for each sector of the economy. It will be updated annually, to ensure alignment with Ireland's legally binding economy-wide carbon budgets and sectoral ceilings.

Ireland's latest greenhouse gas (GHG) emissions 1990-2020 are provisional figures based on the SEAI's final energy balance released in September 2021 (EPA, 2021). In 2020, Ireland's GHG emissions are estimated to be 57.70 million tonnes carbon dioxide equivalent (Mt CO₂eq), which is 3.6% lower (or 2.14 Mt CO₂ eq) than emissions in 2019 (59.84 Mt CO₂ eq). There was a decrease of 4.0% in emissions reported for 2019 compared to 2018. Emissions reductions have been recorded in six of the last ten years of inventory data (2010-2020). In 2020, national total emissions decreased by 3.6%, emissions in the stationary ETS sector decreased by 6.4% and emissions under the ESD (Effort Sharing Decision) decreased by 2.7%. In 2020, the energy industries, transport and agriculture sectors accounted for 70.1% of total GHG emissions. Agriculture is the single largest contributor to the overall emissions, at 37.1%. Transport, energy industries and the residential sector are the next largest contributors, at 17.9%, 15.0% and 12.3%, respectively (EPA, 2021).

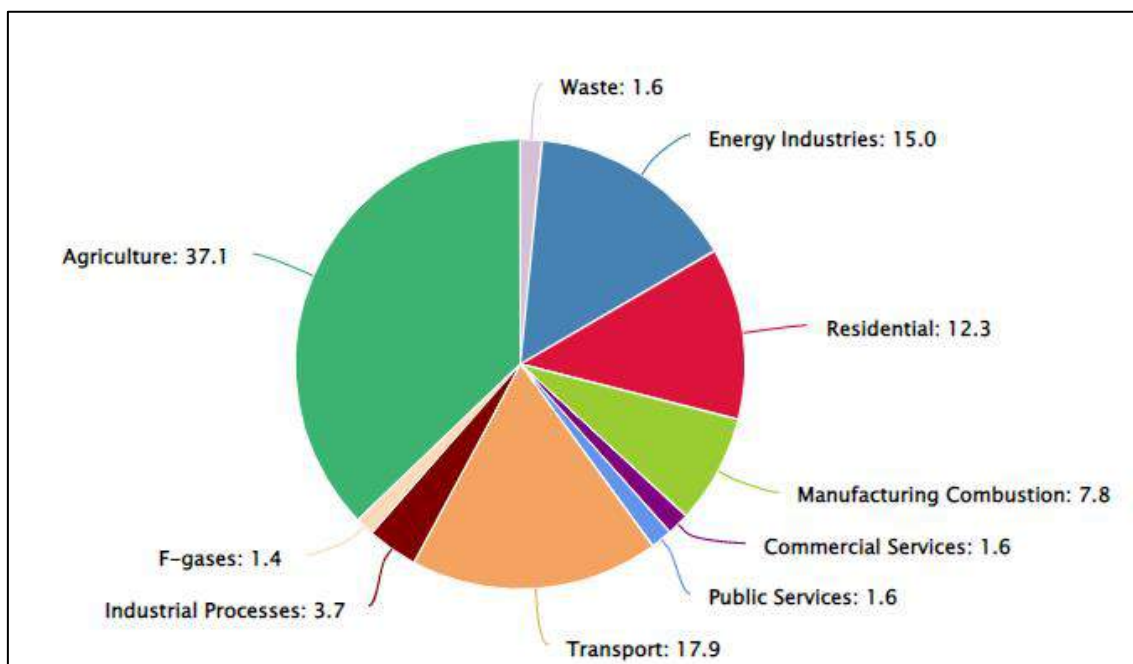


Figure 8-1: Ireland's Greenhouse Gas Emissions by Sector for 2020 (Source: EPA, 2021)

8.1.2 Study Methodology

Taking into account Ambient Air Quality Standards, the baseline air quality of the Site will be examined using EPA monitoring data. Air quality impacts from the Proposed Development will then be determined by a qualitative assessment of the nature and scale of dust generating activities associated with the construction phase of the project in accordance with relevant guidance (Transport Infrastructure Ireland (TII) 2011 Appendix 8; Institute of Air Quality Management (IAQM) 2014).

Operational Phase traffic impact assessment will involve air dispersion modelling using the UK Design Manual for Roads and Bridges Screening Model (DMRB, UK Highways Agency 2007) (Version 1.03c), the NO_x to NO₂ Conversion Spreadsheet (UK Department for Environment, Food and Rural Affairs, 2017), and following all relevant guidance (TII, 2011; HA, 2007; EPA; UK DEFRA; IAQM).

A desktop study involving various national and international documents on climate change and analysis of synoptic meteorological data from the nearest Met Eireann station was also carried out in order to compile this Chapter. Attention will be focused on Ireland's obligations under the Kyoto Protocol (including the Doha Amendment) and the Paris Agreement in the context of the overall climatic impact of the presence and absence of the Proposed Development.

8.1.3 The Existing and Receiving Environment (Baseline Situation)

The site of the Proposed Development has a sloped topography and comprises of a total site area of 3.7 hectares (ha) in the townland of Kilmoney within the town of Carrigaline in Co. Cork. The net developable area of the Site is 1.9 ha.

The Proposed Development Site is situated to the west of Carrigaline town centre and approximately 10km southeast of Cork City Centre. The site lies to the south of the N28 Cork to Ringaskiddy route. The site is bounded on the west by agricultural lands, to the north by Owenabue river and mature trees and hedgerows, to the east by the Dairygold Co-op Superstore and associated car park and to the south by a number of detached bungalows with the Kilmoney Road beyond. The site is within easy walking distance of a number of commercial and community facilities including local shops, churches and schools. Access to the site is via the inner relief road (currently under construction) and the Kilmoney Road which runs to the south of the site.

8.1.3.1 Air Quality

According to the 2012 Regulations (S.I. No. 326 of 2012) the proposed Site falls into 'Zone B' of Ireland which is described by the EPA as 'Cork Conurbation'. It is expected that existing ambient air quality in the vicinity of the Site is characteristic of a suburban location with the primary source of air emissions such as particulate matter, NO₂, and hydrocarbons likely to be of traffic and domestic fuel burning.

In conjunction with individual local authorities, the EPA undertakes ambient air quality monitoring at specific locations throughout the country in the urban and rural environment; an Air Quality Report based on data from 30 monitoring stations and a number of mobile air quality units is developed on an annual basis. The EPA's most recent publication 'Air Quality in Ireland, 2020' reports the quality of the air in Ireland based on the data from the National Ambient Air Quality Monitoring Network throughout the year 2020.

When assessing air quality, the EPA focuses on two main pollutants: particulate matter and nitrogen oxides. Measured concentrations of NO₂ for the years 2019 and 2020 are presented in Table 8-2 for Zone B monitoring stations. These results show that current levels of NO₂ are well below the annual mean and 1-hour maximum limit values. In the year 2019, annual mean concentrations of NO₂ ranged from 10 - 21 ug/m³ across all Zone B stations, with no exceedance of the maximum hourly limit (EPA, 2020). In the year 2020, annual mean concentrations of NO₂ ranged from 8 - 14 ug/m³ across all Zone B stations, with no exceedance of the maximum hourly limit (EPA, 2021).

The closest representative background monitoring station to the Site which continuously monitors for concentrations of nitrogen oxides (NO₂) is located in Cork South Link Road (ca. 8.6km to the northwest). Air quality monitoring carried out at this location is likely to be broadly

representative of conditions experienced at the Site. Concentrations of NO₂ are also well below the threshold limits contained within the regulations at Cork South Link Road monitoring station, with an annual mean of 21 ug/m³ and 14 ug/m³ measured in 2019 and 2020, respectively (EPA, 2020; EPA, 2021).

During 2020, the restriction of movement in Ireland due to the COVID-19 Pandemic had an impact on air quality nationally with a large-scale reduction in vehicular traffic. It is noted that the decrease in NO₂ levels during that year is a direct result of the restrictions placed on movements and construction due to COVID-19.

Based on the EPA monitoring data and taking account of the Site’s environs and surrounding land-use, along with changes in vehicular and construction activity, a conservative estimate of current background NO₂ concentrations in the vicinity of the Site is 18ug/m³.

Table 8-2: Concentrations of NO₂ at Zone B Monitoring Stations

Station	Objective	Concentration (µg/m ³)		Limit or Threshold Value (ug/m ³)	Number of values >200µg/m ³
		2019	2020		
South Link Road	Annual Mean NO ₂	21	14	40	N/A
	Hourly Max NO ₂	142	40.7	200	0
UCC Distillery Fields	Annual Mean NO ₂	10	8	40	N/A
	Hourly Max NO ₂	79	72.6	200	0

Measured concentrations of PM₁₀ for the years 2019 and 2020 are presented in Table 8-3 for Zone B monitoring stations. As is evident from these results, current levels of PM₁₀ are well below the annual mean limit value. In the year 2019, annual mean concentrations of PM₁₀ ranged from 12 – 18 ug/m³ across all Zone B stations, with no exceedance of short-term limit values (EPA, 2021). In the year 2020, annual mean concentrations of PM₁₀ ranged from 11 – 15 ug/m³ across all Zone B stations, with no exceedance of short-term limit values (EPA, 2021).

The suburban background monitoring site of Cork South Link Road is located ca. 8.6km from the Site of the Proposed Development and therefore is broadly representative of background concentrations in the vicinity of the Proposed Development. This station continuously monitors for concentrations of PM₁₀. Concentrations of PM₁₀ at South Link Road monitoring station are well below their respective limit values in 2019 and 2020, with an annual mean of 18 ug/m³ and 15 ug/m³, respectively, and with no exceedances of the PM₁₀ daily limit for the protection of human health (EPA, 2020; EPA, 2021).

Based on the EPA data, a conservative estimate of the current background PM₁₀ concentration in the region of the Proposed Development is 17 µg/m³.

Table 8-3: Concentrations of PM₁₀ at Zone B Monitoring Stations

Station	Objective	Concentration (µg/m ³)		Limit or Threshold Value
		2019	2020	
South Link Road	Annual Mean PM ₁₀	18	15	40 µg/m ³
	Days >50µg/m ³	6	2	35 days
Heatheron Park	Annual Mean PM ₁₀	12	11	40 µg/m ³
	Days >50µg/m ³	1	2	35 days
Bishopstown MTU	Annual Mean PM ₁₀	15	14	40 µg/m ³
	Days >50µg/m ³	1	0	35 days

8.1.3.2 Macroclimate

Ireland has a typical maritime climate, largely due to its proximity to the Atlantic Ocean and the presence of the Gulf Stream. Due to the moderating effects of the Gulf Stream, Ireland does not suffer the temperature extremes that are experienced by many other countries at a similar latitude. Mean annual temperatures generally range between 9°C and 10°C. Winters tend to be cool and windy while summers are mostly mild and less windy. The prevailing wind direction is between the south and west with average annual wind speeds ranging between 6 knots in parts of south Leinster to over 15 knots in the extreme north. Rainfall in Ireland occurs throughout the year with reasonable frequency. The highest rainfall occurs in the western half of the country and on high ground, and generally decreases towards the northeast. As the prevailing winds are from the west-southwest, the west of Ireland experiences the largest number of wet days. The area of least precipitation is along the eastern seaboard of the country.

8.1.3.3 Microclimate

The synoptic meteorological station at Cork Airport is located approximately 6.45km northwest of the Proposed Development; and for the purposes of this Chapter, weather data collected here may be considered similar to that which is experienced in the area of the Proposed Development Site.

The weather in the area of the Proposed Development Site is generally dominated by cool oceanic air masses, with cool winters, mild humid summers, and a lack of temperature extremes. Based on meteorological data at Cork Airport over the last 3 years, the mean January temperature is 5.8°C, while the mean July temperature is 15.8°C. The prevailing wind direction is from a quadrant centred on the southwest. These are moderately warm winds from the Atlantic and they habitually bring rain. The average annual rainfall in Cork is 1230mm.

Easterly winds are less frequent, weaker, and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

8.1.3.3.1 Rainfall

Rainfall is a key indicator of changes in climate, as measurements of rainfall are fundamental to assessing the effects of climate change on the water cycle and water balance. Table 8-4 illustrates the monthly and annual rainfall data collected over a 3-year period (2019-2021) at Cork Airport Weather Station. The annual rates of precipitation ranged from 1244.4mm in 2021 to 1407.0mm in 2020 with distribution of the highest monthly rainfall values falling mainly in the autumn and winter months. This is broadly within the expected range of the southern half of the country.

Table 8-4: Monthly Rainfall Values (mm) for Cork Airport Weather Station from January 2019 to December 2021 (Source: Met Eireann)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2021	121.8	235.9	67.5	18.2	172.7	37.4	60.7	65.0	85.4	197.6	34.2	148.0	1244.4
2020	112.2	199.3	64.7	72.3	68.8	94.1	97.6	175.0	58.2	118.6	160.8	185.4	1407.0
2019	74.3	81.5	128.6	135.8	41.0	110.5	43.9	107.6	91.1	179.2	145.0	125.6	1264.1
LTA⁷	131.4	97.8	97.6	76.5	82.3	80.9	78.8	96.8	94.6	138.2	120.0	133.1	1228.0

8.1.3.3.2 Wind

Wind at a particular location can be influenced by a number of factors, such as obstructions by trees or buildings, the nature of the terrain, and deflection by nearby mountains or hills. Wind blows most frequently from the south and west for open sites while winds from the northeast and north occur less often. The analysis of hourly weather data from Cork Airport synoptic weather station over a period of 30 years suggests that the predominant wind direction blows from the southwest, with windspeeds of between 7 and 10 knots occurring most frequently.

Figure 8-2 provides a wind speed frequency distribution which represents wind speed classes and the frequency at which they occur (% of time) at Cork Airport weather station over a period of 5 years. Wind speeds of 7 knots have the highest frequency, occurring approximately 8.5% of the time.

⁷ The 'LTA' is average for the climatological long-term-average (LTA) reference period 1981-2010

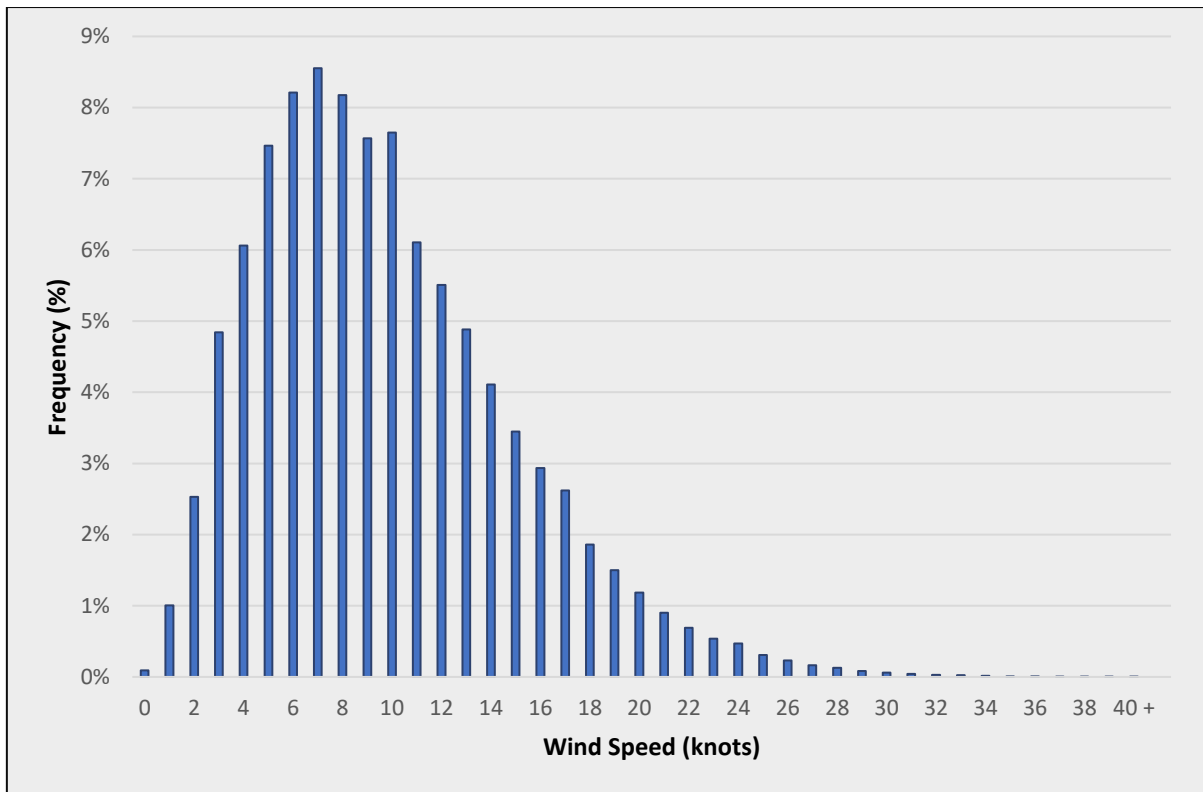


Figure 8-2: Wind Speed Frequency Distribution at Cork Airport Synoptic Weather Station over 30 years (1992-2021)

Figure 8-3 provides a wind rose of the predominant wind directions and associated wind speeds at Cork Airport. As is visible from Figure 8-3, the prevailing wind is from a south-westerly direction with an annual incidence of 29.40% for winds between 200 and 250 degrees. The most frequent wind speed associated with this wind direction is between 7 and 10 knots which is considered a ‘gentle breeze’ in terms of the Beaufort scale, this wind direction and wind speed occurs in combination approximately 9.76% of the time. The overall most common windspeed is also between 7 and 10 knots, occurring in 31.95% of incidences, and wind speeds of between 11 and 16 knots occurring in 26.99% of incidences.

The lowest frequency is for winds blowing from the northern quadrant at approximately 4.58% of the time. The incidence of wind between 1 and 6 knots is about 30.11% of the year with wind speeds of above 17 knots (8.7 m/s) occurring in just 10.86% of incidences. This windrose is broadly representative of the prevailing conditions experienced at the Proposed Development Site.

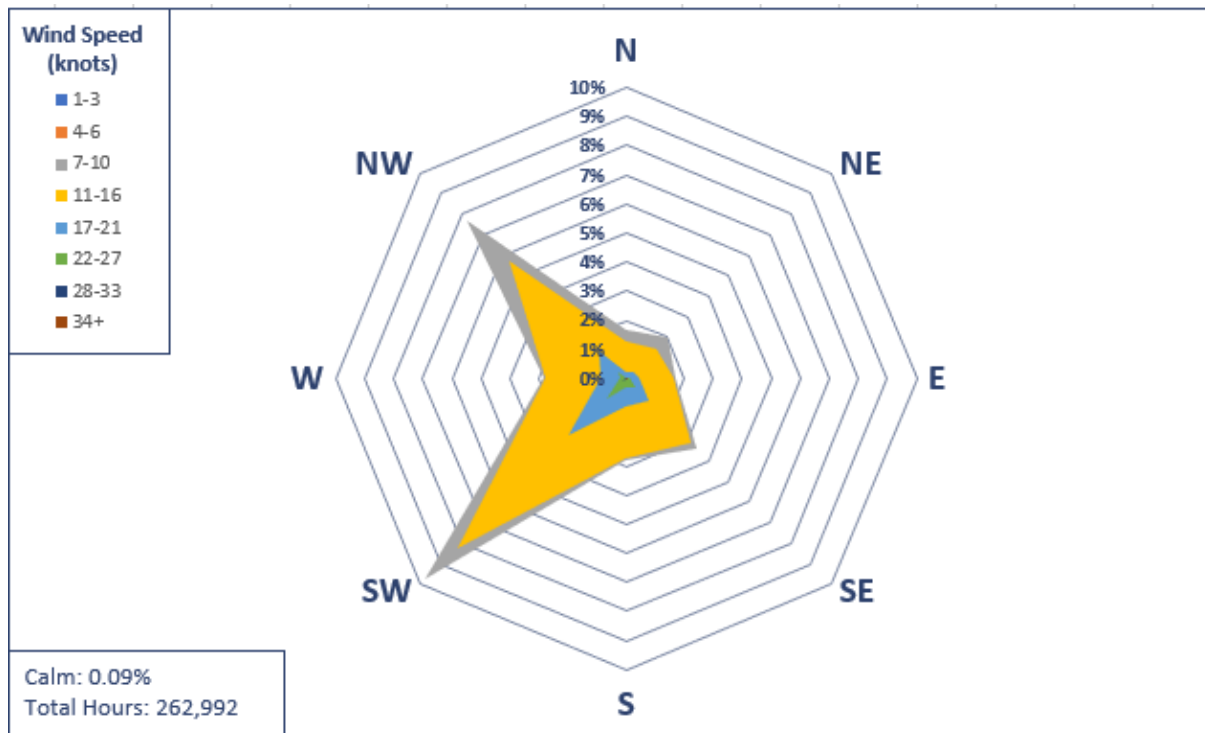


Figure 8-3: 30-year Windrose at Cork Airport Synoptic Weather Station 1992-2021
(Developed using Met Eireann Hourly Data)

8.1.4 Characteristics of the Proposed Development

The Proposed Development will consist of following:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units
- A 184 m² creche/childcare facility
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level, and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

8.1.5 Potential Impact of the Proposed Development

8.1.5.1 Potential Impacts on Air Quality

8.1.5.1.1 Construction Phase

All construction works will occur in a single phase which is estimated to last 18 months. During the general excavation of the foundations there will be additional (heavy goods vehicle (HGV)

movements to and from the Site. All suitable material will be used for construction and fill activities where possible and appropriate. It is envisaged that tower cranes will be erected to hoist materials on Site in the construction of apartments.

For the duration of the proposed infrastructure works it is envisaged that the maximum working hours will be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 13:00 Saturdays, subject to the restrictions imposed by the local authorities. No working will be allowed on Sundays and Public Holidays unless express permission is obtained from the Local Authority. There is potential for construction related air emissions to impact on local air quality as a result of the Proposed Development. Potential impacts are expected to be short-term and of a temporary nature. The main air quality impacts that may arise during construction activities are:

- Dust deposition;
- Elevated particulate matter concentrations (PM_{10} and $PM_{2.5}$) as a result of dust generating activities on Site; and
- An increase in concentrations of airborne particles, volatile organic compounds, nitrogen oxides, and sulphur oxides due to exhaust emissions from diesel powered vehicles and equipment on Site (non-road mobile machinery) and vehicles accessing the Site.

The greatest potential impact on air quality during this phase is from construction dust emissions and the potential for nuisance dust. The dust emissions from a construction site that may result in air quality impacts generally depend on:

- Site activities and duration;
- The size of the site;
- The meteorological conditions;
- The proximity of receptors to the activities;
- The adequacy of applied mitigation measures; and
- The sensitivity of receptors to dust.

The primary sources of dust identified include soil excavation works, demolition, bulk material transportation, loading and unloading, stockpiling materials, cutting and filling, and vehicular movements (HGVs and on-site machinery).

According to Transport Infrastructure Ireland guidelines (TII, 2011), it is difficult to accurately quantify dust emissions arising from construction activities. Therefore, it is not possible to easily predict changes to dust soiling rates or PM_{10} concentrations. TII recommend a semi-quantitative approach to determine the likelihood of significant impact in this instance. This should also be combined with an assessment of the proposed mitigation measures. Table 8-

5 outlines the distance criteria which is recommended for use in assisting a semi-quantitative assessment:

Table 8-5: Assessment Criteria for the Impact of Dust Emissions from Construction Activities, with Standard Mitigation in Place

Source		Potential Distance for Significant Effects (Distance from source)		
Scale	Description	Soiling	PM10	Vegetation effects
Major	Large construction sites, with high use of haul routes	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50m	15m	15m
Minor	Minor construction sites, with limited use of haul routes	25m	10m	10m

In order to account for a worst-case scenario, the Proposed Development can be considered moderate in scale due to the size of the Site and the duration of construction activities. Therefore, it can be assumed that there is potential for significant dust soiling 50m from the Site.

There are a number of high-sensitivity receptors (residential dwellings) located within 50m of the Site boundary; these are situated to the south of the Proposed Development Site. Therefore, in the absence of mitigation, it is considered that there is potential for dust impacts to occur at these locations. Sensitive receptors within 100m of the Proposed Development are identified in Table 8-6:

Table 8-6: Sensitive Receptors

Name	Type	Coordinates		Orientation Relative to Site Boundary
		X	Y	
Kilmoney Rd Lower	Residential	51.81206	-8.39564	South
Kilmoney Rd Lower	Residential	51.81206	-8.39686	South
Kilmoney Rd Lower	Residential	51.81171	-8.39629	South

According to IAQM Guidance (2016), the primary factor influencing the Pathway is the distance between the sensitive receptor and the dust sources. However, other factors can

cause a higher or a lower category to be assigned then would be the case based on distance alone. These factors include:

- Orientation of receptors relative to the prevailing wind direction; and
- Topography, terrain and physical features.

Meteorological conditions greatly affect the level of dust emissions and subsequent deposition downwind of the source; the most predominant being rainfall and wind speed. Adverse impacts can occur in any direction from a site; however, they are more likely to occur downwind of the prevailing wind direction and/or close to the site. Relatively high levels of moisture in the surrounding air, soils, and precipitation helps to suppress dust due to the cohesive properties of water between dust particles. The least favourable meteorological conditions for dust generation would typically be warm days with strong winds and low precipitation. Due to the variability of weather, it is impossible to predict the conditions that will occur during the Construction Phase of the development. However, wind direction is most likely to prevail from the southwest.

Table 8-7 outlines the hourly percentage distribution of wind speed and direction at Cork Airport synoptic weather station over a 30-year period (1992-2021). This data is consistent with Figure 8-3 of this chapter and shows that the most frequent wind direction prevails from the southwest (29.40% frequency). The corresponding most frequent wind speed is between 7 and 10 knots which is considered a 'gentle breeze' in terms of the Beaufort scale; this wind direction and wind speed occurs in combination approximately 9.76% of the time.

Table 8-7: Percentage Distribution of Wind Speeds and Direction at Cork Airport (1992-2021)

Wind speed (Knots)		<1	1 - 3	4 - 6	7 - 10	11-16	17-21	22-27	28-33	34+	% Dry Days
Wind Direction	Degrees										
North	350 - 10	0.09	0.43	0.91	1.68	1.28	0.24	0.04	0.00	0.00	33.2%
North-east	20 - 70		0.73	1.49	2.03	1.46	0.35	0.03	0.00	0.00	
East	80 - 100		0.56	1.31	1.72	1.63	0.47	1.10	0.01	0.00	
South-east	110 - 150		1.20	2.68	3.44	3.16	1.11	0.41	0.08	0.01	
South	170 - 190		1.11	1.96	2.77	2.74	0.98	0.30	0.04	0.00	
South-west	200 - 250		1.91	5.63	9.76	8.21	2.77	0.95	0.16	0.01	
West	260 - 280		0.90	2.43	2.85	2.80	0.85	0.22	0.03	0.01	
North-west	290 - 340		1.53	5.32	7.70	5.71	1.30	0.35	0.03	0.00	

Dry days with moderate to high windspeeds (above 5m/s (7-10 knots)) are the conditions which are most likely to result in fugitive dust emissions. Sensitive receptors within 50m of the

Proposed Development have been identified a series of residential dwellings which are located to the south of the Site.

Receptors located to the south of the Site would require prevailing winds from the north to be potentially impacted by fugitive dust emissions. At these receptors, the frequency of winds (>5m/s) occurring from the direction of the dust source on dry days is 0.138%. Therefore, appropriate conditions for fugitive dust emissions at these receptors are highly infrequent and it is expected that adequate mitigation measures, as outlined in Section 8.1.6.1, will prevent nuisance dust from resulting in any adverse impacts.

Appropriate mitigation and monitoring measures are recommended and will be implemented at the Site in order to minimise the risk of dust emissions arising during the Construction Phase. These mitigation measures are detailed in 8.6.1 in this Chapter and in the Construction Environmental Management Plan (CEMP) for the Site, and once such measures are implemented, it is not considered that significant air quality impacts will occur.

Construction vehicles and machinery during this phase will temporarily and intermittently generate exhaust fumes and consequently potential emissions of volatile organic compounds, nitrogen oxides, sulphur oxides, and particulate matter (dust). Dust emissions associated with vehicular movements are largely due to the resuspension of particulate materials from ground disturbance. According to the IAQM (2014), experience from the assessment of exhaust emissions from on-site machinery and Site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. Air pollutants may increase marginally due to construction-related traffic and machinery from the Proposed Development. However, any such increase is not considered significant and will be well within relevant ambient air quality standards. According to TII (2011), the significance of impacts due to vehicle emissions during the Construction Phase will be dependent on the number of additional vehicle movements, the proportion of HGVs and the proximity of sensitive receptors to Site access routes. If construction traffic would lead to a significant change (> 10%) in Annual Average Daily Traffic (AADT) flows near to sensitive receptors, then concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} should be predicted in line with the methodology as outlined within TII guidance. The assessment of potential traffic impacts has been completed within Chapter 12, *Traffic*. Construction traffic is expected to exceed 10% of the traffic flow on the adjoining roads; therefore, concentrations of NO₂ and PM₁₀ have been predicted in the Opening Year (2024) in the following section 8.1.5.1.2.

8.1.5.1.2 Operational Phase

The greatest potential effect on air quality during the Operational Phase of the Proposed Development is from traffic-related air emissions.

Operational traffic will use regional and local roads to access the facility with potential increases of traffic flow on some roads and subsequent associated emissions of VOCs, nitrogen oxides, sulphur dioxides and increased particulate matter concentrations.

In terms of associated impacts on air quality, Table 8-8 outlines the criteria that are prerequisite for an air quality assessment. According to IAQM guidance (2017), if none of the criteria are met, then there should be no requirement to carry out an air quality assessment

for the impact of the development on the local area, and the impacts can be considered as having an insignificant effect.

Table 8-8: Indicative Criteria for Requiring an Air Quality Assessment (Source: IAQM, 2017)

Potential Change resulting from Proposed Development	Indicative Criteria to Proceed to an Air Quality Assessment
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors	A change of LDV flows of more than 1000 Annual Average Daily Traffic (AADT)
Cause a significant change in Heavy Duty Vehicle (HGV) flows on local roads with relevant receptors	A change of HGV flows of more than 100 Annual Average Daily Traffic (AADT)
Realign roads, i.e., changing the proximity of receptors to traffic lanes	Where the change is 5m or more
Cause a change in Daily Average Speed (DAS)	Where the DAS will change by 10 km/h or more
Cause a change in peak hour speed	Where the peak hour speed will change by 20km/h or more.

The UK Highways Agency Design Manual for Roads and Bridges (DMRB) air quality guidance (LA 105) provides a framework for assessing, mitigating, and reporting the effects of road schemes on air quality; however, this can be adapted to any development which results in a change in traffic.

The criteria as set out in Table 8-9 have been used to determine the project's risk potential to the receiving environment, and whether a simple or detailed air quality assessment is required:

Table 8-9: Receiving Environment Sensitivity (Source: DMRA LA 105)

Sensitivity	Features of receiving environment
High	<ol style="list-style-type: none"> 1) Large number of receptors (human and / or ecological) within 50m of roads triggering traffic screening criteria; 2) Baseline monitoring data indicates concentrations above the AQS Objective / EU limit value; 3) Monitoring indicates exceedances of short term AQS Objectives / EU limit value; 4) Projecting forward monitored concentrations to the opening year, indicates exceedances of AQS Objectives / EU limit value; 5) AQMA's or reported EU limit value exceedances within project's study area.
Medium	<ol style="list-style-type: none"> 1) Receptors (human or ecological) within 50m of roads triggering traffic change criteria; 2) Baseline monitoring data illustrates annual mean NO₂ concentrations >36µg/m³; 3) Projections indicate annual mean NO₂ concentrations >36µg/m³ in opening year; 4) AQMA's or EU limit value exceedances within project's study area.
Low	<ol style="list-style-type: none"> 1) Few receptors located close to roads triggering traffic change criteria; 2) Baseline monitoring data illustrates concentrations in base year below an annual mean of 36µg/m³; 3) No AQMA's or EU limit value exceedances within project's study area.

As outlined in the following sections, there is a number of high-sensitivity receptors located within 200m of the affected road network. However, baseline pollutant concentrations are well below an annual mean of 36 µg/m³ and there are no exceedances of EU limit values within the study area. Therefore, in accordance with Table 8-9, it is considered that the receiving environment of the Proposed Development is of a 'Low Sensitivity' and the inclusion of the Proposed Development can be considered low risk. Therefore, in line with DMRB LA 105 guidance, it has been determined that simple air quality assessment is required in this case.

8.1.5.1.2.1 UK Design Manual for Roads and Bridges Screening Model (V. 103c 2007)

The impact of the Operational Phase of the Proposed Development has been assessed by use of the UK DMRB screening model (Version 1.03c 2007). The DMRB screening model provides a simple and straightforward means of predicting pollutant concentrations associated with road traffic emissions from the Proposed Development. According to Transport Infrastructure Ireland Guidelines (TII, 2011), this method is a suitable approach in circumstances where the predicted environmental concentrations (i.e., ambient background + predicted concentration) lie sufficiently below the air quality standards (<90% of the standard).

Where predicted concentrations approach or exceed the air quality standards/limit values, a detailed air quality assessment must be carried out.

The DMRB modelling tool requires the following inputs to complete the assessment: road types, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles (%HGV), annual traffic speeds and background pollutant concentrations. This input data is utilised by the model in predicting the Proposed Development's road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptor. The DMRB modelling tool predicts annual mean concentrations of NO_x and PM₁₀. The road NO_x concentration is then converted to NO₂ using the latest-available version of the UK Department for Environment, Food and Rural Affairs (DEFRA) NO_x to NO₂ conversion spreadsheet (version 8.1). Concentrations of carbon monoxide (CO) and benzene (Bz) are consistently and significantly below their air quality limit values, even in urban centres, therefore modelling of these pollutants is no longer necessary (EPA Annual Air Quality Reports).

As the tool does not account for electric or hybrid vehicle use, vehicle emissions applied in this study are likely to overestimate the actual vehicle emissions experienced from the Proposed Development. The worst-case contributions predicted by the tool are added to the existing background concentration to provide a worst-case predicted ambient concentration. The compliance of the Proposed Development with the relevant ambient air quality standards is subsequently assessed by comparison with the worst-case ambient concentrations.

8.1.5.1.2.1.1 Sensitive Receptors

TII (2011) define sensitive receptor locations as: 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. According to the DMRB LA 105 guidance, sensitive receptors will be chosen within 200m of the Affected Road Network (ARN) and include residential properties, schools and hospitals for the assessment of annual mean air quality thresholds. Where there is a risk of the short-term air quality thresholds being exceeded, then sensitive receptor locations including gardens and playing fields will be assessed. In the current assessment, a number of high-sensitivity receptors such as residential properties and schools were identified within 200m of the ARN.

According to the DMRB LA 105 guidance, it is not necessary to model all receptors within 200m or an excessive number of receptors in the same area to determine whether there is likely to be any exceedances in the do nothing or do something scenarios.

For the purpose of determining local air quality impacts, ten (10 No.) receptors were included in this modelling assessment, and these have been identified in Table 8-10. The receptors modelled will represent the worst-case locations in the vicinity the Proposed Development and were chosen based on proximity (within 200m) to the road links affected by the Proposed Development:

Table 8-10: Sensitive Receptors

Name	Type	ITM Coordinates	
		X	Y
R1	Residential	572563	562622
R2	Residential	572846	562802
R3	Residential	572977	562860
R4	Medical Centre	573041	562806
R5	School	573018	562697
R6	Residential	572996	562599
R7	Residential	573033	562390
R8	Residential	572878	562191
R9	Residential	572741	562239
R10	Residential	572554	562195

Designated sites of ecological conservation importance within 200m of the ARN are required to be included in the air quality assessment. This includes Special Protection Areas, Special Areas of Conservation, Natural Heritage Areas, and nature reserves. Only sites that are sensitive to nitrogen deposition should be included in the assessment, it is not necessary to include sites such as those which have been designated as a geological feature or water course. No Sites of ecological conservation importance have been identified within 200m of the ARN; therefore, this analysis has been excluded in the current assessment.

8.1.5.1.2.1.2 Traffic Data

The traffic data used in this assessment has been provided by AECOM and is shown in Table 8-11:

Table 8-11: Traffic Data Applied to the DMRB Model

Link Number	Road Name	Base Year (2018)	Opening Year (2024)		Design Year (2039)		Speed (Km/h)
			Do Nothing	Do Something	Do Nothing	Do Something	
		AADT	AADT	AADT	AADT	AADT	
1	Main Street R611	13210 (19%HGVS)	13606 (5.2%HGVS)	8402 (5.2%HGVS)	15984 (5.2%HGVS)	9780 (5.2%HGVS)	30kph
2	R611 Kilmoney Road	9227 (6.3%HGVS)	9504 (6.3%HGVS)	12463 (6.3%HGVS)	11164 (6.3%HGVS)	14402 (6.3%HGVS)	50kph
3	Western Relief Road	0 (0%HGVS)	0 (0%HGVS)	12841 (5%HGVS)	0 (0%HGVS)	14573 (5%HGVS)	30kph
4	Internal Link Road	0 (0%HGVS)	0 (0%HGVS)	2182 (5%HGVS)	0 (0%HGVS)	2439 (5%HGVS)	30kph
5	R613 Ballea Road	9776 (3%HGVS)	10069 (3%HGVS)	16914 (3%HGVS)	11828 (3%HGVS)	19585 (3%HGVS)	50kph
6	Roundabout Cork Road R611	14652 (3.7%HGVS)	15091 (3.7%HGVS)	15792 (3.7%HGVS)	17728 (3.7%HGVS)	18304 (3.7%HGVS)	50kph
7	Church Road	10172 (3.7%HGVS)	10646 (3.7%HGVS)	8768 (3.7%HGVS)	12308 (3.7%HGVS)	10231 (3.7%HGVS)	50kph
8	R612 Crosshaven Road	17473 (2.3%HGVS)	17997 (2.3%HGVS)	18012 (2.3%HGVS)	21142 (2.3%HGVS)	21024 (2.3%HGVS)	50kph

8.1.5.1.2.1.3 Pollutants and Background Concentrations

The DMRB modelling tool predicts annual mean concentrations of NO_x and PM₁₀. The road NO_x concentration has then been converted to NO₂ using the latest published version of DEFRA's NO_x to NO₂ conversion spreadsheet (version 8.1). Concentrations of carbon monoxide (CO), and benzene (Bz) are consistently and significantly below their air quality limit values, even in urban centres, therefore modelling of these pollutants is no longer necessary (EPA Annual Air Quality Reports). According to the DMRB LA 105 guidance, it is only necessary to model PM₁₀ for the base year to demonstrate that there is no impact on achievements of the PM₁₀ air quality thresholds as a result of the project. Where air quality monitoring indicates exceedances of the PM₁₀ air quality thresholds in the base year, PM₁₀ should then be included in the model for both the 'do nothing' and 'do something' scenarios. As Ireland currently meets its legal requirements for the achievement of the PM_{2.5} air quality thresholds, there is no requirement to model this parameter. Additionally, the modelling of PM₁₀ can be used to demonstrate that the project does not impact on the PM_{2.5} air quality threshold.

Annual mean of NO₂ and PM₁₀ for the years 2019-2020 have been obtained for Zone B stations (see Section 8.1.3.1). For both parameters, annual limits are well below the threshold limits contained within the regulations.

Background concentrations for the Opening Year (2024) and Design Year (2039) have been predicted for the air quality assessment. Baseline year (2018) background concentrations have been used in combination with correction factors to estimate annual average NO₂ concentrations in future years. These factors have been adapted from both TII (2011) and DEFRA roadside NO₂ projection factors.

Adjustments to the verified modelled NO₂ concentrations are required to be made in order to account for future roadside NO₂ concentrations. An additional scenario known as the projected base year is to be included in the air quality modelling to enable a gap analysis to be completed. The gap analysis is the application of adjustment factors which take into consideration the assumed roadside rates of reduction in NO_x and NO₂ by DEFRA's modelling tools compared to observed roadside monitoring trend i.e., the gap between the predicted reductions and those observed (DMRB LA 105 guidance). This methodology has been applied to the current assessment in order to predict future NO₂ concentrations as a result of the Proposed Development and ensure that these concentrations are not under-estimated.

8.1.5.1.2.1.4 Determining the Impact

The TII guidance document 'Guidelines for the Treatment of Air Quality during the Planning and Construction of Road Schemes (2011)' outlines a clear methodology for determining the magnitude and significance of air quality impacts associated with road schemes; however, this remains applicable to any project which results in a change to traffic volumes. The TII significance criteria have been applied to the Proposed Development and adapted as necessary within tables 8-12 to 8-15.

Tables 8-12 to 8-15 have been designed to assist in describing the air quality impacts at each receptor. They are applicable to the pollutants which are relevant to the Proposed Development and the standards or limit values against which they are being assessed (TII, 2011). The criteria focus on NO₂ and PM₁₀ as these pollutants are most likely to exceed the annual mean limit values (40 µg/m³).

The definition of 'impact magnitude' is exclusively related to the degree of change in pollutant concentrations, expressed as micrograms per cubic metre (µg/m³). 'Impact description' takes account of the impact magnitude and of the absolute concentrations and how they are linked to the air quality standards or limit values. The descriptors for the magnitude of change due to the Proposed Development are set out in Table 8-12:

*Table 8-12: Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations
 (Source: Adapted from TII, 2011)*

Magnitude of Change	Annual Mean NO ₂ /PM ₁₀	No. days with PM ₁₀ concentration greater than 50 µg/m ³
Large	Increase/decrease ≥4 µg/m ³	Increase/decrease >4 days
Medium	Increase/decrease 2 - <4 µg/m ³	Increase/decrease 3 or 4 days
Small	Increase/decrease 0.4 - <2 µg/m ³	Increase/decrease 1 or 2 days
Imperceptible	Increase/decrease <0.4 µg/m ³	Increase/decrease <1 day

The subsequent impact descriptors are set out in Table 8-13 and Table 8-14:

Table 8-13: Air Quality Impact Descriptors for Changes to Annual Mean NO₂ and PM₁₀ Concentrations at Receptors (Source: Adapted from TII, 2011)

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration ⁸		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme ($\geq 40 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme ($36 < 40 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme ($30 < 36 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme ($< 30 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value with Scheme ($\geq 40 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with Scheme ($36 < 40 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with Scheme ($30 < 36 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with Scheme ($< 30 \mu\text{g}/\text{m}^3$ of NO₂ or PM₁₀)	Negligible	Negligible	Slight Beneficial

⁸ Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible.

Table 8-14: Air Quality Impact Descriptors for Changes to Number of Days with PM10 Concentration Greater than 50 µg/m³ at a Receptor (Source: TII, 2011)

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration ⁹		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (32-<35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (26-<32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value with Scheme (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with Scheme (32-<35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with Scheme (26-<32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Beneficial

In terms of 'significance of effects', professional judgment has been applied in making this determination. The TII Guidance (2011) outlines that the overall air quality impact of the Proposed Development should be described as either 'insignificant', 'minor', 'moderate', or 'major'; and a number of factors, as listed in Table 8-15, are set out which should be taken into account:

⁹ Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible.

Table 8-15: Factors to Consider when Determining Air Quality Significance (Source: Adapted from TII, 2011)

Factors
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.
The number of people exposed to levels above the objective or limit value, where new exposure is being introduced.
The magnitude of the changes and the descriptions of the impacts at the receptors i.e., using the findings based on Boxes Tables 8-12 to 8-14.
Whether or not an exceedance of a standard or limit value is predicted to arise in the study area where none existed before or an exceedance area is substantially increased.
Whether or not the study area exceeds a standard or limit value and this exceedance is removed, or the exceedance area is reduced.
Uncertainty, including the extent to which worst-case assumptions have been made.
The extent to which a standard or limit value is exceeded, e.g., an annual mean NO ₂ of 41 µg/m ³ should attract less significance than an annual mean of 51 µg/m ³

8.1.5.1.2.1.5 Modelling Results

The impact of the Proposed Development has been determined by modelling traffic-related air emissions resulting from the presence or absence of Proposed Development.

Concentrations of NO₂ and PM₁₀ were modelled for the baseline year of 2018 using the UK DMRB screening model (Version 1.03c 2007). As is evident from Table 8-16, the model has indicated that concentrations for all pollutants were in compliance with the annual limit of 40 µg/m³. Therefore, in line with DMRB LA 105 guidance, further modelling of PM₁₀ for the Opening and Design Years is not required. The highest road increment of PM₁₀ experienced at receptors was 1.59 µg/m³. When this is assessed in combination with the 2018 background concentration of 16 µg/m³, an overall impact of 44% of the annual limit is experienced at the worst-case receptor.

The impact of NO₂ was predicted for the Opening and Design Years at the nearest receptors to the affected road network (ARN). The degree of impact has been determined based on both the absolute and relative impact of the Proposed Development. A 'Do-Nothing Scenario', which assumes that the Proposed Development does not exist in future years, has also been assessed within the model and results have been compared in order to determine the degree of impact.

Table 8-16: Modelled Baseline NO₂ and PM₁₀ Concentrations (2018)

Receptor	ITM Coordinate	Receptor Type	Parameter	Total (µg/m ³)	Road Traffic Component
R1	572563, 562622	Residential	PM ₁₀	16.01	0.01
			NO ₂	18.05	0.05
R2	572846, 562802	Residential	PM ₁₀	16.58	0.58
			NO ₂	20.83	2.83
R3	572977, 562860	Residential	PM ₁₀	16.64	0.64
			NO ₂	21.16	3.16
R4	573041, 562806	Medical Centre	PM ₁₀	17.59	1.59
			NO ₂	25.6	7.6
R5	573018, 562697	School	PM ₁₀	17.54	1.54
			NO ₂	24.99	6.99
R6	572996, 562599	Residential	PM ₁₀	17.20	1.20
			NO ₂	23.38	5.38
R7	573033, 562390	Residential	PM ₁₀	16.87	0.87
			NO ₂	22.02	4.02
R8	572878, 562191	Residential	PM ₁₀	16.69	0.69
			NO ₂	21.49	3.49
R9	572741, 562239	Residential	PM ₁₀	16.49	0.49
			NO ₂	20.72	2.72
R10	572554, 562195	Residential	PM ₁₀	16.53	0.51
			NO ₂	20.97	2.97

The impact of the Proposed Development on annual mean NO₂ concentrations in the Opening Year (2023) and Design Year (2038) has been assessed relative to the 'Do Nothing' levels. The results shown in Table 8-17 and 8-18 determine that there may be some 'imperceptible', 'small', 'medium', and 'large' increases in concentrations of NO₂ at worst-case receptors assessed when compared with 'Do Nothing' levels; with the highest predicted increase of 4.3 µg/m³ and 4.28 µg/m³ measured at R10 in the Opening Year and Design Year 'Do Something' scenarios, respectively.

Sensitive receptors in close proximity to the proposed Western Relief Road are likely to experience a higher increase in NO₂ when compared to the 'Do Nothing' scenario. However, the proposed Western Relief Road is expected to divert a high volume of traffic away from a number of surrounding roads; thus, allowing for a decrease in concentrations of NO₂ at a number of sensitive receptors in close proximity to these roads. Furthermore, in accordance with Table 8-13, when assessing the Proposed Development contribution in relation to the NO₂ objective/limit value, concentrations of NO₂ at all sensitive receptors are less than 24 µg/m³ with the inclusion of the Proposed Development in both the Opening and Design Years, and as such, are well below the objective/limit value of 40 µg/m³. Therefore, it is considered that the impact of the Proposed Development is minor at sensitive receptors and insignificant in terms of overall ambient air quality standards.

Having regard to the assessment criteria set out in Section 8.1.5.1.2.1.4 and the modelling results outlined in Table 8-17 and Table 8-18, the impact of the Proposed Development on NO₂ concentrations in the locality is likely to be 'long-term', 'negative' and 'imperceptible'.

Table 8-17: Predicted Annual Mean Concentrations of NO₂ (Opening Year 2024)

Receptor	Parameter	Background (µg/m ³)	Opening Year 2023				
			Do Nothing	Do Some-thing	Proposed De-velopment Contribution	Magnitude	Impact description
R1	NO ₂	16.4	16.45	17.55	1.1	Small	Negligible Increase
R2	NO ₂		19.22	22.56	3.34	Medium	Negligible Increase
R3	NO ₂		19.55	19.79	0.24	Imperceptible	Negligible Increase
R4	NO ₂		23.97	23.88	-0.09	Imperceptible	Negligible Decrease
R5	NO ₂		23.32	21.88	-1.44	Small	Negligible Decrease
R6	NO ₂		21.71	20.04	-1.67	Small	Negligible Decrease
R7	NO ₂		20.37	20.16	-0.21	Imperceptible	Negligible Decrease
R8	NO ₂		19.84	19.91	0.07	Imperceptible	Negligible Increase
R9	NO ₂		19.08	19.89	0.81	Small	Negligible Increase
R10	NO ₂		19.33	23.63	4.3	Large	Slight Adverse In-crease

Table 8-18: Predicted Annual Mean Concentrations of NO₂ (Design Year 2039)

Receptor	Parameter	Background (µg/m ³)	Design Year 2038				
			Do Nothing	Do Something	Proposed Development Contribution	Magnitude	Impact description
R1	NO ₂	14.9	14.95	16.17	1.22	Small	Negligible Increase
R2	NO ₂		18.12	21.74	3.62	Medium	Negligible Increase
R3	NO ₂		18.27	18.48	0.21	Imperceptible	Negligible Increase
R4	NO ₂		23.1	22.87	-0.23	Imperceptible	Negligible Decrease
R5	NO ₂		22.5	20.93	-1.57	Small	Negligible Decrease
R6	NO ₂		20.73	18.98	-1.75	Small	Negligible Decrease
R7	NO ₂		19.07	18.85	-0.22	Imperceptible	Negligible Decrease
R8	NO ₂		18.76	18.85	0.11	Imperceptible	Negligible Increase
R9	NO ₂		17.96	18.82	0.86	Small	Negligible Increase
R10	NO ₂		18.25	22.53	4.28	Large	Slight Adverse Increase

8.1.5.2 Potential Impacts on Climate

8.1.5.2.1 Construction Phase

There is the potential for combustion emissions from onsite machinery and traffic derived pollutants of CO₂ and N₂O to be emitted during the construction phase of the development. However, due to the size and duration of the construction phase, and the mitigation measures proposed, the effect on national GHG emissions will be insignificant in terms of Ireland's obligations under the Kyoto Protocol and therefore will have no considerable impact on climate. Overall, climatic impacts are considered to be short-term and imperceptible.

8.1.5.2.2 Operational Phase

8.1.5.2.2.1 Daylight, Sunlight and Overshadowing Analysis

Passive Dynamics Sustainability Consultants carried out a daylight, sunlight and overshadowing analysis for the Proposed Development at Carrigaline, Co. Cork.

Daylight and Sunlight calculations were carried out in accordance with BRE's 'Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice' (2011) (herein referred to as the "BRE Guide") by P J Littlefair, which is accepted as good practice by Planning Authorities.

The Design Standards for New Apartments - Guidelines for Planning Authorities (March 2018) were also considered as part of this study.

The BRE Guide gives advice on site layout to achieve provision of daylight and sunlight both within buildings, and in the open spaces between them. In general, it aims to aid designers in considering the relationship between new and existing buildings to ensure that each retains the potential to achieve good daylighting and sunlight levels. The BRE Guide is preceded by the following very clear warning as to how the design advice contained therein should be used:

“The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design.”

The methodology consists of reviewing the potential impact against the following criteria:

- (A) Vertical Sky Component (VSC)
- (B) Average Daylight Factor (ADF)

A full copy of this assessment and results can be found in Appendix C of this EIAR.

8.1.5.2.2.2 Flood Risk

There is growing scientific consensus that the warming of the climate is expected to increase the risk of floods. Rising sea levels and more frequent and severe coastal storms will increase the risk of coastal and estuarial flooding as well as coastal erosion. According to the Planning System and Flood Risk Management (DECLG & OPW, 2009), where the floodplain or coastal plain is well defined, climate change is expected to change the probability of flooding and the depth for a particular event with little change in spatial extent. Only where extensive areas of land rise gently from the river or the sea is climate change expected to significantly increase the area affected by flooding.

There is a great deal of uncertainty in relation to the potential effects of climate change; therefore, a precautionary approach should be adopted, where necessary, to reflect uncertainties in flooding datasets and the ability to predict the future climate. Development should be designed with careful consideration to possible future changes in flood risk, including the effects of climate change so that future occupants are not subject to unacceptable risk (OPW, 2009).

A Flood Risk Assessment (FRA) was undertaken by Arup on behalf of ResideInvestments Limited for the Proposed Development. This assessment identifies the risk of flooding at the Site from various sources and sets out possible mitigation measures against the potential risks of flooding. In board terms, the potential sources of flooding at the Site and its vicinity can be categorised as:

- Fluvial (River) Flooding – There is a potential risk of flooding from the Owenboy River at the northern part of the Site;
- Coastal/Tidal Flooding – There is a potential risk of tidal flooding from the Owenboy estuary at the Site;
- Pluvial Flooding/urban drainage – Pluvial flooding occurs when the capacity of the local surface water network is exceeded during periods of intense rainfall. At these times, water can collect at low points in the topography and cause flooding;

- Groundwater Flooding – This can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the ground water table is already high. If the groundwater level rises above ground level, it can pond at local points and cause periods of flooding.

The Site is at predominantly at risk from fluvial and tidal flooding from the River Owenboy. A hydrological analysis and hydraulic modelling were undertaken to assess in detail the risk of fluvial and tidal flooding from the river. The modelling showed increases in the flood zones compared to the CFRAM mapping.

Flood mitigation measures have been developed to ensure the Proposed Development is safe from flooding now and in the future. Measures include raising of development levels above the flood protection level, vertical differentiation of uses, and water tanking construction methods to prevent groundwater ingress to lower levels if needed.

The residual risks to the occupants of the development were assessed as part of the FRA. The residual risk of flooding was considered to be acceptable.

The Proposed development is a 'highly vulnerable development', and partially lies within Flood Zone A. Therefore, a Justification Test in accordance with the OPW Guidelines is carried out. It has been demonstrated that the Proposed Development satisfies the criteria of the development management Justification Test.

This FRA has demonstrated that the risks relating to flooding can be managed and mitigated to acceptable levels and therefore comply with DoEHLG / OPW and Cork City Council planning guidance. The full FRA Report can be found in Appendix D.

8.1.5.2.2.3 GHG Emissions

8.1.5.2.2.3.1 Traffic

Increased LDV and HGV traffic flow as a result of the Proposed Development is likely to contribute to increases in GHG emissions such as CO₂ and N₂O. However, these contributions are likely to be marginal in terms of overall national GHG emission estimates and Ireland's obligations under the Kyoto Protocol and the Paris Agreement, and therefore unlikely to have an adverse effect on climate. Furthermore, it is widely anticipated that CO₂ emissions for the passenger car fleet will reduce substantially in future years due to the increasing prevalence of electric or hybrid vehicle use.

8.1.5.3 Potential Cumulative Impacts

Cumulative Impacts can be defined as "*impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project*". Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor. Such effects are not caused or controlled by the project developer.

Cumulative air quality impacts have the potential to arise locally when construction activities associated with the Proposed Development take place at the same time as other developments in a specific location.

All planning applications which have been granted permission and are already developed have been incorporated into the baseline assessment of this application, a comprehensive list of the proposed planning applications within the vicinity of the Proposed Development is presented in Table 8-19. A planning search has revealed that there have been a number of planning applications in the vicinity of the Proposed Development Site which have been granted permission, that could potentially be constructed at the same time as the Proposed Development. The proposed Western Relief Road is expected to divert a high volume of traffic away from a number of surrounding roads; thus, allowing for a decrease in concentrations of NO₂ at a number of sensitive receptors in close proximity to these roads.

The cumulative effects on the air quality and climate of the current Proposed Development and other permitted or existing developments have been considered, in particular through the generation of air pollutants and GHG emissions. The potential impacts on air quality and climate are assessed in Section 8.1.5 and it is considered that there are no other potential significant cumulative impacts associated with the Proposed Development and considered offsite permitted developments.

In terms of dust, no significant impacts are predicted; good construction practice, which incorporates the implementation of the identified mitigation measures, will be employed at the Proposed Development Site. Due to the implementation of good construction practices at the Site of the Proposed Development and these offsite permitted developments, it is not anticipated that significant cumulative impacts will occur.

Assessment of operational stage impacts on air quality involved traffic data which is inclusive of traffic associated with other existing and permitted developments on the road networks surrounding the Site both in current and future years. Therefore, cumulative impacts have been assessed in this regard and the impact on ambient air quality has been determined as insignificant.

Table 8-19: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part Planning 8	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	<p>The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence.</p> <p>The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians, cyclists and vehicular traffic).</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
217464	Aldi Stores (Ireland) Ltd	<p>On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.</p>	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
214818	Ruden Homes Ltd	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
205230	Barry Collins (Supermarket) Ltd	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
196065	Athena Private Assets Ltd	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
194642	Piton Properties Ltd	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

8.1.5.4 ‘Do Nothing’ Impact

The Proposed Development Site is currently comprised of agricultural lands; if to remain undeveloped, the site will continue to exist in the current environment and have no significant impact on the existing ambient air quality or microclimate.

The Do-Nothing impact has been assessed in terms of air quality in this Chapter. It has been determined that there is an overall insignificant impact on ambient air quality as a result of the Proposed Development in both the Opening and Design Years when compared to the Do-Nothing scenario.

Greenhouse gas emissions as a result of the Proposed Development are also likely to be marginal in terms of overall national GHG emission estimates and Ireland’s obligations under the Kyoto Protocol and the Paris Agreement when compared to a Do-Nothing scenario.

8.1.6 Avoidance, Remedial & Mitigation Measures

8.1.6.1 Air Quality

8.1.6.1.1 Construction Phase

It is not expected that adverse air quality impacts are likely to occur at sensitive receptors as a result of the Proposed Development. However, appropriate mitigation measures, as outlined within the Construction and Environmental Management Plan (CEMP), which has been prepared by Enviroguide Consulting, will be employed as necessary to further prevent such impacts occurring:

- Vehicle and wheel washing facilities will be provided at site exit where practicable. If necessary, vehicles are to be washed down before exiting the site.
- Engines and exhaust systems will be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
- Dust emission over the site boundary will be minimised using static sprinklers or other watering methods as necessary.
- No burning of materials will be permitted on site.
- Water sprays for dust suppression will be affixed to mechanical excavators/munchers involved in demolition works.
- Demolition waste will be removed from site as quickly as possible to minimise risk of dust generation and any fine material will be covered with a tarpaulin or similar material and tied down.
- Water sprays and cannons will be used where possible during cutting, with protective measures applied to retained finishes local to the cutting.
- Prior to commencement, the Main Contractor will identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions.
- In areas of poor natural ventilation, dust capture/extraction methods will be employed by the Main Contractor.
- The Main Contractor will be required to allocate suitably qualified and experienced personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.

- The Main Contractor will be required to appoint a senior member of its site management team to act as the liaison with third parties in respect of complaints regarding dust and or site activities.
- Monitoring of dust deposition will be undertaken at nominated boundary locations to ensure that dust levels comply with the TA Lift limit value of 350mg/(m²/day) based on a 30-day average using Bergerhoff gauges (Limits to be agreed with local authority).

8.1.6.1.2 Operational Phase

It has been determined that the Operational Phase air quality impact is negligible and therefore no site-specific mitigation measures are proposed.

8.1.6.2 Climate

As negative climatic impacts associated with the Construction and Operational Phases of the Proposed Development are negligible, no mitigation measures are proposed. Best practice measures will be implemented to minimise exhaust emissions from construction and operational vehicles and machinery by avoidance of engines running unnecessarily, as idle engines will not be permitted for excessive periods. Furthermore, all proposals for development will seek to achieve the greatest standards of sustainable construction and design and will have regard to sustainable building design criteria.

8.1.6.3 “Worst Case” Scenario

A worst case scenario situation would involve failures of mitigation measures for the Proposed Development. In such events, it is not considered that dust nuisances will occur.

A worst-case scenario has been applied to the Construction Phase air quality assessment in terms of the scale of the source and potential dust nuisances. It is expected that adequate mitigation measures, as outlined in Section 8.1.6.1.1, will assist in preventing nuisance dust from resulting in any significant effects. In the event of a failure of such measures, it is not considered that significant dust related effects will occur.

A worst-case scenario has been applied to the Operational Phase air quality assessment in terms of traffic volumes experienced on the surrounding road network and associated air emissions. As the DMRB modelling tool does not account for electric or hybrid vehicle use, vehicle emissions applied in this study are likely to overestimate the actual vehicle emissions experienced from the Proposed Development. The worst-case contributions predicted by the tool are added to the existing background concentration to provide a worst-case predicted ambient concentration. The compliance of the Proposed Development with the relevant ambient air quality standards is subsequently assessed by comparison with the worst-case ambient concentrations. Associated impacts have been determined as insignificant in this case.

8.1.7 Residual Impacts

Residual Impacts are defined as *‘effects that are predicted to remain after all assessments and mitigation measures’*. They are the remaining ‘environmental costs’ of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts. Potential residual impacts from the Proposed Development were considered as part of this environmental assessment.

The Proposed Development is likely to result in a long-term increase in traffic on the roads surrounding the Proposed Development Site; however, this increase in traffic has been determined to have an overall insignificant impact in terms of local air quality. Furthermore, the increase in traffic has been determined as marginal with regard to climatic impacts. Therefore, no adverse residual impacts are anticipated from the proposed scheme in the context of air quality and climate.

8.1.8 Monitoring

The monitoring of construction dust during the Construction Phase of the Proposed Development is recommended to ensure that impacts are not experienced beyond the Site boundary. Monitoring of dust can be carried out by using the Bergerhoff Method. This involves placing Bergerhoff Dust Deposit Gauges at a strategic locations along the Site boundaries for a period of 30 +/- 2 days. The selection of sampling point locations should be carried out in consideration of the requirements of *VDI 2119* with respect to the location of the samplers relative to buildings and other obstructions, height above ground, and sample collection and analysis procedures. After the exposure period is complete, the Gauges will be removed from the Site; the dust deposits in each Gauge will then be determined gravimetrically and expressed as a dust deposition rate in mg/m²/day in accordance with the relevant standard.

Due to the negligible impact on air quality and climate from the Operational Phase of the Proposed Development, no specific monitoring is recommended.

8.1.9 Interactions

Interactions between Air Quality and Climate and other aspects of this Environmental Impact Assessment Report have been considered and are detailed below.

8.1.9.1 Population and Human Health

Interactions between Air Quality and Population and Human Health have been considered as the Operational Phase has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic-related pollutants have been assessed and determined as having an overall insignificant impact, therefore air quality impacts from the Proposed Development are not expected to have a significant impact on population and human health.

8.1.9.2 Traffic

There can be a significant interaction between air quality, climate and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect Air Quality and Climate have been deemed as insignificant. Therefore, the impact of the interaction between air quality and climate is insignificant.

8.1.10 Difficulties Encountered

No difficulties have been encountered while compiling this Chapter.

8.1.11 References

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8.2 Microclimate Wind

8.2.1 Introduction

B-Fluid Limited has carried out the Wind Microclimate Study for the proposed Carrigaline SHD, Co. Cork. *Figure 8-4 shows a view of the Proposed Development (coloured blocks) in the existing urban context.*



Figure 8-4: Proposed Carrigaline SHD Development

Quality Assurance and Competence

This Chapter was completed by Dr. Cristina Paduano, Dr. Giacomo Politi, and Dr. Arman Safdari.

Dr. Cristina Paduano is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environment and the construction industry with over 18 years of experience. She holds a PhD in Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Aerospace Engineering.

Dr. Giacomo Politi is a Consultant Engineer who specialises in computational fluid dynamics applications. He holds a PhD in Civil Engineering from Trinity College Dublin, a M.Sc. in Sustainable Engineering and B.Sc. in Mechanical Engineering.

Dr. Arman Safdari is a Computational Fluid Dynamics (CFD) Modelling Engineer who specialises in computational fluid dynamics applications. He is an expert in airflow modelling, heat and mass transfer and multi-phase flow simulations. He holds a PhD in Mechanical Engineering from Pusan National University, a M.Sc. and B.Sc. in Mechanical Engineering.

A Wind Microclimate Study identifies the possible wind patterns that form when wind moves through a built environment and evaluates how a new development is going to modify those patterns. Wind Microclimate is defined as the wind flow experienced by people and the subsequent influence it has on their activities. Wind can accelerate or re-circulate through buildings in such a way to compromise the comfort /safety of pedestrians and the capacity of using the public realm / external places in accordance with their designated intended use.

A wind microclimate study considers the possible wind patterns formed under both mean and peak wind conditions typically occurring on the site area, accounting for a scenario where the Proposed Development is inserted in the existing environment (potential impact) and, for a scenario where the Proposed Development is analysed together with the existing environment and any permitted development (not constructed yet) that can be influenced by the wind patterns generated by the proposed one (cumulative impact).

The potential receptors include those areas, in the surrounding area of the development, which can be exposed to potential risks generated by the elevated wind speed or building massing wind effects. In particular:

- Amenity areas (pedestrian level), areas likely to be utilised for leisure purposes and as such should be comfortable surroundings.
- Pedestrian routes and seating areas – to determine if locations are comfortable for leisure activities.
- Entrance to the buildings – to determine if there is potential for pressure related issues for entrances or lobbies.
- Landscaped areas – where there are sheltered areas.
- Impact to existing or adjoining developments – where the proposed buildings will cause discomfort conditions through proximity related issues.

The acceptance criteria which define the acceptable wind velocities in relation to the perception of comfort level experienced while carrying out a specific pedestrian activity is known as the '*Lawson Criteria for Pedestrian Comfort and Distress*'. A wind microclimate study analyses the wind flow in an urban context (considering the wind conditions typically occurring on the site during a typical year) to develop the so called '*Lawson Comfort and Distress Map*'; the map identifies where a specific pedestrian activity can be carried out comfortably during most of the time. The assessment can be performed by physical testing in wind tunnels or by performing "virtual wind tunnel testing" through numerical simulation using Computational Fluid Dynamics (CFD), as done for this project. The scope of the numerical study is to simulate the wind around the development this to predicting under which wind speeds pedestrians will be exposed and what level of comfort pedestrian will experience when carrying out a specific activity (i.e., walking, strolling, sitting).

The following sections details the methodology, acceptance criteria, CFD wind simulations and the impact of the Proposed Development on the local wind microclimate against best practice guidelines for pedestrian comfort and safety.

8.2.1.1 Guidance and Legislation

According to the ‘Urban Development and Building Heights, Guidelines for Planning Authorities (Government of Ireland, December 2020)’ document, specific wind impact assessment of the microclimatic effects should be performed for ‘buildings taller than prevailing building heights in urban areas’. In the same guidance, standard buildings height is considered 6-8 storeys. Above this height, buildings are considered ‘taller’ for Cork standards.

The recommended approach to wind microclimate studies is outlined in the “Wind Microclimate Guidelines for Developments in the City of London (August 2020) and in the guidelines and recommendations contained in BRE Digest (DG) 520, “Wind Microclimate Around Buildings” (BRE, 2011). The Lawson Criteria of Comfort and Distress is used to benchmark the pedestrian wind microclimate.

The document also indicates how to use Computational Fluid Dynamics (CFD) to assess wind microclimate conditions and how to generate high quality outputs to provide a good understanding of the fundamental flow features around an urban context.

Building Height	Recommended Approach to Wind Microclimate Studies
Similar or lower than the average height of surrounding buildings Up to 25m	Wind studies are not required, unless sensitive pedestrian activities are intended (e.g. around hospitals, transport hubs, etc.) or the project is located on an exposed location
Up to double the average height of surrounding buildings 25m to 50m	Computational (CFD) Simulations OR Wind Tunnel Testing
Up to 4 times the average height of surrounding buildings 50m to 100m	Computational (CFD) Simulations AND Wind Tunnel Testing
High Rise Above 100m	Early Stage Massing Optimization: Wind Tunnel Testing OR Computational (CFD) Simulations Detailed Design: Wind Tunnel Testing AND Computational (CFD) Simulations to demonstrate the performance of the final building design

Figure 8-5: Recommended Approach to Wind Microclimate Studies based on Building Height, as prescribed by the Wind Microclimate Guidelines for Developments in the City of London (August 2020)

8.2.1.2 Urban Wind Effects

Buildings and topography affect the speed and direction of wind flows. Wind speed increases with increasing height above the ground, assuming a parabolic profile.

Flow near the ground level encounters obstacles represented by terrain roughness / buildings that reduce the wind speed and introduce random vertical and horizontal velocity components. This turbulence causes vertical mixing between the air moving horizontally at one level, and the air at those levels immediately above and below it. For this reason, the wind velocity profile is given by a fluctuating velocity along a mean velocity value. Figure 8-6 shows the wind velocity profile, as described above.

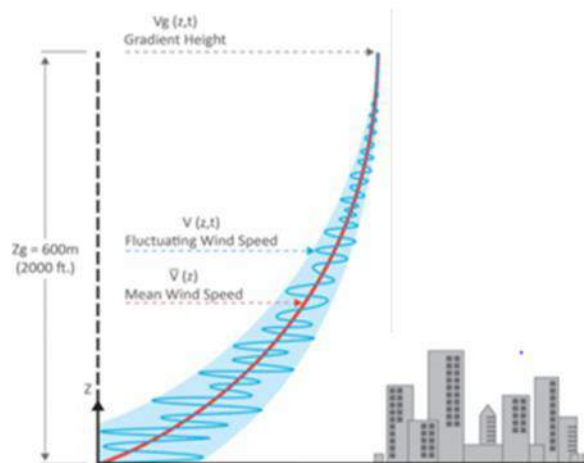


Figure 8-6: Atmospheric wind velocity profile

In an urban context, wind speeds at pedestrian level are generally low compared with upper-level wind speeds, however, the wind can create adverse patterns when flowing in between buildings which can cause local wind accelerations or re-circulations (Figure 8-7). These patterns effects pedestrian safety and comfort. In general, the wind effects to be avoided / mitigated in an urban context include the following:

- **Funnelling Effects:** The wind can accelerate significantly when flowing through a narrow passage between building structures. The highest speeds are experienced at the point where the restriction of the area is the greatest.
- **Downwash Effects:** The air stream when striking a tall building can flow around it, over it and a part can deflected towards the ground. This downward component is called downwash effect and its intensity depends on the pressure difference driving the wind. The higher the building, the higher this pressure difference can be.
- **Corner Effects:** Wind can accelerate around the corners of the buildings. Pedestrians can experience higher wind speeds as well as more sudden changes in wind speeds. The reason for this is that there are narrow transition zones between the accelerated flows and the adjacent quiescent regions. This effect is linked to the downwash effect as the downward stream component subsequently flows around the corners towards the leeward side of the building.

- **Wake Effect:** Excessive turbulence can occur in the leeward side of the building. This can cause sudden changes in wind velocity and can raise dust or lead to accumulation of debris. This effect is also dependent on the height of the building.

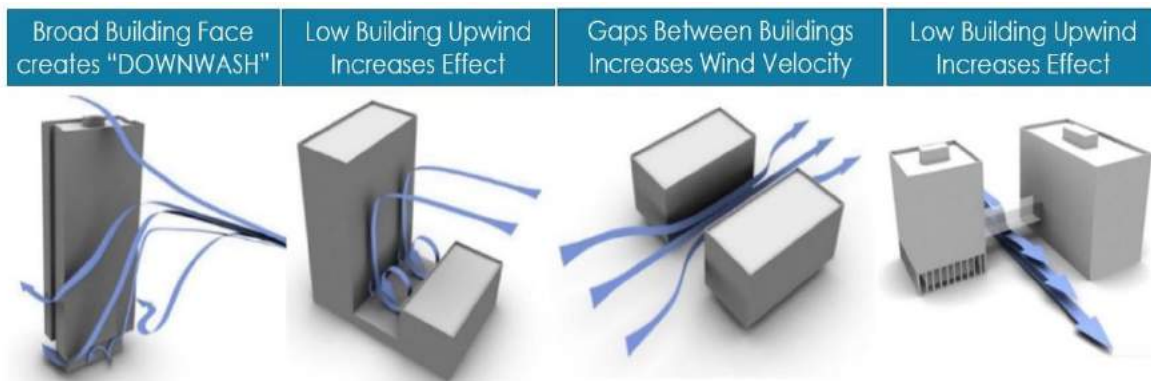


Figure 8-7: Wind patterns created around buildings showing typical wind microclimate in an urban context

The anticipation of the likely wind conditions resulting from new developments are important considerations in the context of pedestrian comfort and the safe use of the public realm. While it is not always practical to design out all the risks associated with the wind environment, it is possible to provide local mitigation to minimise risk or discomfort where required.

8.2.2 Study Methodology

The method for the study of wind microclimate combines the use of Computational Fluid Dynamics (CFD) to predict wind velocities and wind flow patterns, with the use of wind data from suitable meteorological station and the recommended comfort and safety standards (Lawson Criteria). The effect of the geometry, height and massing of the Proposed Development and existing surroundings including topography, ground roughness and landscaping of the site, on local wind speed and direction is considered as well as the pedestrian activity to be expected (sitting, standing, strolling and fast walking). The results of the assessment are presented in the form of contours of the Lawson criteria at pedestrian level.

The assessment has comprised the following scenarios:

- **Baseline Existing Scenario**: this consist of the existing wind microclimate at the site.
- **Proposed Development in the Existing Scenario**: this consist of the assessment of the wind microclimate of the site with the Proposed Development surrounded by existing buildings.

In accordance with the guideline cited in section 8.2.1.1, the wind microclimate study should consider the effect of the Proposed Development together with buildings (existing and / or permitted) that are within 400m from the centre of the site. Other taller buildings outside of this zone that could have an influence on wind conditions within the project site should be included for wind directions where they are upwind of the project site.



Figure 8-8: Extent of relevant area for the wind microclimate study

In particular, the following has been undertaken:

- Topography of the site with buildings (proposed and adjacent existing / permitted developments massing, depending on the scenario assessed “*baseline, proposed or cumulative*”) have been modelled using CFD OpenFOAM Software (CFD model and details are in Appendix 8.2 of this chapter).
- Suitable wind conditions have been determined based on historic wind data. Criteria and selected wind scenarios included means and peaks wind conditions that need to be assessed in relation to the Lawson Criteria.
- Computational Fluid Dynamics (CFD) has been used to simulate the local wind environment for the required scenarios (‘baseline, proposed, cumulative’).
- The impact of the Proposed Development massing on the local wind environment has been determined (showing the wind flows obtained at pedestrian level).
- Potential receptors (pedestrian areas) have been assessed through review of external amenity / public areas (generating the Lawson Comfort and Distress Map).
- Potential mitigation strategies for any building related discomfort conditions (where necessary) have been explored and their effect introduced in the CFD model produced.

8.2.2.1 Assessment Criteria for Pedestrian Comfort and Distress

“Lawson Comfort and Distress Criteria” has been developed for wind microclimate studies as a means of assessing the long-term suitability of urban areas for walking or sitting, accounting for both microclimatic wind effects (i.e. site location and prevailing winds) and microclimatic air movement associated with wind forces influenced by the localised built environment forms and landscaping effects.

The Lawson scale assesses pedestrian wind comfort in absolute terms and defines the reaction of an average person to the wind.

For the distress (safety) criterion, only gust winds are considered. These are usually rare events but deserve special attention in city planning and building design due to their potential impact on pedestrian safety. Gusts cause most cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 and these “gust *equivalent mean*” (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

The following criteria are widely accepted by local authorities as well as the international building design and city planning community:

- COMFORT CRITERIA: Relates to the activity of the individual.
Onset of discomfort:
 - Depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM) which is exceeded for 5% of the time.
- DISTRESS CRITERIA: Relates to the physical well-being of the individual.
Onset of distress:
 - ‘Frail Person or Cyclist’: equivalent to an hourly mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year (0.022% of the

times). This is intended to identify wind conditions which less able individuals or cyclists may find physically difficult. Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.

- 'General Public': A mean speed of 20 m/s and a gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed, aerodynamic forces approach body weight and it rapidly becomes impossible for anyone to remain standing. Where wind speeds exceed these values, pedestrian access should be discouraged.

Table 8-20: Lawson Pedestrian Comfort / Distress Criteria Details

Pedestrian Comfort Category (Lawson Scale)	Mean and Gem wind speed not to be exceeded more than 5% of the time	Description
Long-Term Sitting	4m/s	Acceptable for frequent outdoor sitting use, i.e. restaurant /café
Standing	6m/s	Acceptable for occasional outdoor sitting use, i.e. public outdoor spaces
Walking/Strolling	8m/s	Acceptable for entrances/bus stops /covered walkways
Business Walking	10m/s	Acceptable for external pavements, walkways
Unacceptable/Distress	>10m/s	Start of not comfortable/distress level for pedestrian access

Table 8-21: Lawson Pedestrian Comfort / Distress Criteria Details of Unsafe Conditions

Pedestrian Safety Category (Lawson Scale)	Mean and Gem wind speed not to be exceeded more than 0.0022% of the time	Description
Unsafe for public	>20m/s	Distress/safety concern for pedestrian
Unsafe for cyclists or frail person	>15m/s	Distress/safety concern for cyclist/frail person

These criteria for wind forces represent average wind tolerances. They are subjective and variable depending on thermal conditions, age, health, clothing, etc. which can all affect a person's perception of a local microclimate. Moreover, pedestrian activity alters between winter and summer months. The criteria assume that people will be suitably dressed for the time of year and individual activity. It is reasonable to assume, for instance, that areas designated for outdoor seating will not be used on the windiest days of the year. Weather data

measured are used to calculate how often a given wind speed will occur each year over a specified area.

Pedestrian comfort and distress criteria are assessed at 1.5m above ground level as required by the guideline cited in section 8.2.1.1. If the predicted wind conditions exceed the threshold, then conditions are unacceptable for the type of pedestrian activity and mitigation measures should be implemented into the design.

8.2.2.2 Significance Criteria

The significance of on-site measurement locations is defined by comparing the wind comfort / safety levels with the intended pedestrian activity at each location, using the table provided by the Lawson Comfort and Distress Criteria.

Table 8-22: On-site Receptors Significance Criteria extracted by Wind Microclimate Guidelines for Developments in the City of London (August 2020)

Significance	Trigger	Mitigation required?
Major Adverse	Conditions are “unsafe”	Yes
Moderate Adverse	Conditions are “unsuitable” (in terms of comfort) for the intended pedestrian use.	Yes
Negligible	Conditions are “suitable” for the intended pedestrian use.	No
Moderate Beneficial	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	No

The significance of off-site measurement locations is defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, prior and after the introduction of the Proposed Development.

Table 8-23: Off-site Receptors Significance Criteria extracted by Wind Microclimate Guidelines for Developments in the City of London (August 2020)

Significance	Trigger	Mitigation required?
Major Adverse	Conditions that were “safe” in the baseline scenario became “unsafe” as a result of the Proposed Development. OR Conditions that were “suitable” in terms of comfort in the baseline scenario became “unsuitable” as a result of the Proposed Development. OR Conditions that were “unsafe” in the baseline scenario are made worse as a result of the Proposed Development.	Yes
Moderate Adverse	Conditions that were “suitable” in terms of comfort in the baseline scenario are made windier (by at least one comfort category) as a result of the Proposed Development but remain “suitable” for the intended pedestrian activity.	No
Negligible	Conditions remain the same as in the baseline scenario.	No
Major Beneficial	Conditions that were “unsafe” in the baseline scenario became “safe” as a result of the Proposed Development.	No
Moderate Beneficial Potential Receptors	Conditions that were “unsuitable” in terms of comfort in the baseline scenario became “suitable” as a result of the Proposed Development. OR Conditions that were “unsafe” in the baseline scenario are made better as a result of the Proposed Development (but not so as to make them “safe”).	No

8.2.2.3 Local Wind Climate

A statistical analysis of 30 years historical wind data has been carried out to characterise the existing local wind climate in terms of wind speeds, frequency, and directions.

The existing wind conditions are obtained using the annual average of meteorology data collected at Cork Airport Weather Station. Figure 8-9 shows on the map the position of the subject site and the position of Cork Airport.

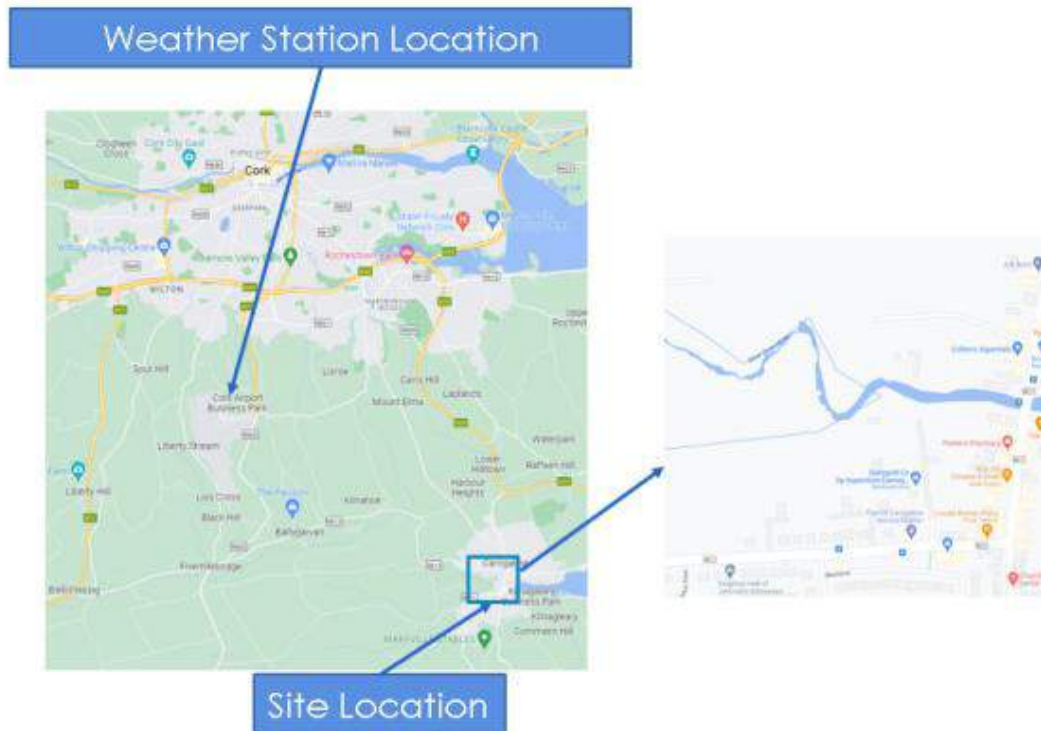


Figure 8-9: Map showing the position of Carrigaline SHD Development and Cork Airport

Regarding the transferability of the available wind data from the Cork Airport Weather Wind station to the site location, the following considerations have been made:

Terrain: The meteorological station is located on the flat open terrain of the airport, whereas the development site is located in an area with small elevation and with low level buildings.

Mean Wind Speeds: Due to the different terrain environment, the ground-near wind speeds (at pedestrian level) will be lower at the proposed site compared to the meteorological station at the airport.

Wind Directions: The landscape around the development site can principally be characterised as a sub urban terrain with some isolated elevations in the near area of the development.

Based on the above considerations, it can be concluded that the data from the meteorological station at Cork Airport are applicable for the assessment of the wind climate at the Proposed Development Site.

Two different data sets are analysed as follows:

- The meteorological data associated with the maximum daily wind speeds recorded over a 30-years period between 1990 and 2020 and,

- The mean hourly wind speeds recorded over a 10-years period between 1990 and 2020. The data is recorded at a weather station at the airport, which is located 10m above ground or 71mOD.

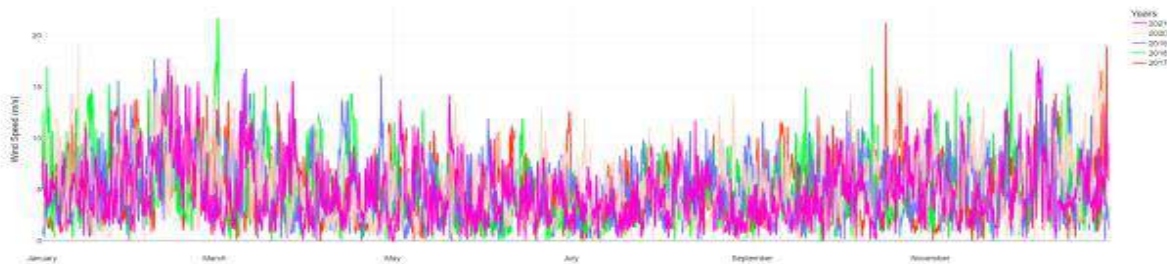


Figure 8-10: Local Wind Conditions - Wind Speed (Mean Values per Months)- historic data 1990-2020

8.2.2.4 Local Wind for the Assessment of Pedestrian Comfort and Distress

The predominant wind directions on the baseline environment identifies from which direction the wind is blowing on the site for most of the time during a typical year.

In accordance with Lawson Criteria, if the proposed site is exposed to a wind from a specific direction for more than 5% of the times, then the microclimate analysis should consider the impact of this wind (accounting for its direction and most frequent speed) on the local microclimate.

A statistical analysis was carried out based on 2 historical wind data sources:

- Meteoblue (over 40 years historical data – since 1979) – Cork Airport
- Openweather (over 40 years historical data – since 1979) – Cork Airport and Site location

To understand and correctly validate the weather conditions at the site, a comparison was carried out between the historical data provided by both sources (Meteoblue and Openweather) at the weather station (Cork Airport).

Data analysis and data visualization were obtained with an in-house program which is coded based on Python language. The speed and frequency of wind per each direction were considered, and also, seasonal changes were analysed in order to indicate the prevailing wind directions (as shown in the following Figures).

Furthermore, statistical analysis of the number of hours and magnitudes of wind for 36 angles (10° increments) is performed to produce the Lawson plots. Each of the 36 wind directions were interpolated to calculate the probability that a velocity threshold will be exceeded.

In accordance with Lawson Criteria, if the Proposed Development Site is exposed to a wind from a specific direction for more than 5% of the times, then the microclimate analysis should consider the impact of this wind (accounting for its direction and most frequent speed) on the local microclimate.

Figure 8-11 presents the wind speed diagram for Cork, the diagram shows how often (how many days per month) the wind blows with a specific speed.

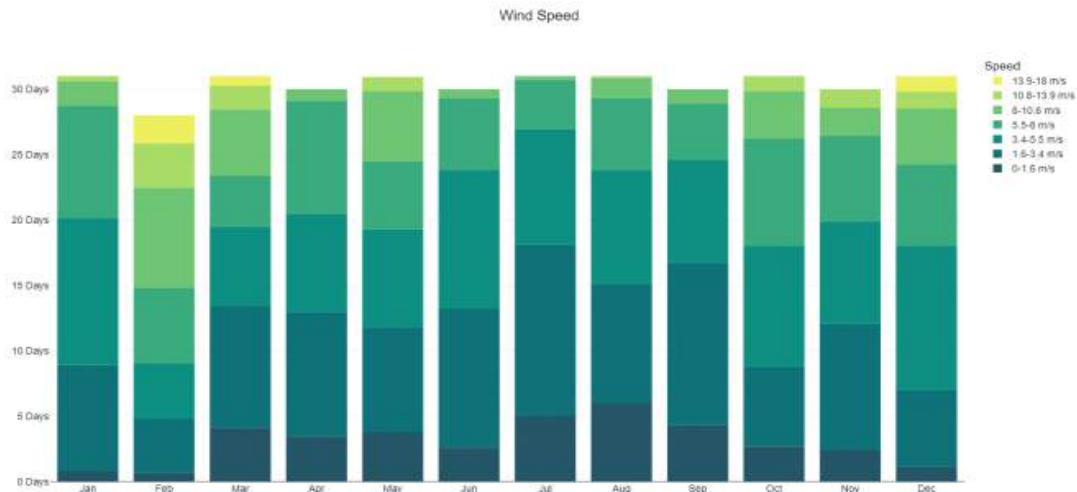


Figure 8-11: Wind Speed Monthly Historic Diagram

Figure 8-12 shows the wind rose for Cork and details how often (how many hours per year in this case) the wind blows from a specific direction, these data highlights that the predominant wind directions for the site are West-South-West, West, and South-South-West, Northwest.

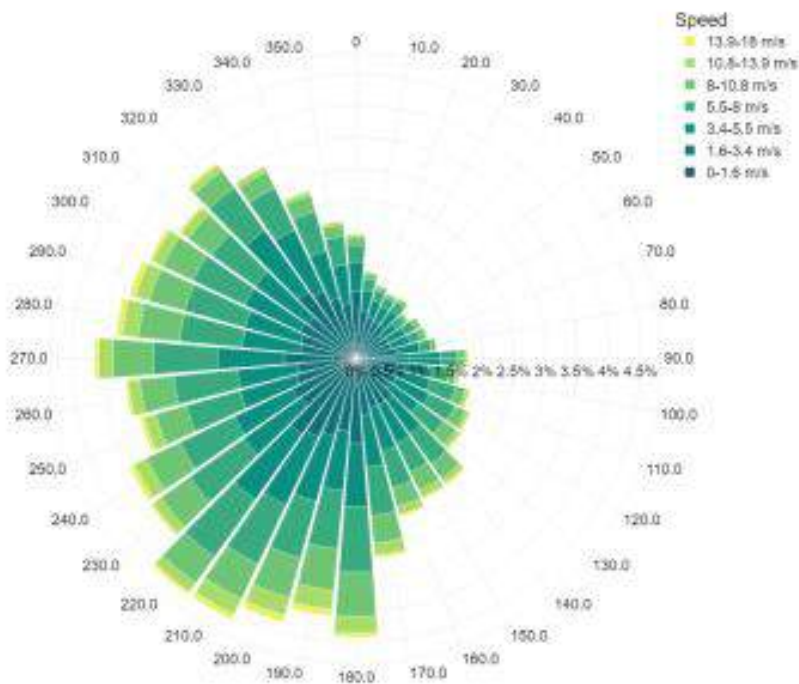


Figure 8-12: Local Wind Rose with wind frequency of occurrence details

As it can be noted, the wind at the Proposed Development Site is mostly blowing (higher frequency of occurrence) from the South-West (225deg) direction with a wind velocity of approximately 5m/s. A similar wind speed is blowing also from the South-South-West direction

(213deg), however the frequency of occurrence of this wind is less than 5% (only 3.288% of the times, as indicated in the table) therefore, this wind is not relevant for the scope of performing the pedestrian comfort and distress analysis as per Lawson Criteria. Northwest direction is also significant with wind speeds in the frequency of 3-4% of the times and mean speeds of up to 10m/s approximately.

For assessing the wind microclimate for the Proposed Development, the study has considered the site exposed to all the wind directions which exceed the 5% of frequency, as required for the Lawson Criteria and some additional high-speed winds, which are occurring less often (below 5% of the times) but that can cause distress conditions because of their speed.

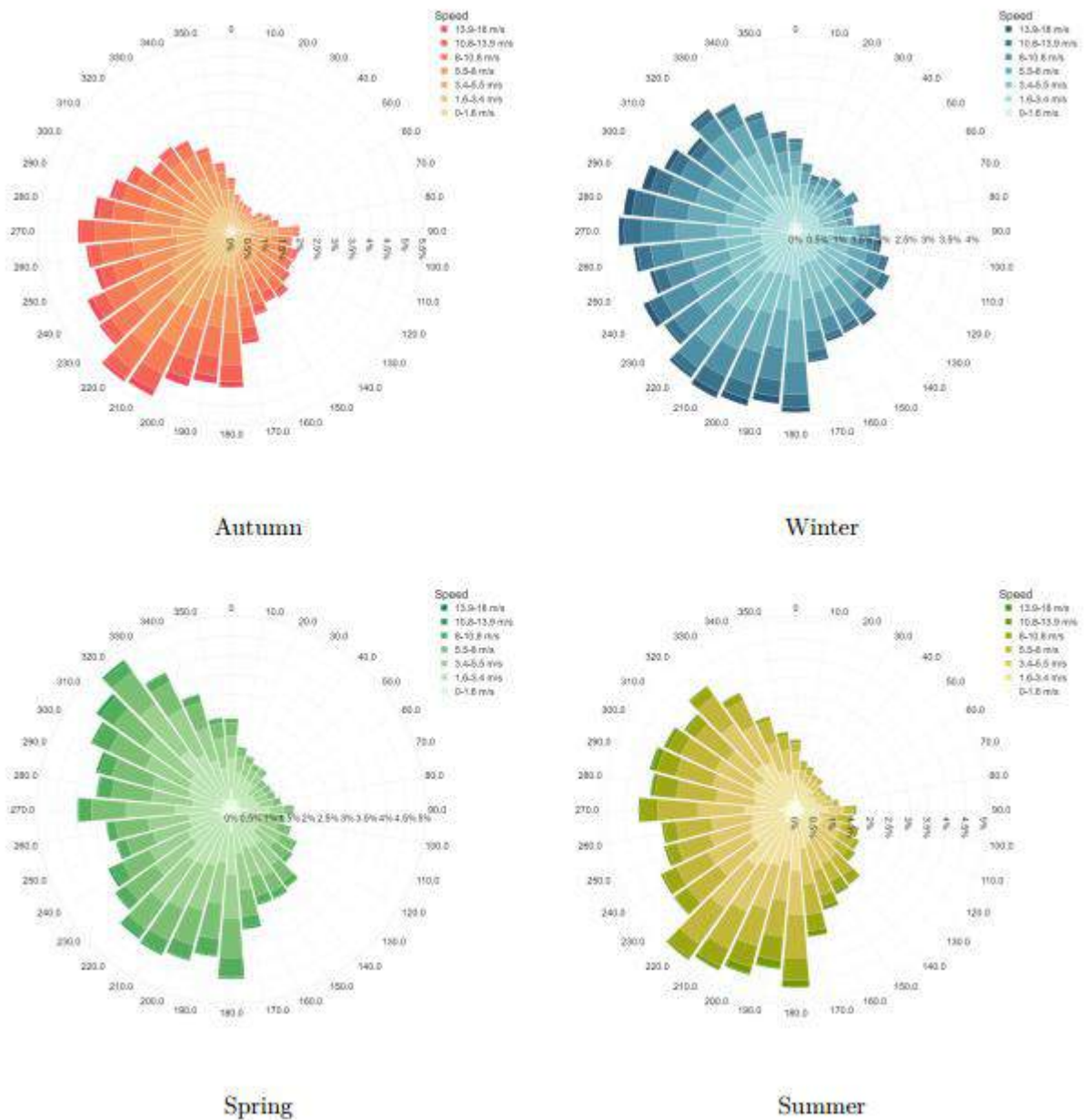


Figure 8-13: Wind speeds and wind directions at different seasons

The seasonal wind maps have been also considered for this assessment, this to characterise the conditions at which occupant will be mostly exposed when using the roof terraces proposed. Indeed, due to the higher level, the wind is increasing on the roof terraces with respect to the conditions at ground level, therefore the terraces are normally more exposed to higher speeds even when conditions at ground level could be calm.

For the above reason a seasonal usage of the terrace is a realistic consideration which permit to assess the terraces under the wind conditions typical of the season at which their usage is occurring (such as spring/summer months).

8.2.3 The Existing and Receiving Environment (Baseline Situation)

The wind microclimate of the baseline scenario is defined by the wind patterns that develop on the site and it's the surroundings (existing buildings and topography) under the local wind conditions relevant for the assessment of the Pedestrian Comfort and Distress.



Figure 8-14: Existing Receiving Environment (Baseline Situation)

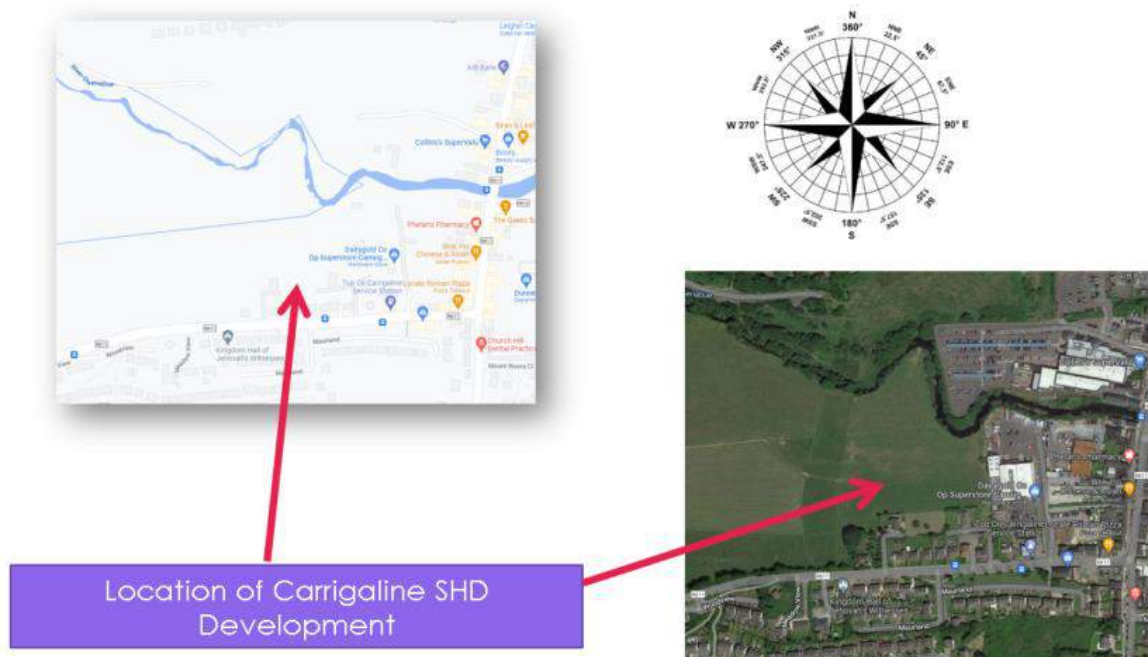


Figure 8-15: Carrigaline SHD Development Site Location and Existing Environment

8.2.3.1 Wind Microclimate at Pedestrian Level – (Baseline Scenario)

Results of the wind simulations carried out are detailed in the following sections. Results of wind microclimate at ground level (1.5m height - flow speeds) are collected throughout the modelled site and the impact of these on the potential receptors presented in the map that show the area of comfort and distress in accordance with Lawson Criteria.

These flow velocities identify if locally, wind speeds at pedestrian-level are accelerated or decelerated in relation to the undisturbed reference wind speed due to the presence of the existing baseline environment. As it can be seen, wind speeds are shown to be within tenable conditions and in general comparable to the wind speed of the undisturbed flow for the direction considered.

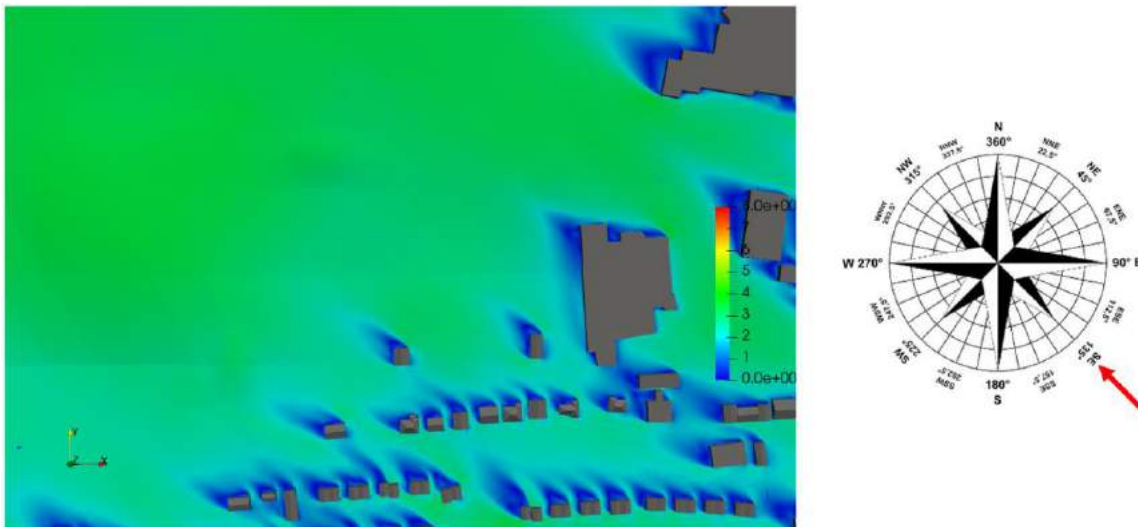


Figure 8-16: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 135°

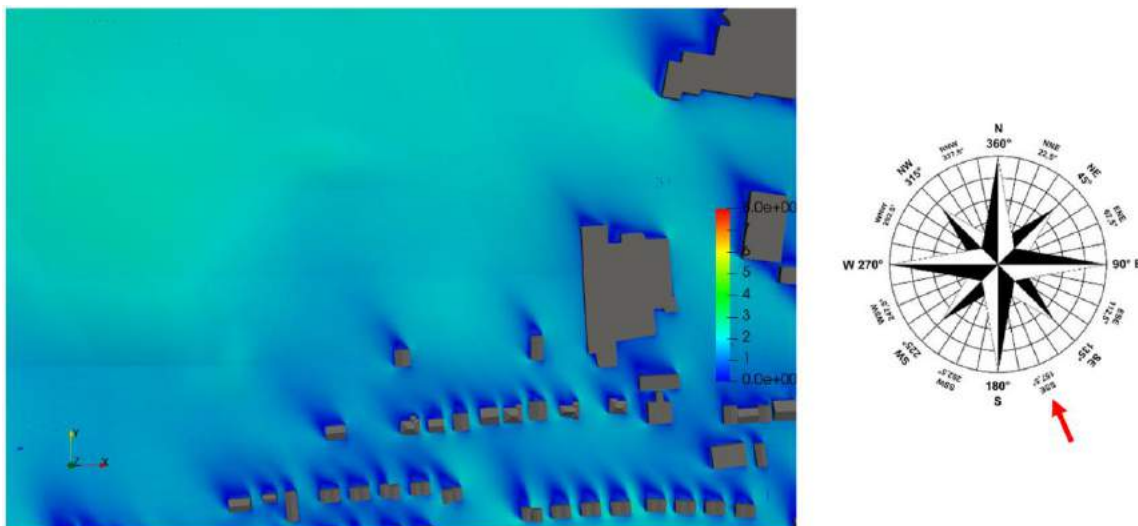


Figure 8-17: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 157°

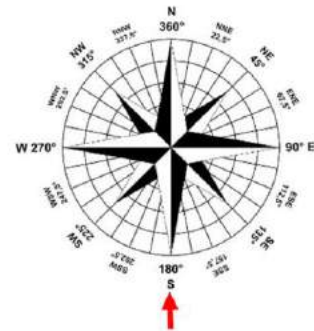
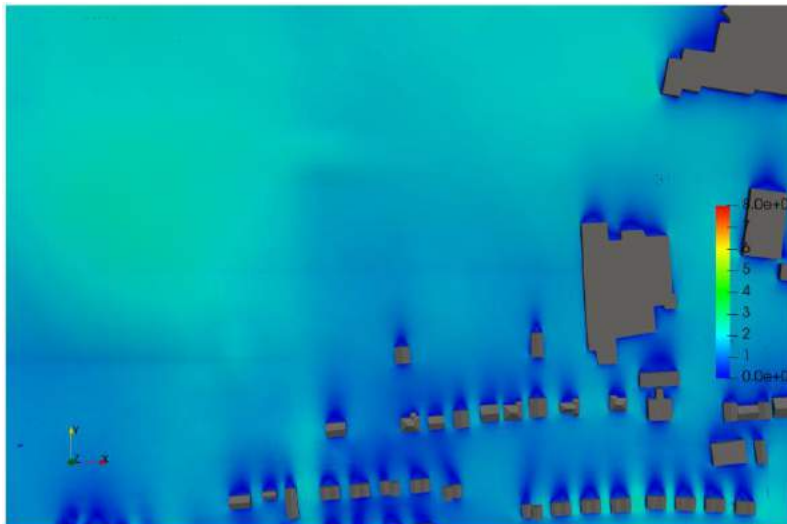


Figure 8-18: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 180°

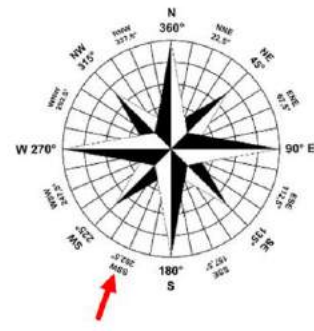
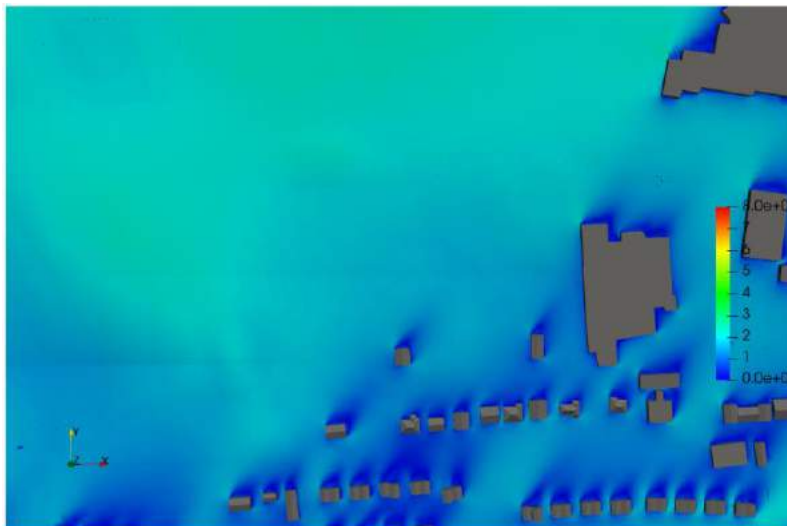


Figure 8-19: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 202°

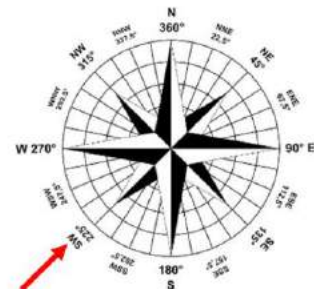
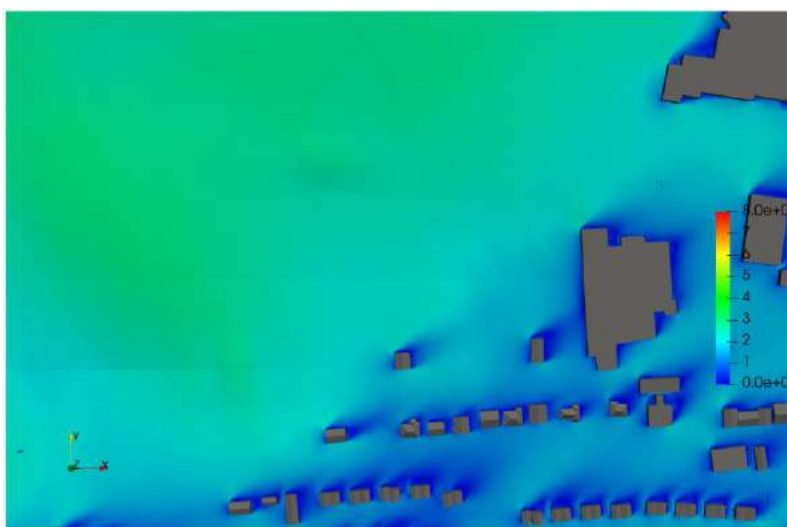


Figure 8-20: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 225°

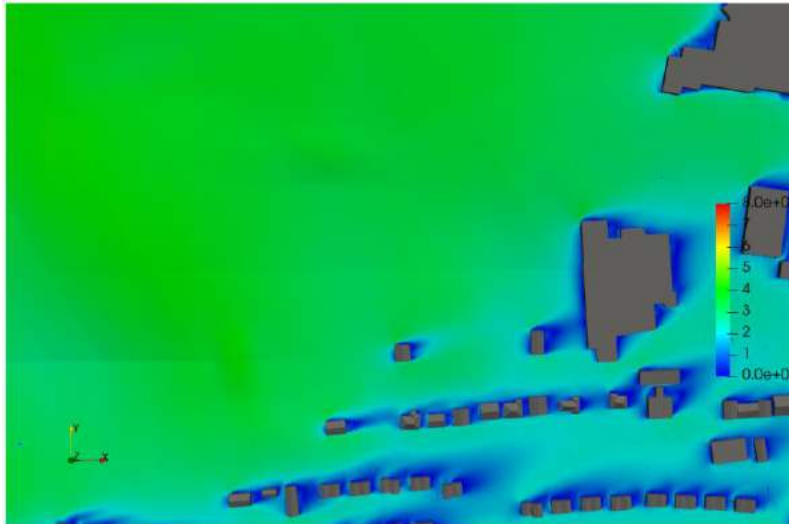


Figure 8-21: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 236°

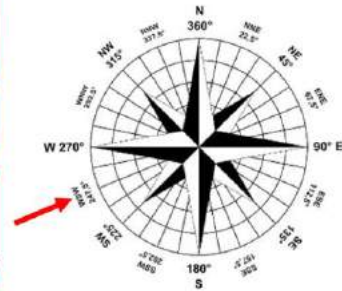
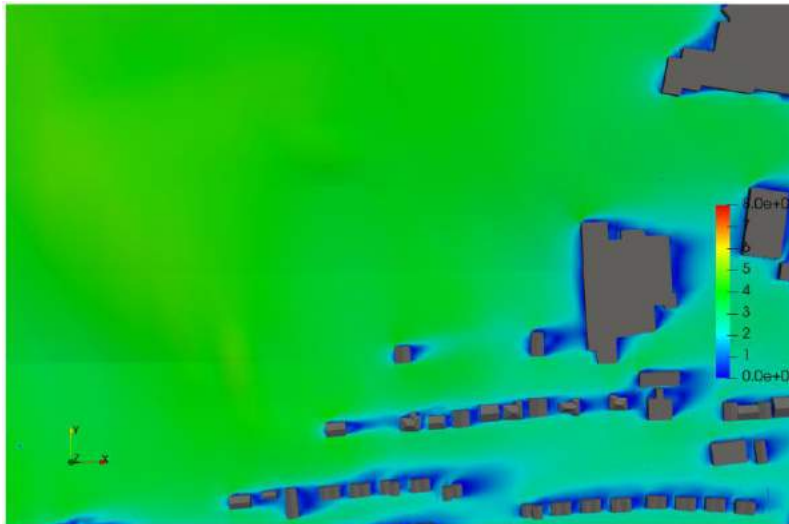


Figure 8-22: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 247°

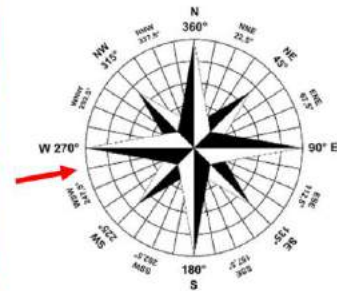
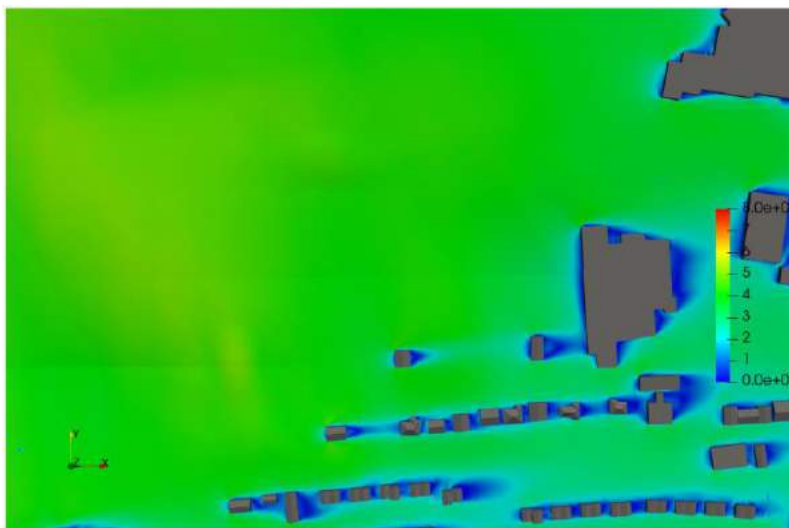


Figure 8-23: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 258°

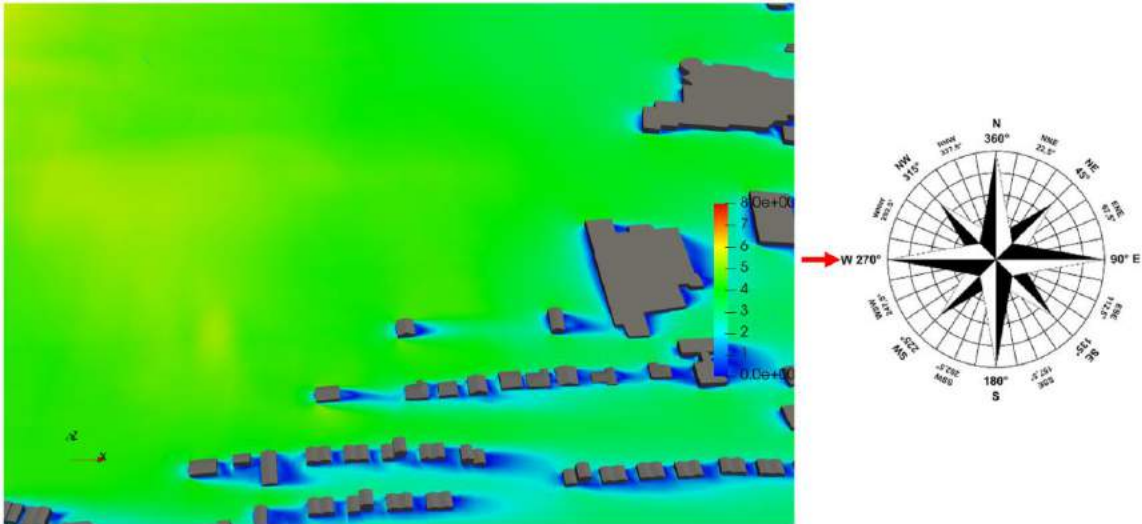


Figure 8-24: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 270°

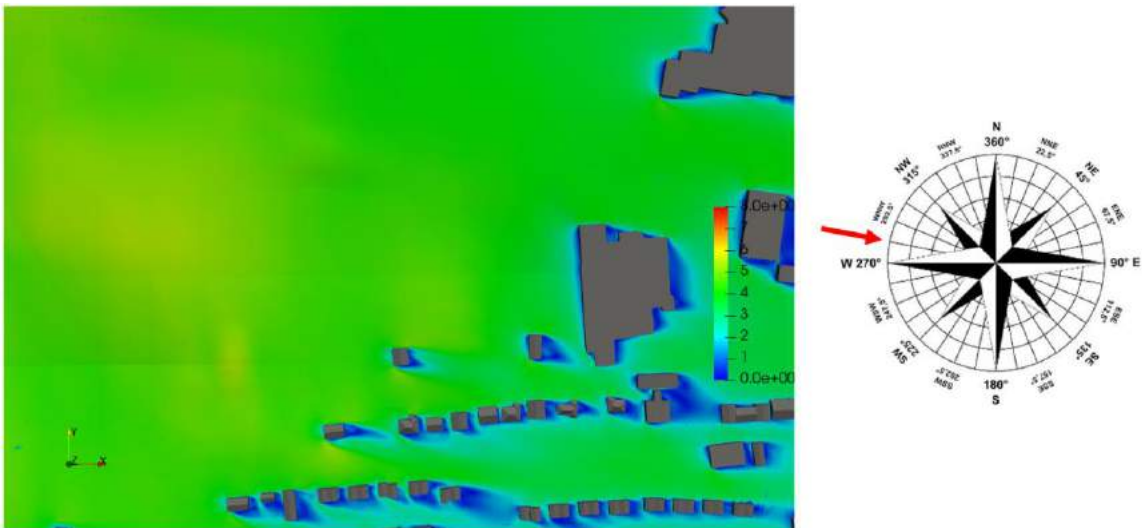


Figure 8-25: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 285°

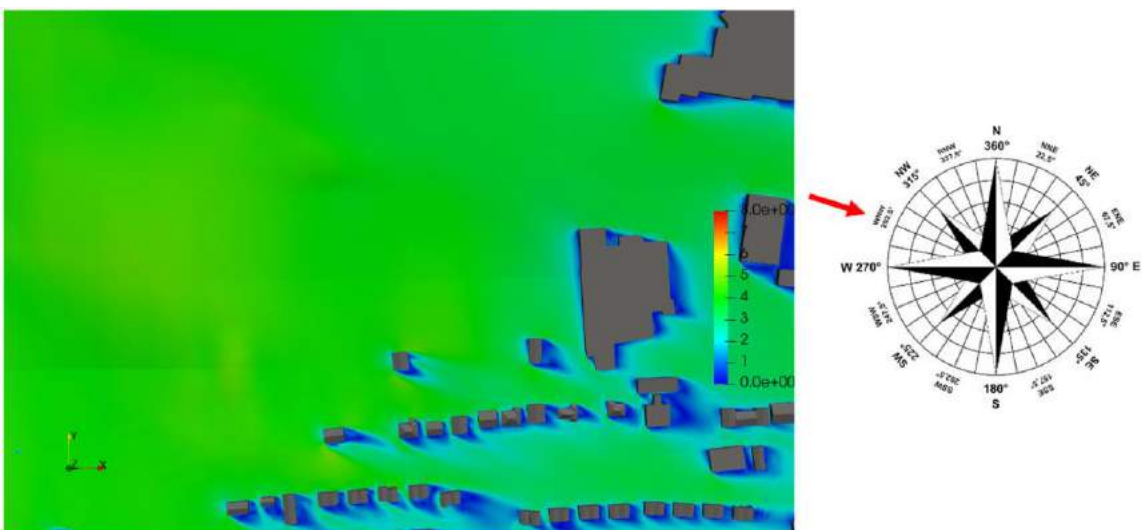


Figure 8-26: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 292°

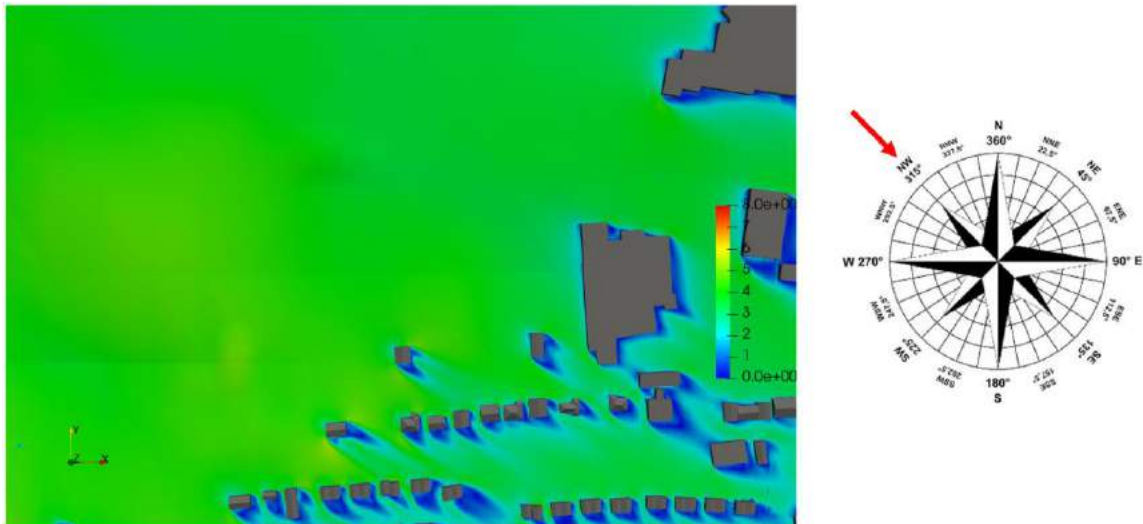


Figure 8-27: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 315°

8.2.3.2 Impact on Pedestrian Comfort and Distress

The wind flow results obtained simulating the different direction and wind speeds, are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows. The comfort / distress conditions are presented using a colour coded diagram (Figure 8-28) formulated in accordance with the Lawson Criteria.



Figure 8-28: Colour coded Lawson category for plotting of the Lawson Map

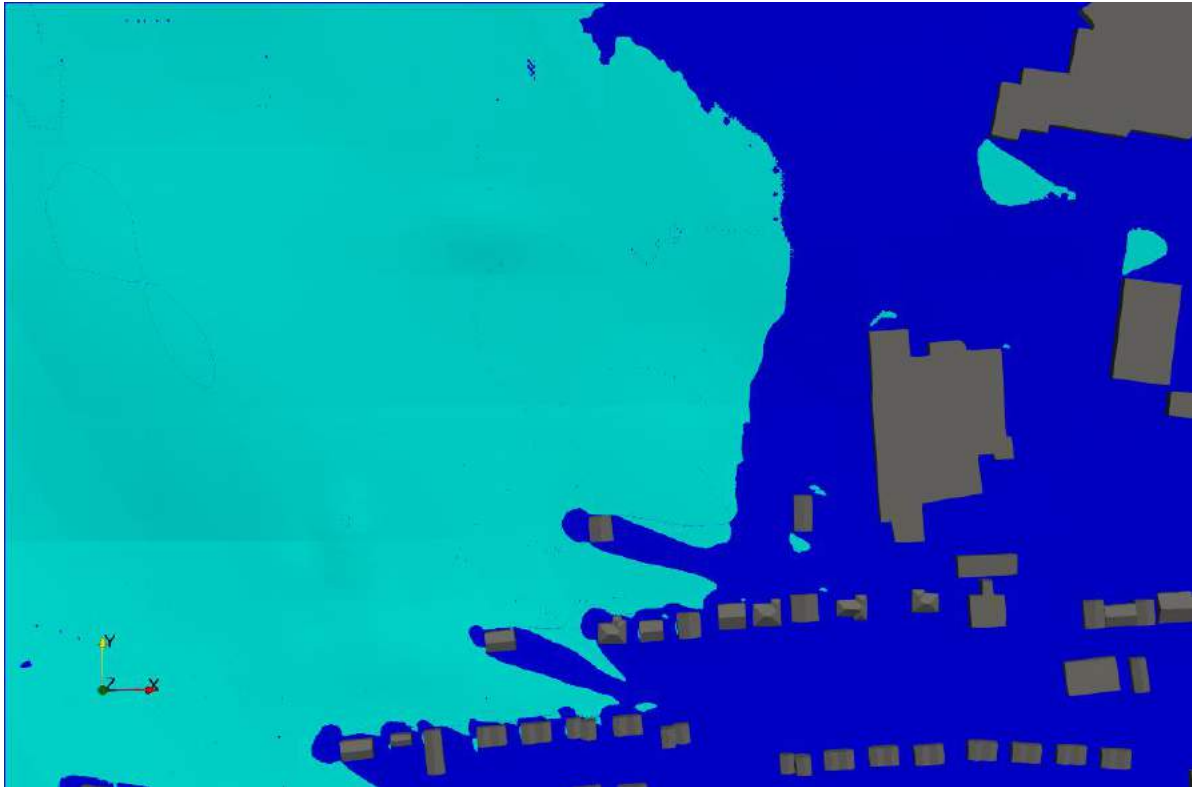


Figure 8-29: Carrigaline Baseline Condition – Lawson Comfort Map at Ground Level

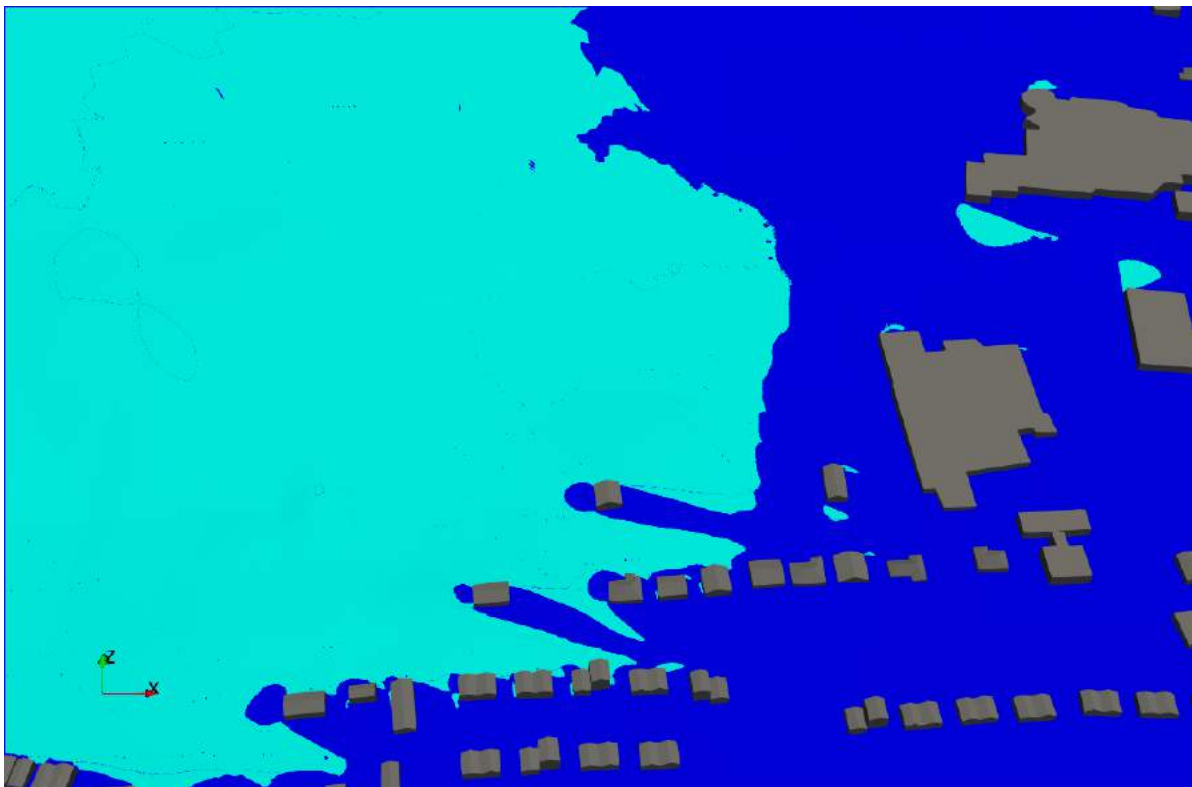


Figure 8-30: Carrigaline Baseline Condition – Lawson Comfort Map at Ground Level

- The assessment of the baseline scenario has shown that no area is un-safe and no conditions of distress are created in the existing environment under the local wind climate.
- The site is usable for walking and short-term sitting, the roads in the surrounding are usable for their intended scope (walking).
- At the moment, there is no designated area for public long-term sitting, however some area of the site present comfortable conditions for this activity.

8.2.4 Characteristics of the Proposed Development

The Proposed Development will consist of:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units:
- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

The following image shows the CFD model developed for the purpose of assessing the wind impact on the Proposed Development microclimate, this accounting for the on-site receptors and off- site receptors within the area of 400-500m radius from the centre of the site.



Figure 8-31: CFD Model of the Proposed Development in the existing environment

8.2.4.1 Potential Receptors

Potential receptors for the wind assessment are all pedestrian circulation routes, building entrances and leisure open areas within the site and in neighbouring adjacent areas. The pedestrian level is considered at 1.5m above ground.

In addition to the roads and entrances, some sensitive receptors for this assessment are highlighted in the following image and relate to the “Public Open Space”, “Communal Open Space”, “Roof terraces at level 3 and 4 of Block B” which will be used by public for long term sittings and need to be particularly comfortable/safe.



Figure 8-32: Proposed Carrigaline SHD Development - Potential Sensitive Receptors - Pedestrian Activities Area (green colour)

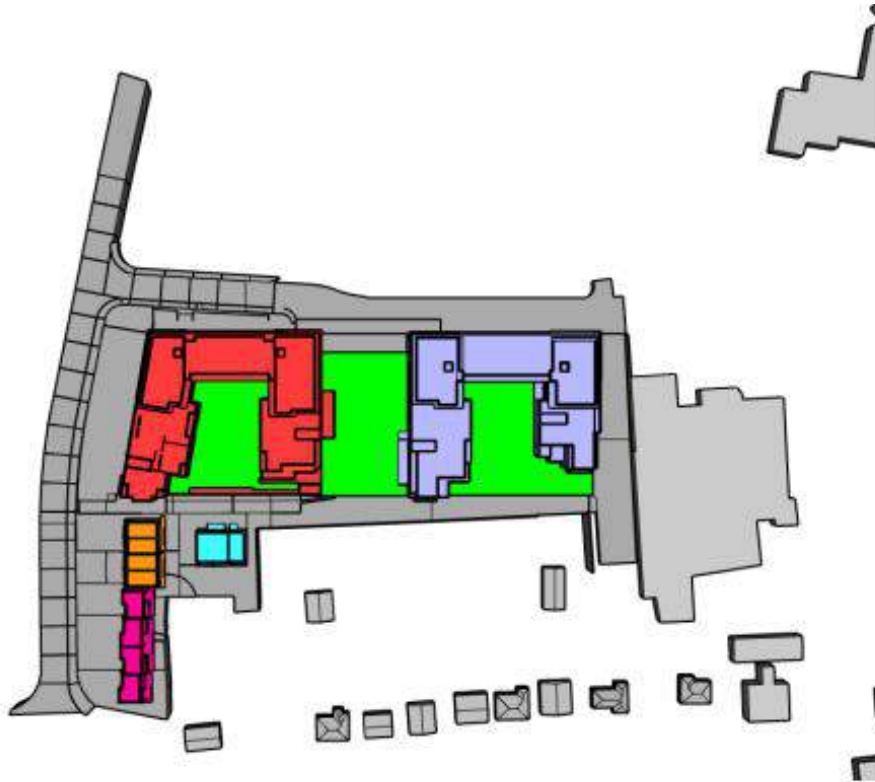


Figure 8-33: Potential Sensitive Receptors on courtyard - Pedestrian Activities Area (green colour)

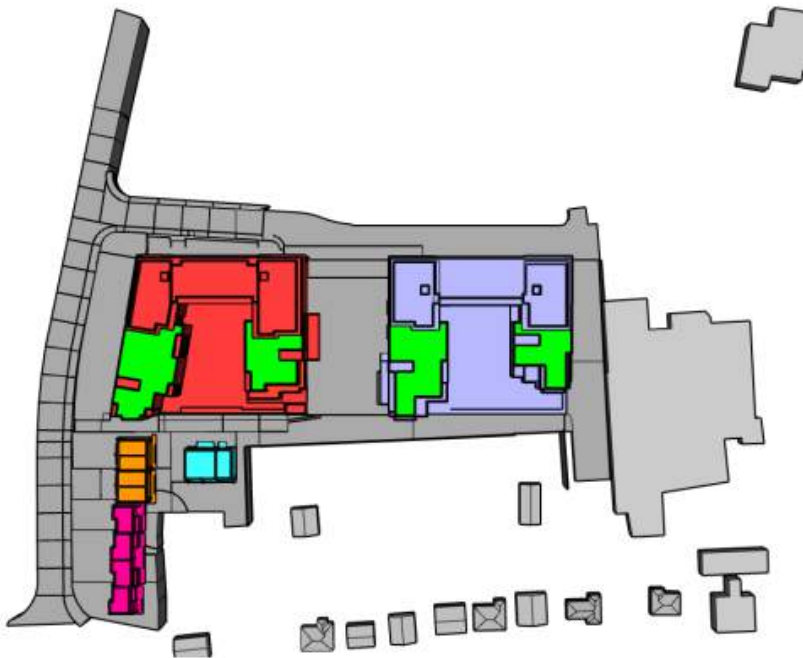


Figure 8-34: Potential Sensitive Receptors on terraces - Pedestrian Activities Area (green colour)

8.2.5 Potential Impact of the Proposed Development

The wind microclimate of the Proposed Development is defined by the wind patterns that develop in the surroundings of the Proposed Development under the local wind conditions relevant for the Lawson Criteria and considering the existing buildings and topography. For this analysis also the proposed landscaping is included as the presence of landscaping in corners of buildings and roads impact in a beneficial way the local microclimate, creating calmer *wind conditions*.



Figure 8-35: CFD Model of the Proposed Development Scenario

Results of the wind simulations carried out are detailed in the following sections. Results of wind microclimate at ground level (1.5m height - flow speeds) are collected throughout the modelled site, and the impact of these on the potential receptors is presented in the map that show the area of comfort and distress in accordance with Lawson Criteria.

8.2.5.1 Construction Phase

As construction of the Carrigaline SHD progresses, the wind conditions at the site would gradually adjust to those of the completed development. During the construction phase, wind conditions will be in line with the baseline wind microclimate and the effect on potential receptors (pedestrians) can be considered negligible. Furthermore, the areas more sensitive for receptors are potentially not going to be used until construction will be finalised.

8.2.5.2 Operational Phase

8.2.5.2.1 Wind Microclimate at Pedestrian Level

Results of wind speeds and their circulations at pedestrian level of 1.5m above the development ground are presented in the images that follow in order of frequency of occurrence, from the most frequent wind direction to the least frequent one.

These flow velocities identify if locally, wind speeds at pedestrian-level are accelerated or decelerated in relation to the undisturbed reference wind speed (baseline wind speed) by the presence of the Proposed Development. As it can be seen, wind speeds are shown to be within tenable conditions and in general comparable to the wind speed of the undisturbed flow for the direction considered.

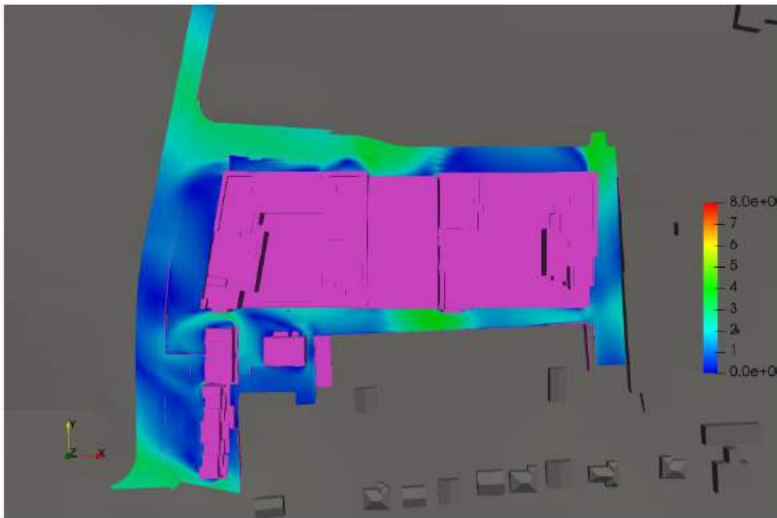


Figure 8-36: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 135°

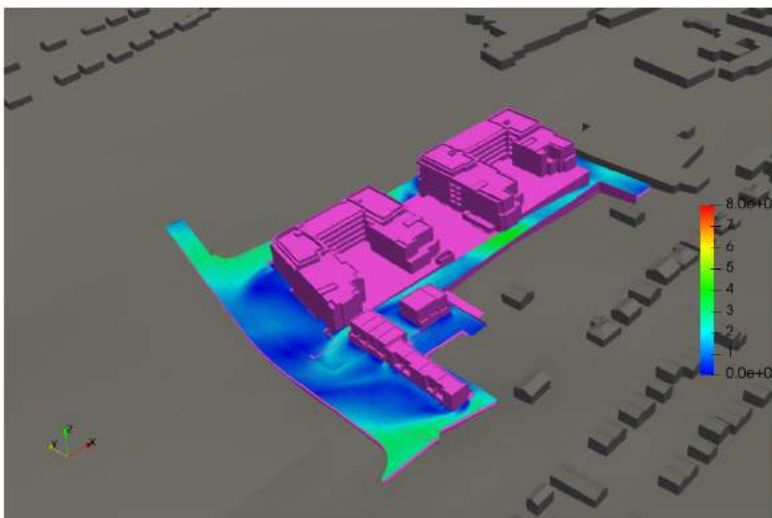
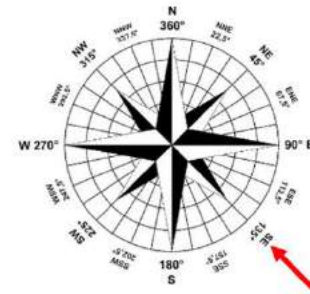
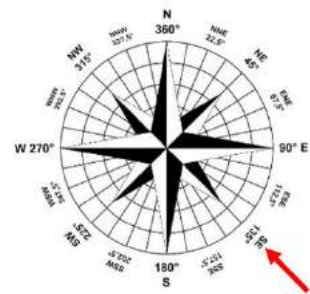


Figure 8-37: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 135°



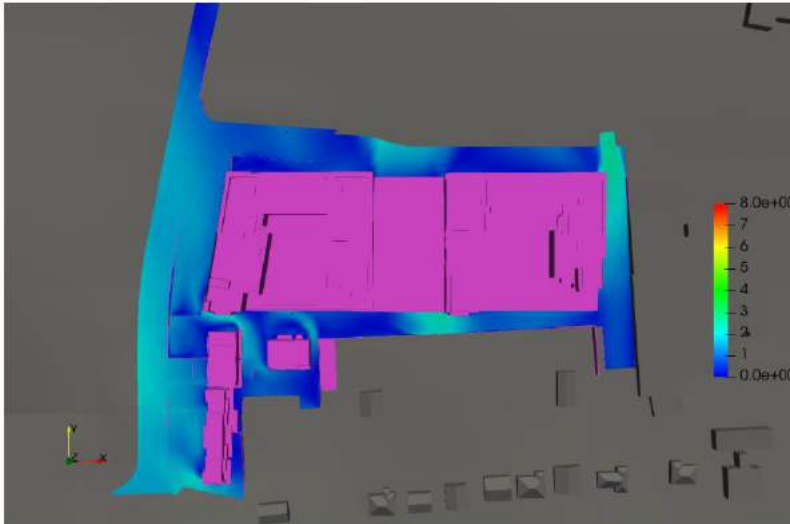


Figure 8-38: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 157°

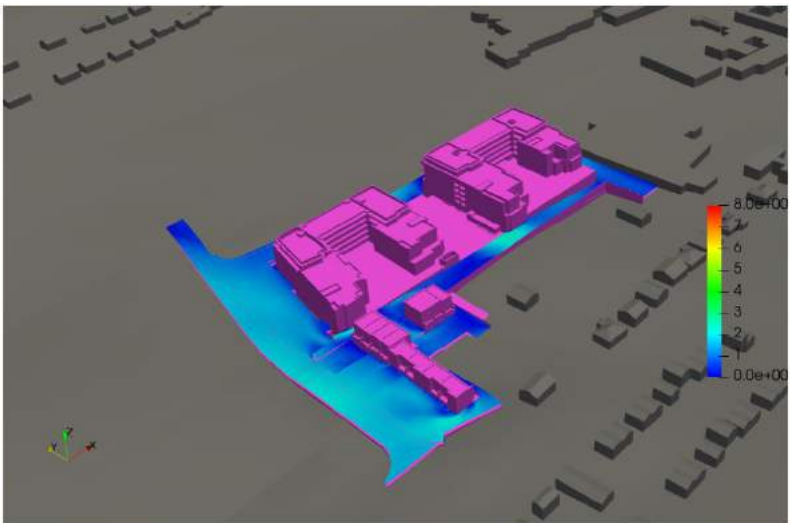


Figure 8-39: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 157°

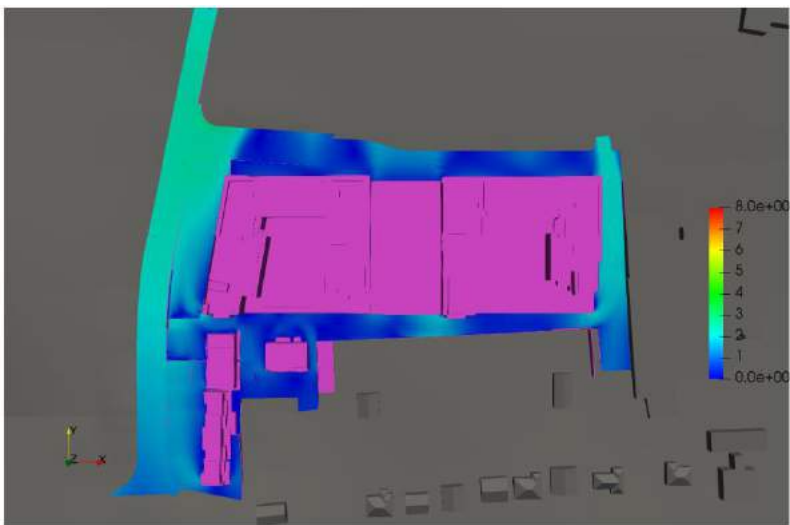


Figure 8-40 : Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 180°

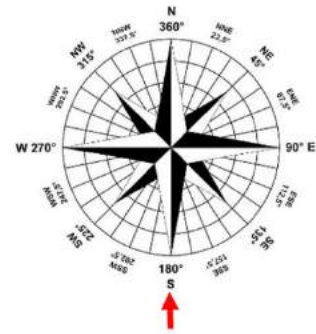
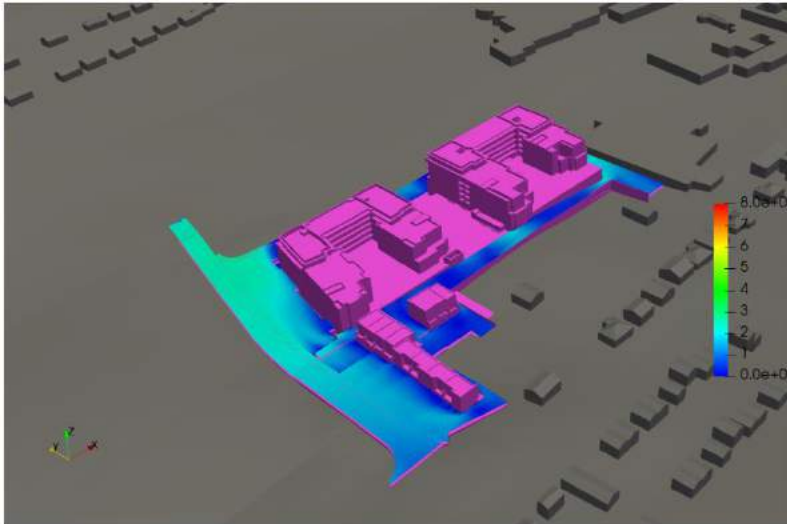


Figure 8-41: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 180°

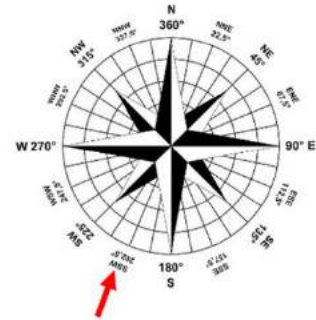
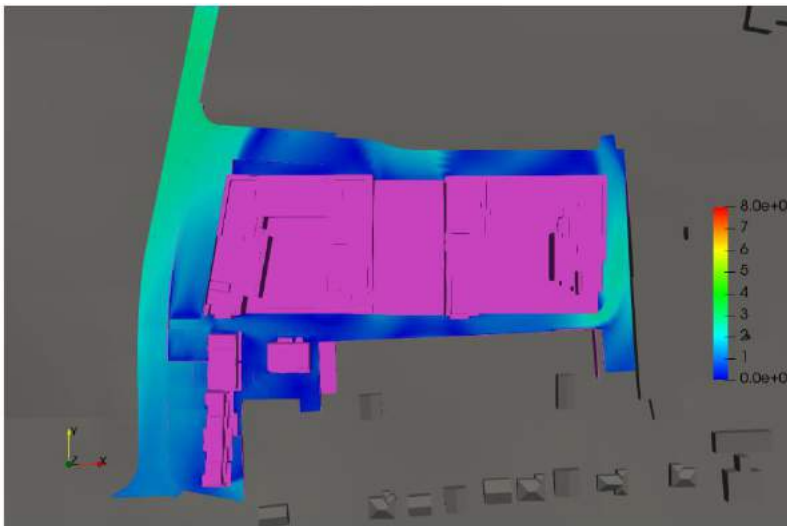


Figure 8-42: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 202°

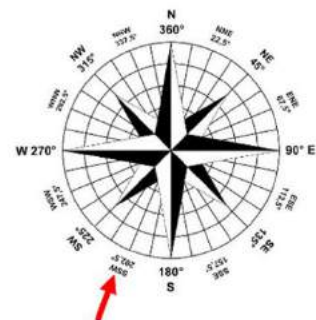
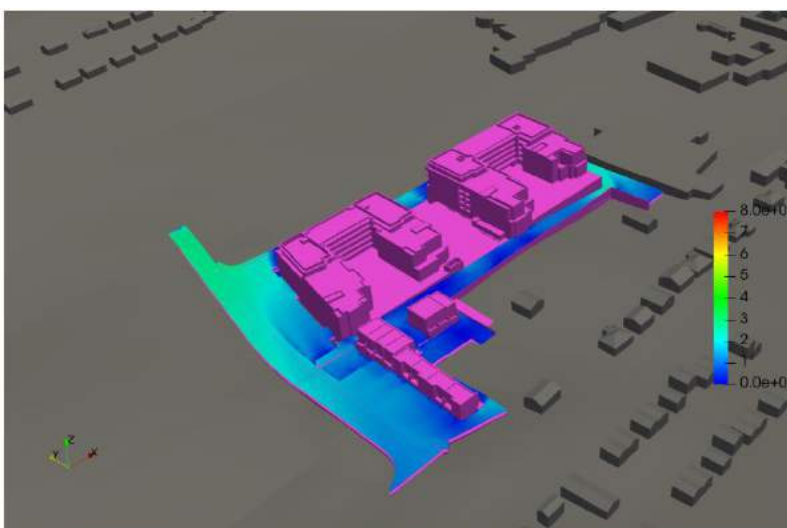


Figure 8-43: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 202°

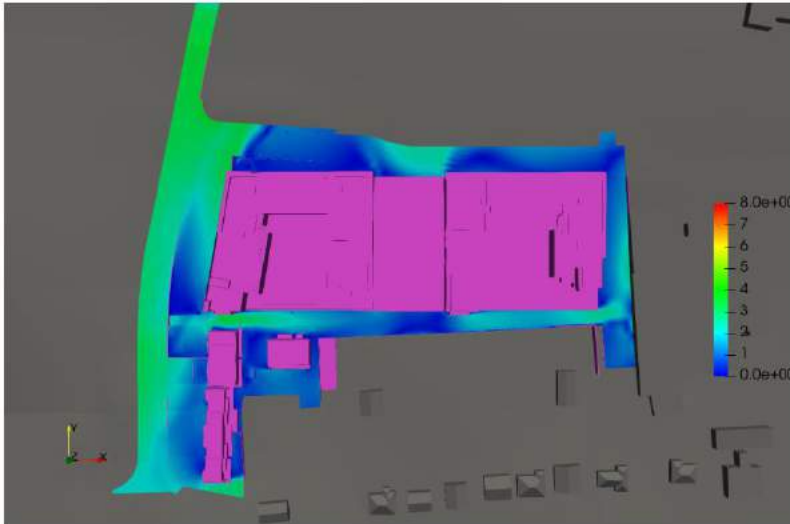


Figure 8-44: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 225°

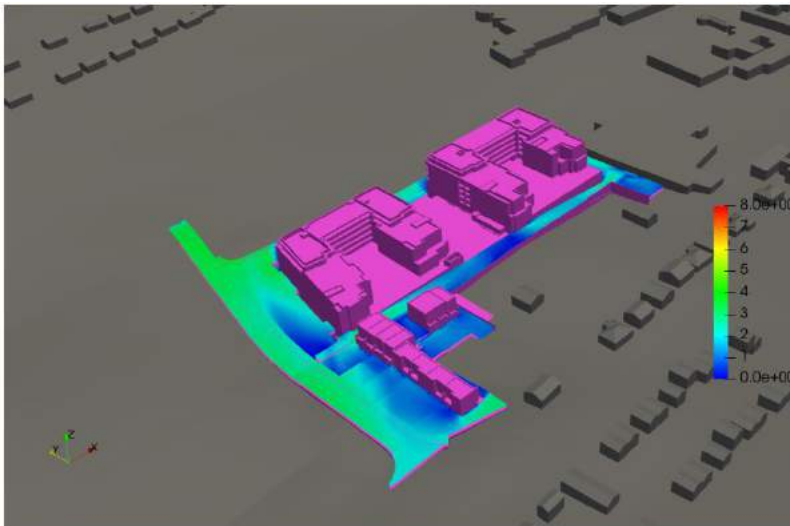


Figure 8-45: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 225°

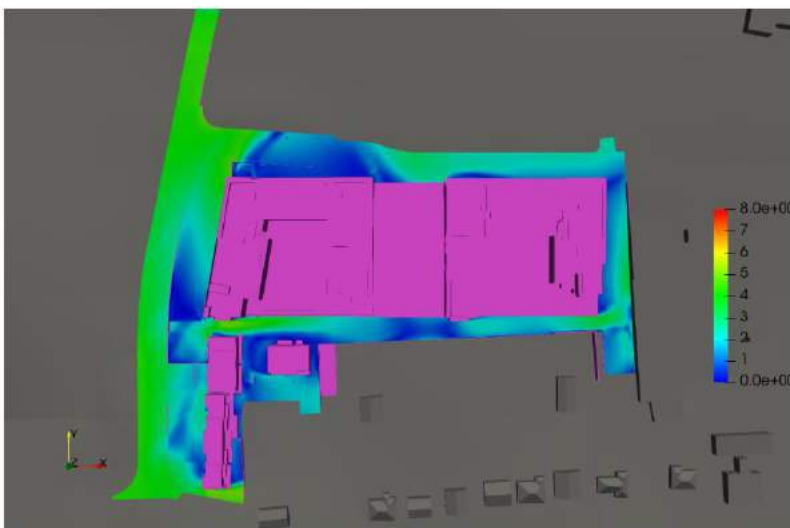


Figure 8-46: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 236°

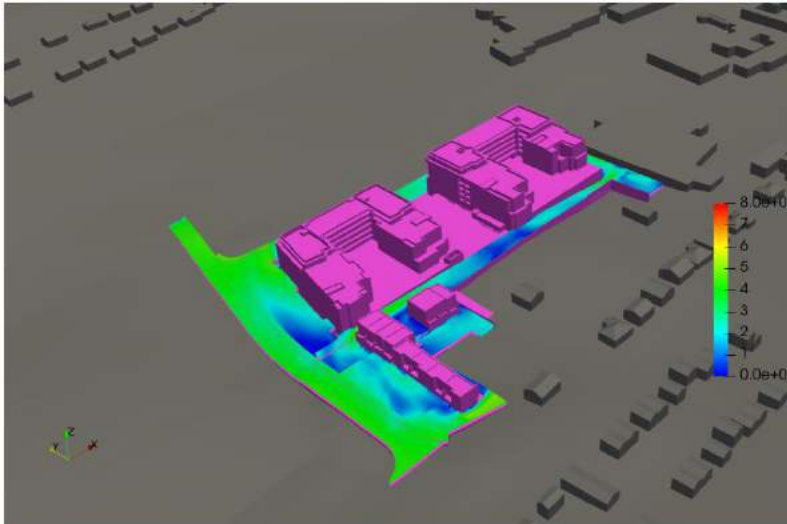


Figure 8-47: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 236°

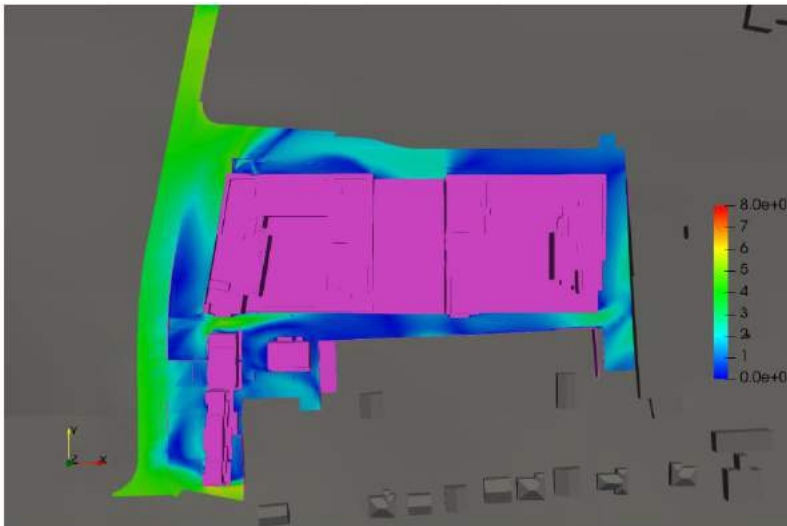


Figure 8-48: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 247°

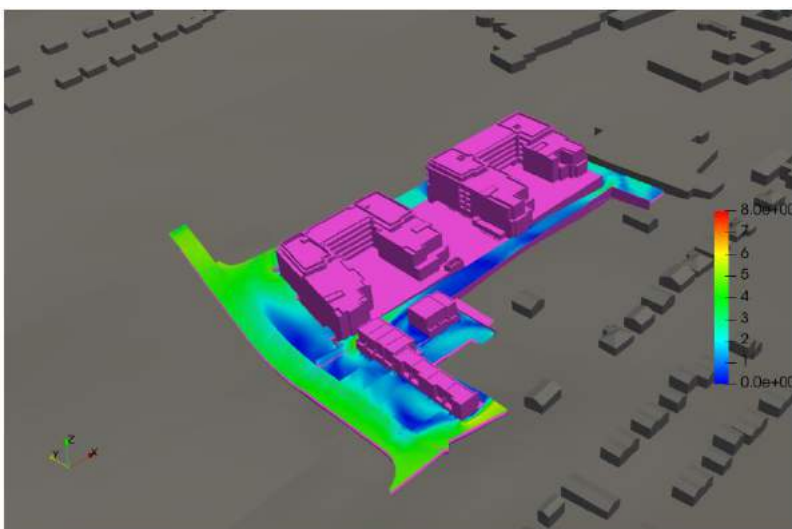


Figure 8-49: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 247°

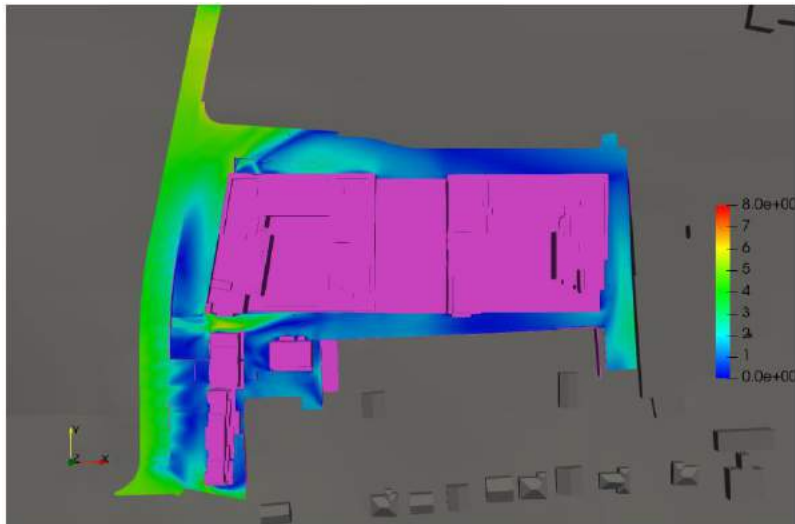


Figure 8-50: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 258°

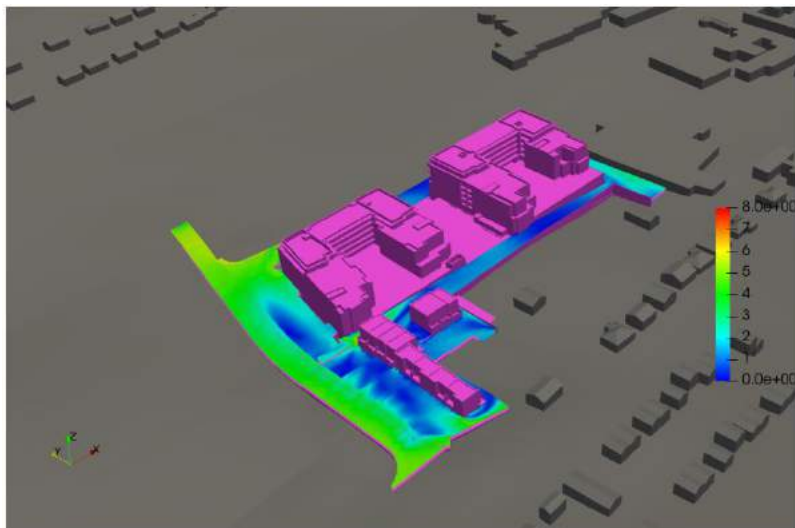


Figure.8-51: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 258°

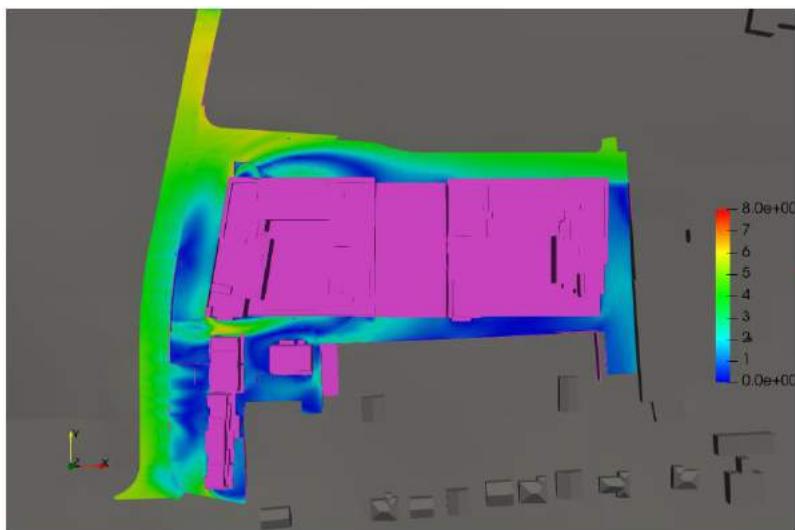


Figure 8-52: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 270°

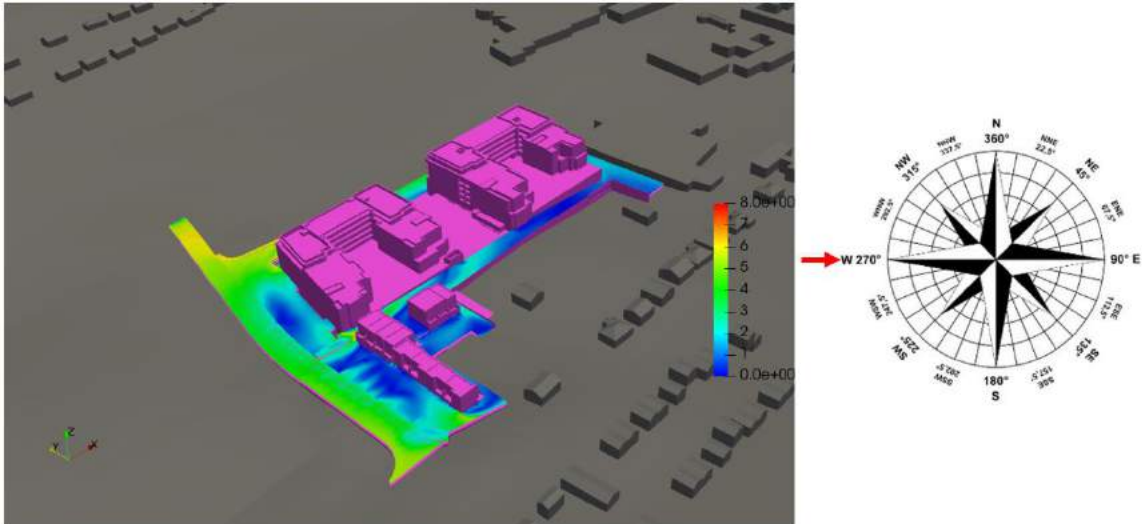


Figure 8-53: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 270°

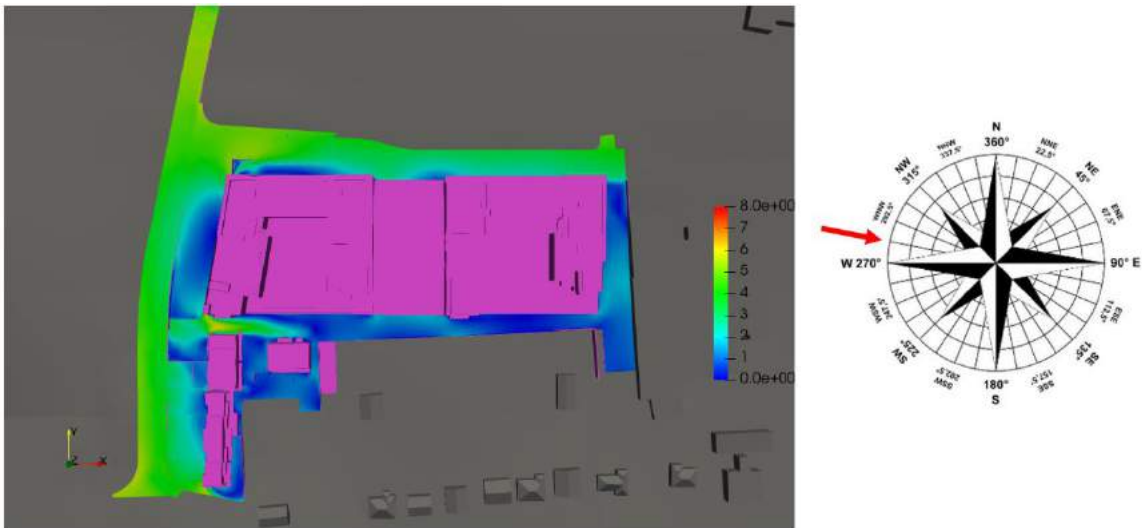


Figure 8-54: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 281°

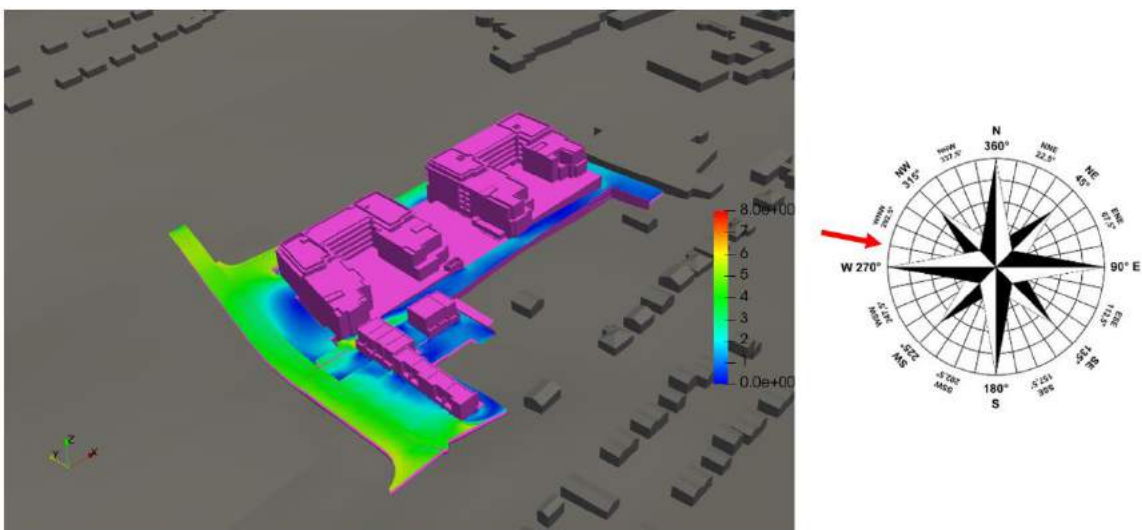


Figure 8-55: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 281°

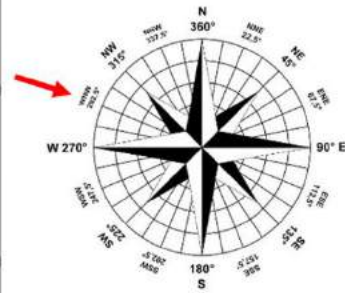
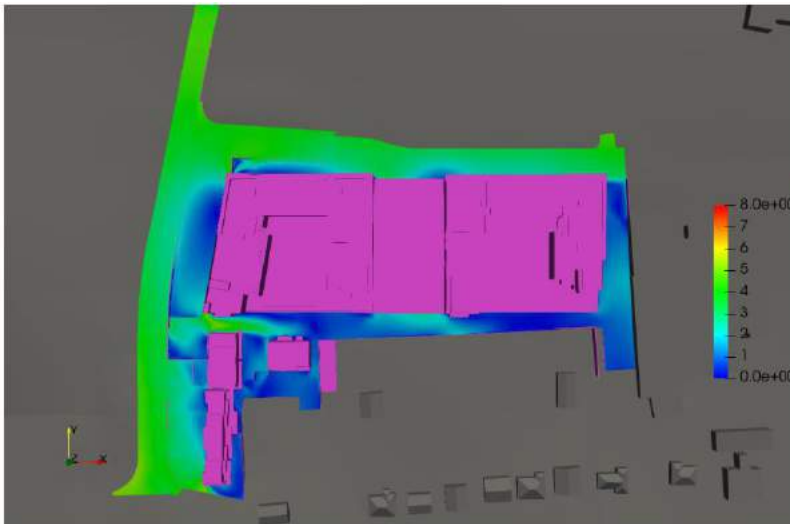


Figure 8-56: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 292°

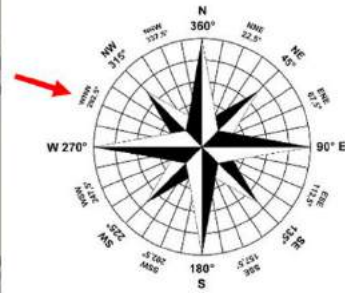
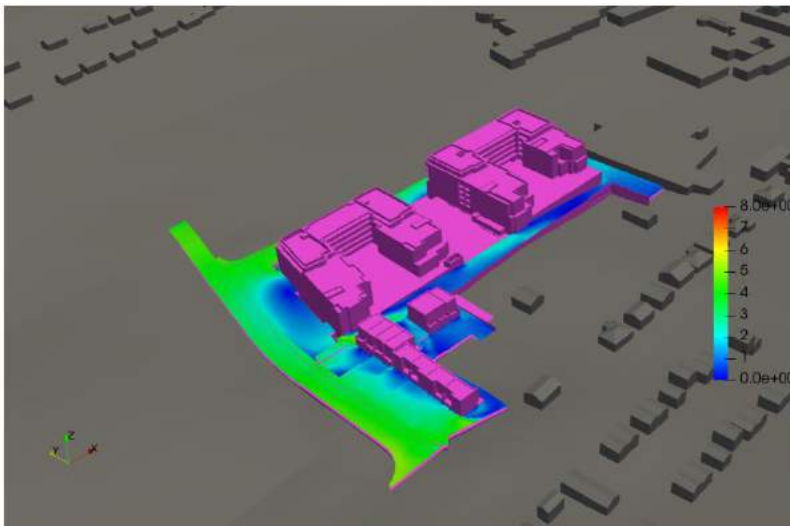


Figure 8-57: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 292°

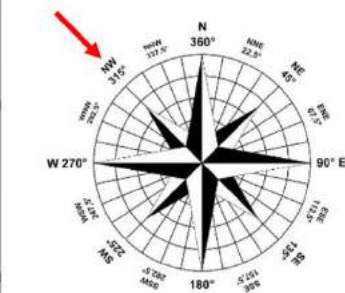
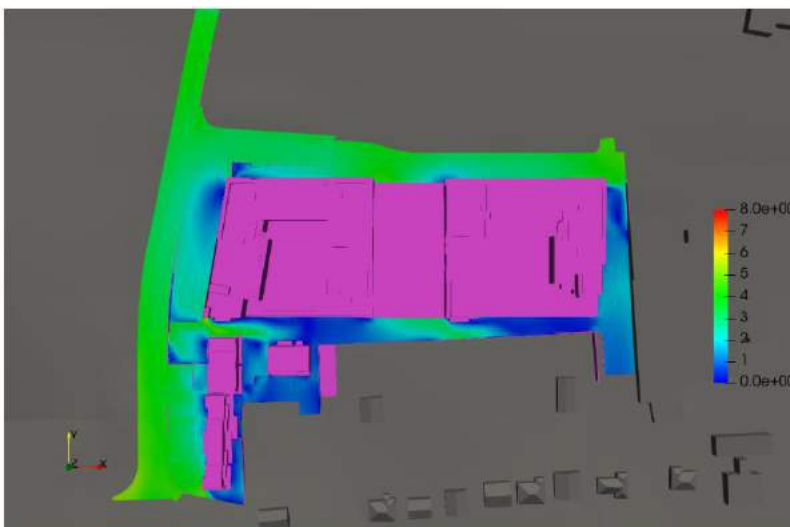


Figure 8-58: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 315°

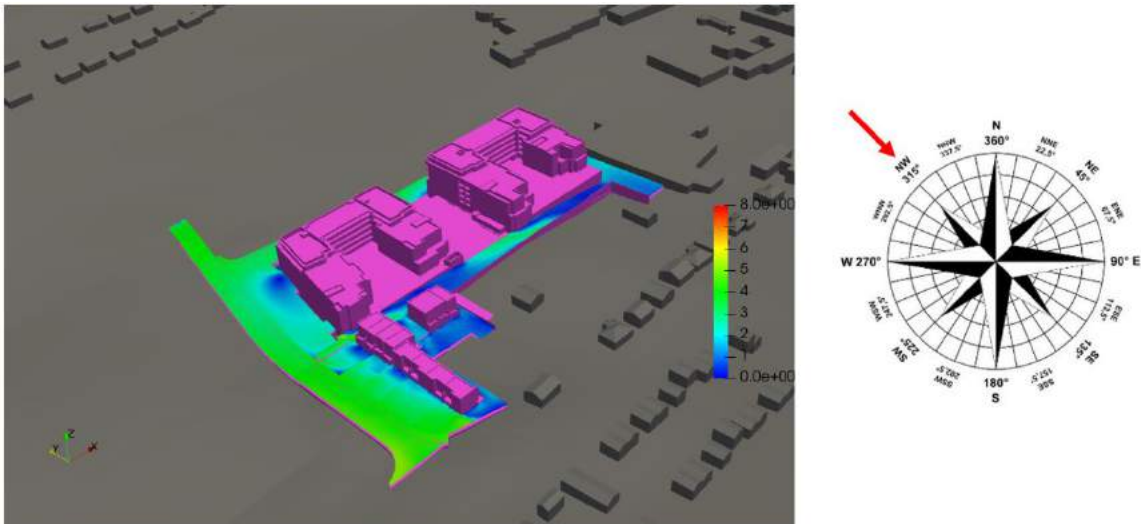


Figure 8-59: Pedestrian Level - Velocity at 1.5m above the ground - Wind Direction: 315°

8.2.5.2.2 Impact on Pedestrian Comfort and Distress

The wind flow results obtained simulating the different direction and wind speeds, are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows. The comfort / distress conditions are presented using a colour coded diagram (Figure 8-60) formulated in accordance with the Lawson Criteria.

The assessment of the proposed scenario has shown that no area is unsafe, and no conditions of distress are created by the Proposed Development.

The wind microclimate of the Proposed Development is comfortable and usable for pedestrians. As the result of the Proposed Development construction, the wind on the surrounding urban context is also mitigated when compared with the baseline situation. In this sense the Proposed Development has a beneficial effect on the surrounding wind microclimate and can create comfortable pedestrian areas and public spaces.



Figure 8-60: Colour coded Lawson category for plotting of the Lawson Map

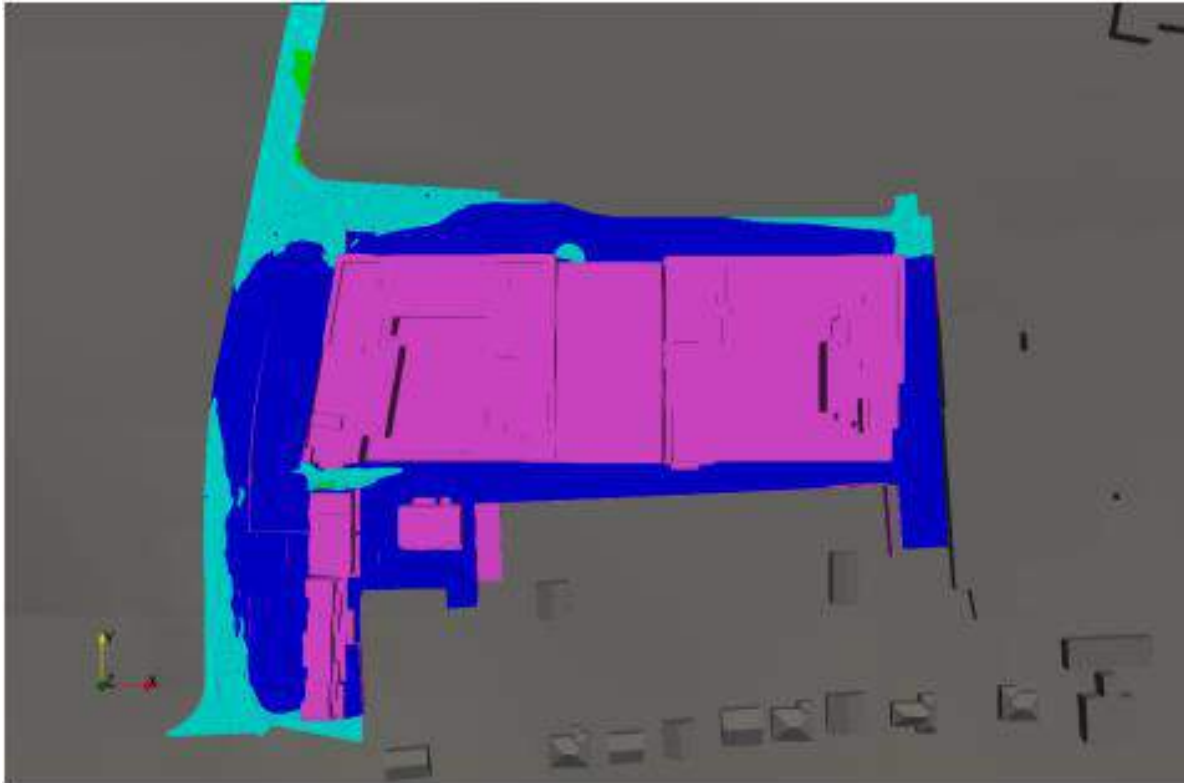


Figure 8-61: Carrigaline Proposed Development - Pedestrian Level - Lawson Comfort / Distress Map

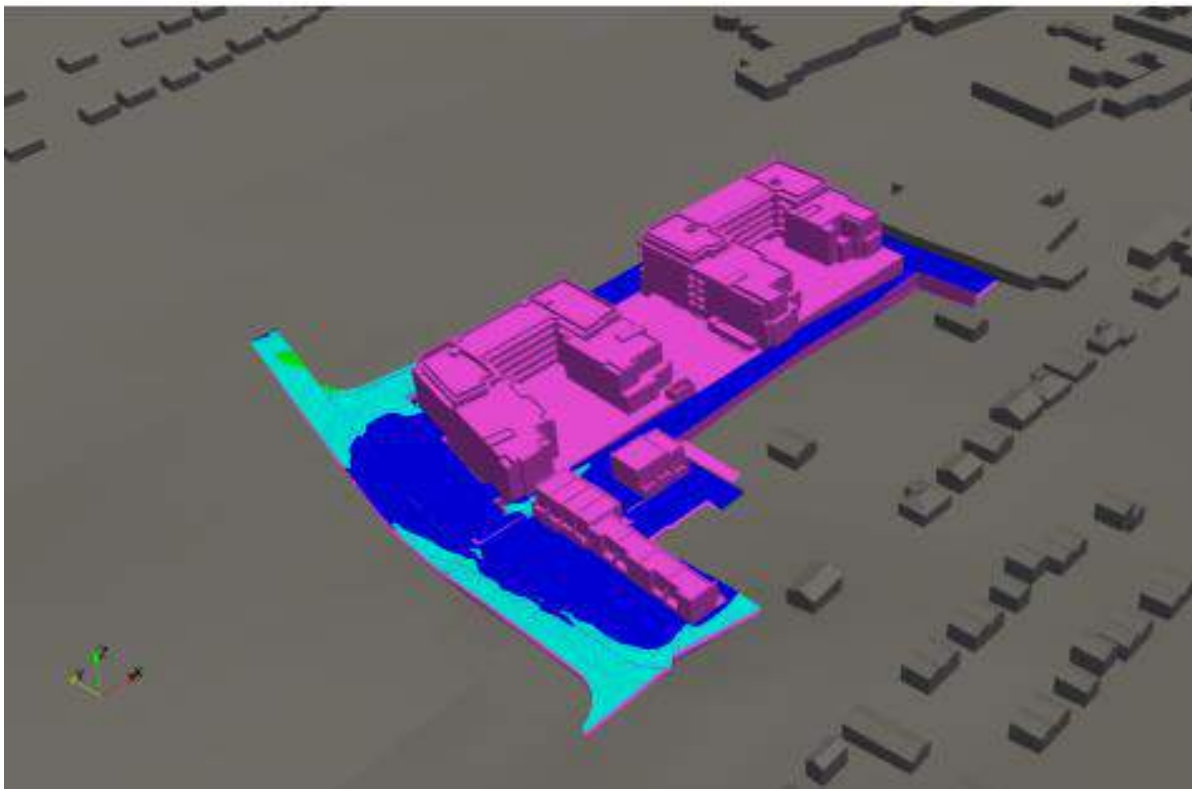


Figure 8-62: Carrigaline Proposed Development - Pedestrian Level - Lawson Comfort / Distress Map

8.2.5.2.3 Wind Microclimate at Roof Terraces Level

The results of the wind impacts are collected at 1.5 m height above the roof terraces. The terraces will be available to residents use and they are part of the sensitive receptors for this assessment. The images that follow show the wind flow velocities at roof terrace level for the directions simulated and the speed relevant to the Lawson criteria for Comfort and *Distress*.

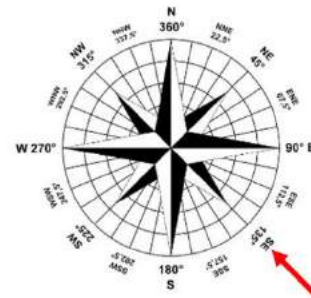
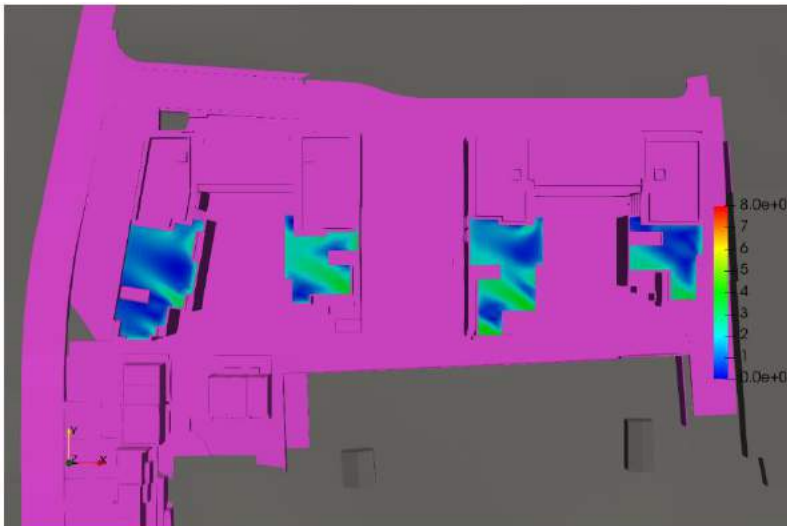


Figure.8-63: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 135°

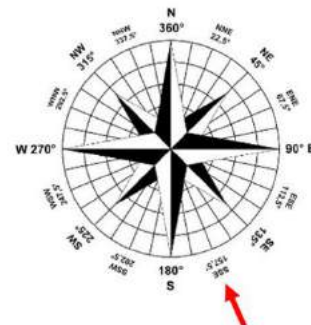
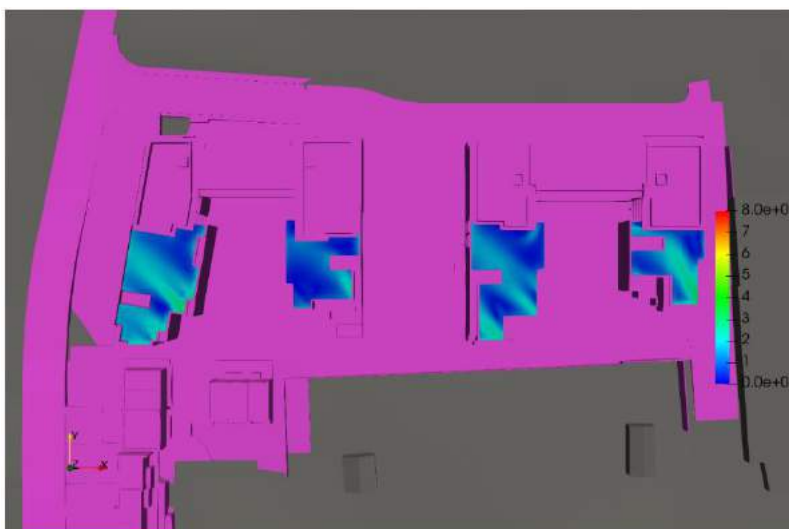


Figure.8-64: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 157°

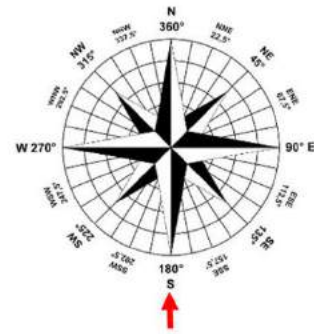
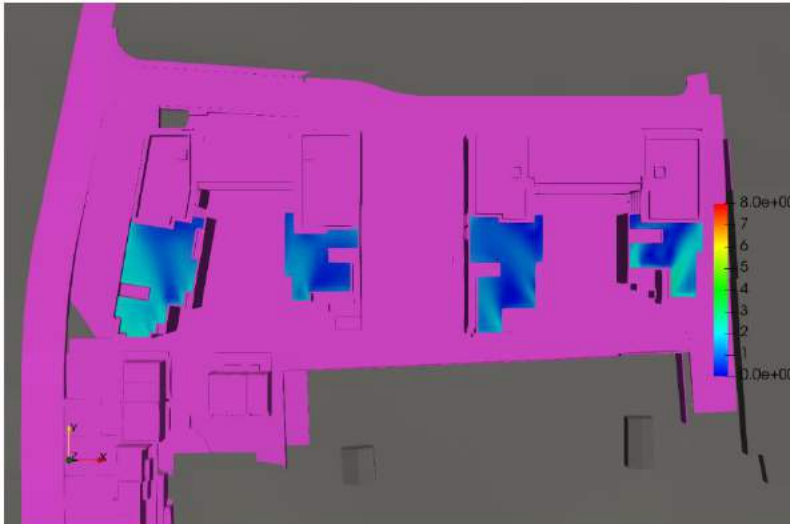


Figure 8-65: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 180°

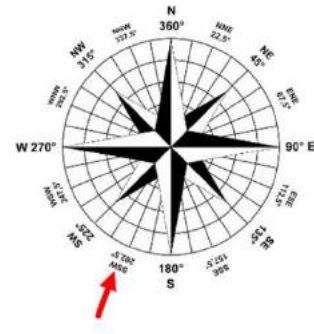


Figure.8-66: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 202°

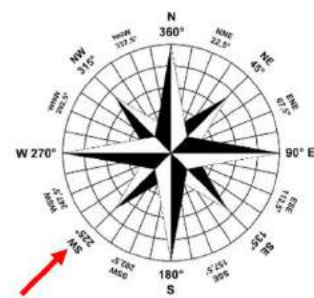
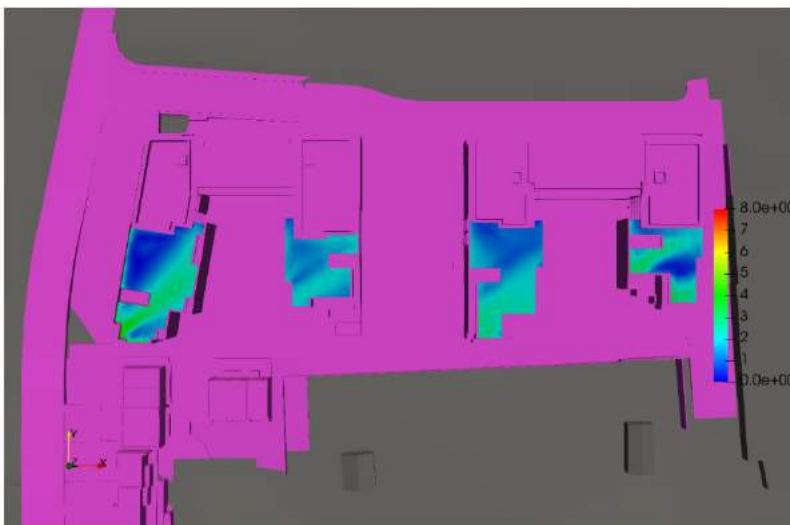


Figure.8-67:Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 225°

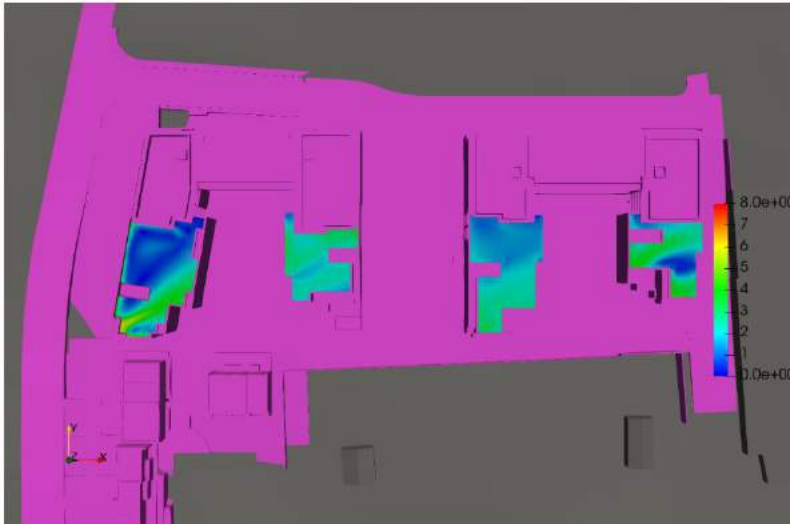


Figure.8-68: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 236°



Figure.8-69: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 247°

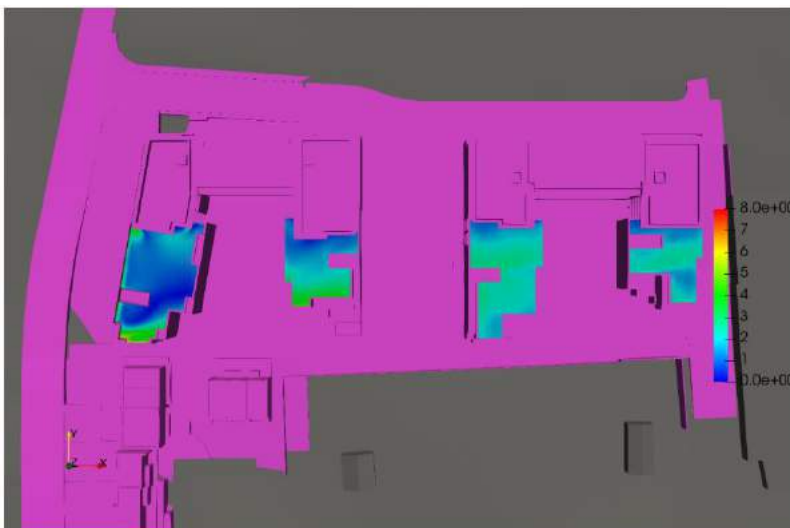


Figure 8-70: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 258°

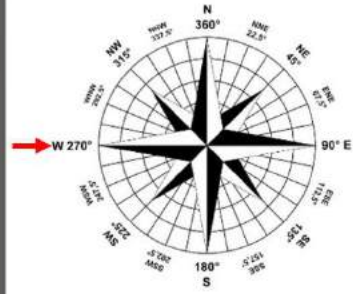
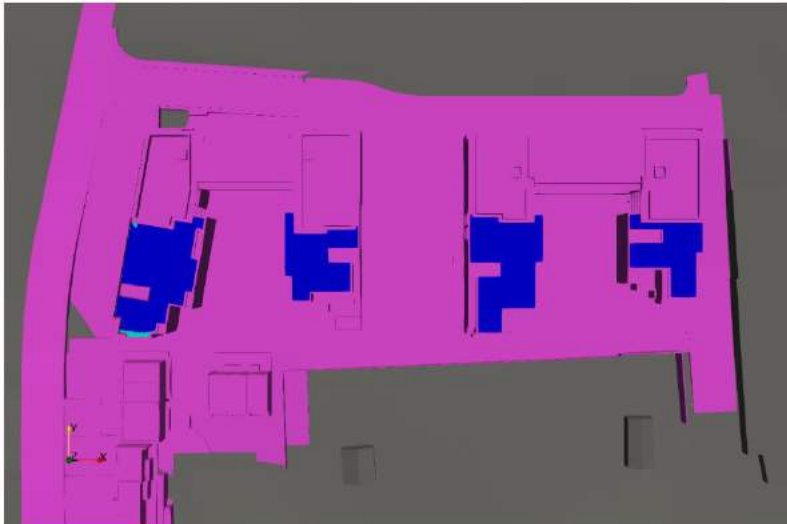


Figure 8-71: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 270°

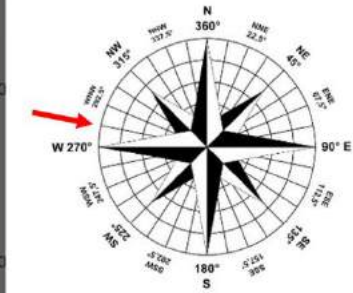
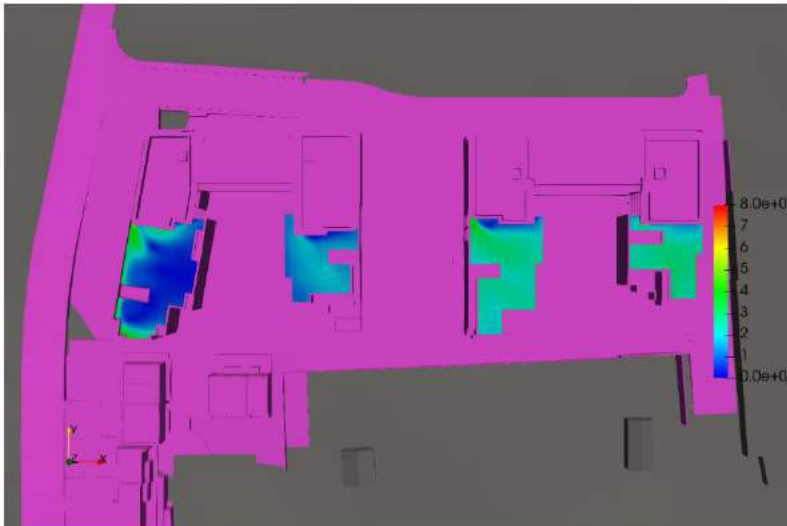


Figure 8-72: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 281°

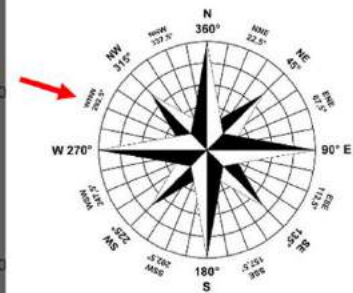
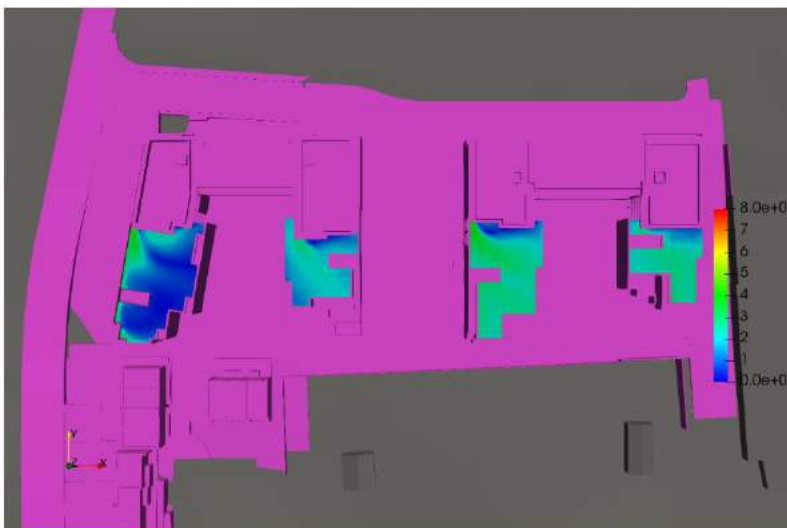


Figure 8-73: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 292°

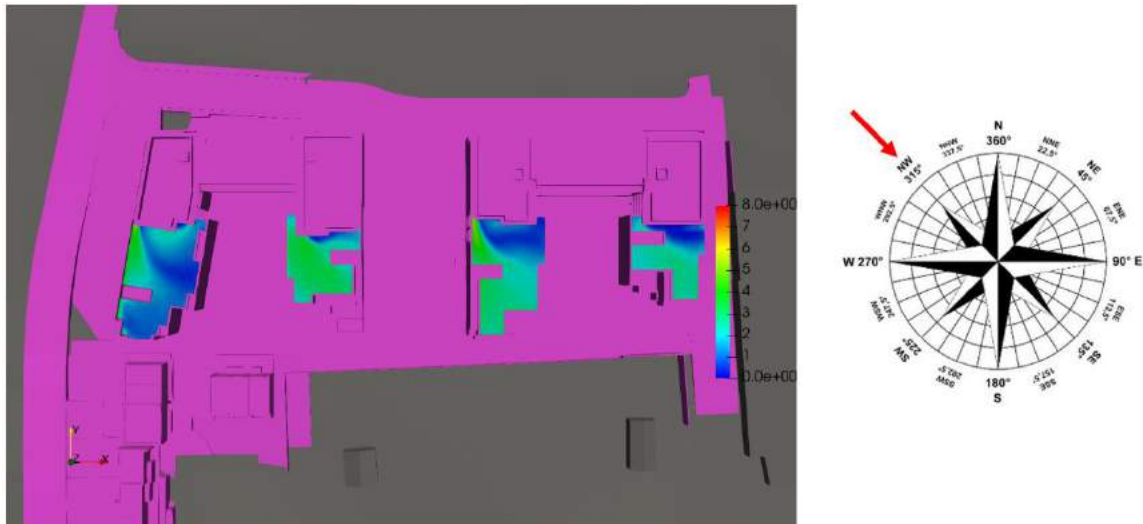


Figure 8-74: Terrace Level - Velocity at 1.5m above the roof floor- Wind Direction: 315°

8.2.5.2.4 Impact on Pedestrian Comfort and Distress - Roof Terraces Level

The wind flow results obtained simulating the different direction and wind speeds, are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows. The comfort / distress conditions are presented using a colour coded diagram (Figure 8-75) formulated in accordance with the Lawson Criteria.

The assessment of the proposed scenario has shown that no area is unsafe, and no conditions of distress are created by the Proposed Development.

The wind microclimate of the Proposed Development is comfortable and usable for pedestrians. As the result of the Proposed Development construction, the wind on the surrounding urban context is also mitigated when compared with the baseline situation. In this sense the Proposed Development has a beneficial effect on the surrounding wind microclimate and can create comfortable pedestrian areas and public spaces.



Figure 8-75 Lawson Map Comfort categories

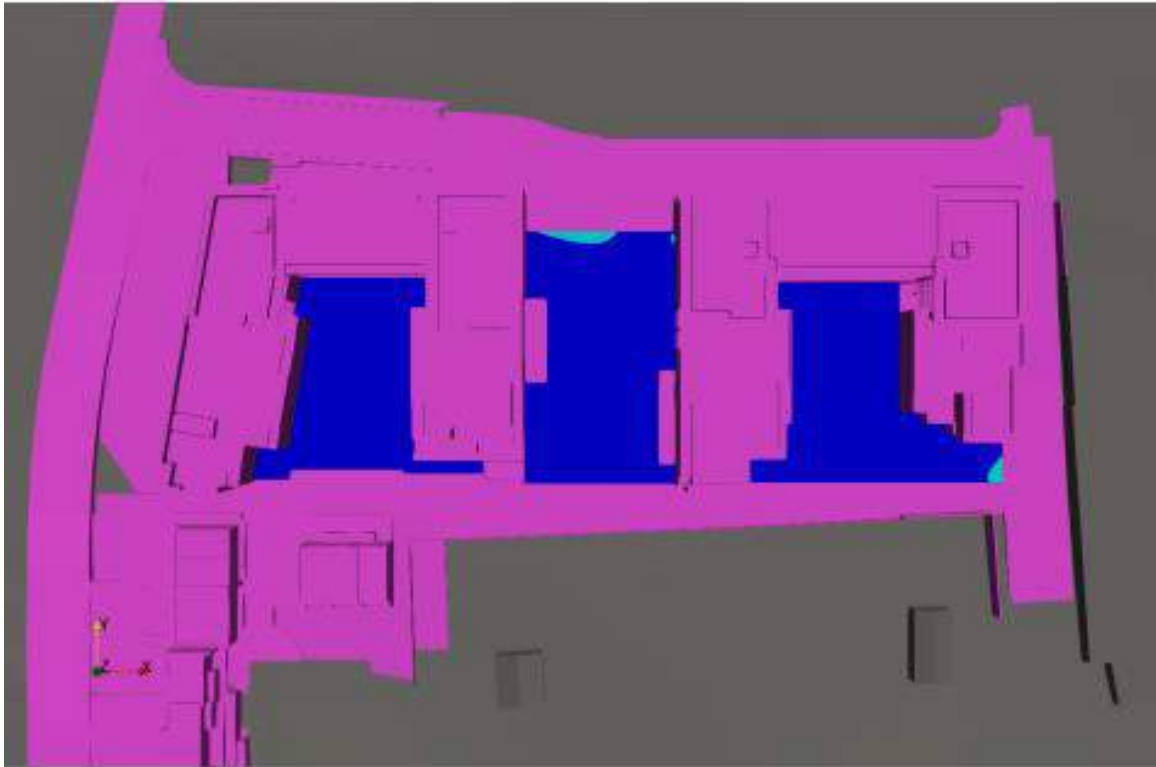


Figure 8-76: Carrigaline Proposed Development - Pedestrian Level - Lawson Comfort / Distress Map (Courtyards)

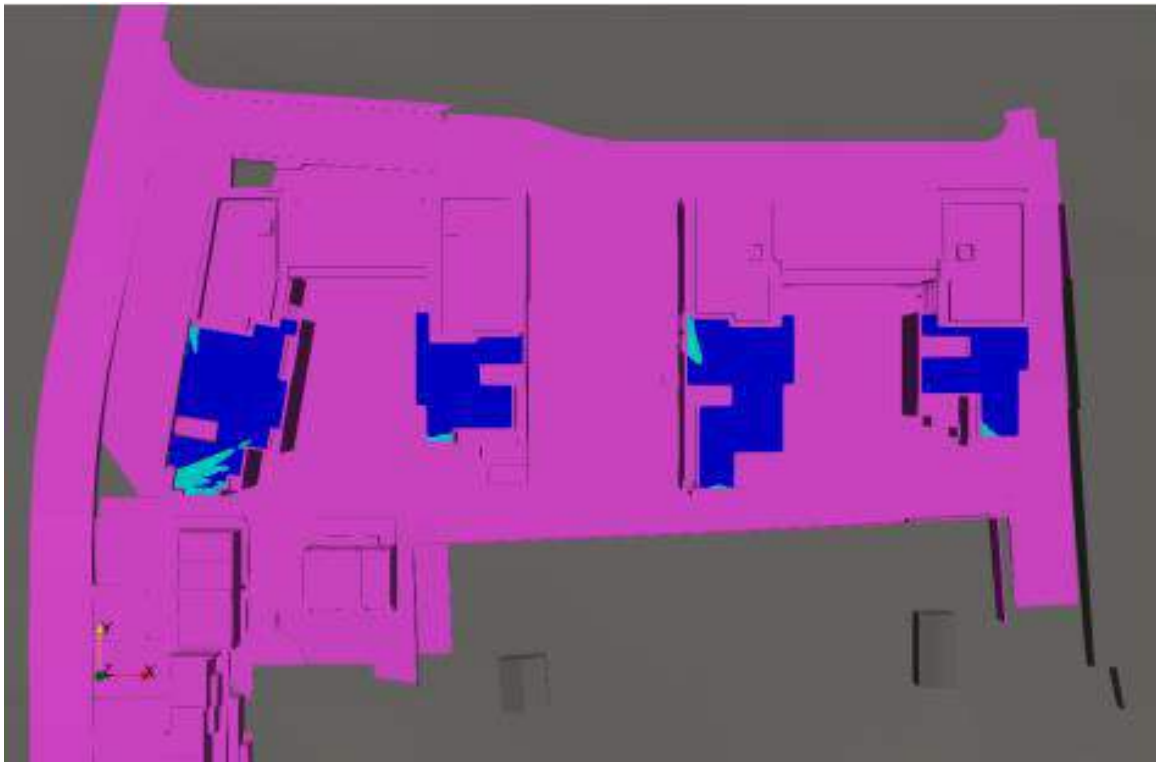


Figure 8-77: Carrigaline Proposed Development - Pedestrian Level - Lawson Comfort / Distress Map-(Terraces)

This Chapter presented the “Wind Microclimate” study performed for Carrigaline SHD. This study has been carried out to identify the possible wind patterns around the area proposed, under mean and peaks wind conditions typically occurring in Cork.

The wind profile of the baseline environment has been built using the annual average meteorology data collected at Cork Airport Weather Station. The prevailing wind directions for the site are identified as West, South-East, West-South-West and North-West with magnitude of approximately 6m/s. A CFD numerical model was built, where the typical winds conditions were applied on the area around the development, both considering the baseline scenario both considering the impact of the Proposed Development in a cumulative assessment.

The results of the wind speeds and patterns formed under the different simulated wind conditions were combined with the frequency of occurrence of the same and an overall wind map was produced (Lawson map) which has shown the suitability of each area to a specific pedestrian activity.

The following conclusions can be made observing the results of the wind microclimate analysis and comparing the results obtained, under the same wind conditions for the baseline scenario versus the Proposed Development scenario in a cumulative assessment:

- The Proposed Development does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings. Moreover, in terms of distress, no critical conditions were found for “Frail persons or cyclists” and for members of the” General Public” in the surroundings of the development.
- The development is designed to be a high-quality environment for the scope of use intended of each areas/building (i.e. comfortable, and pleasant for potential pedestrian).
- The assessment of the proposed scenario has shown that no area is unsafe, and no conditions of distress are created by the Proposed Development.

The table at the end of this summary indicates the impact and significance criteria accounting the impact of the Proposed Development on the on-site receptors (pedestrian areas, roads, entrances) and on the off-site receptors (roads/ pedestrian areas off-site on the north, south, west and east directions) and the impact are evaluated in comparison with the conditions on the same areas for the baseline scenario. As result of the Proposed Development construction, the wind on the surrounding urban context is also mitigated when compared with the baseline situation, in this sense the Proposed Development has a beneficial effect on the surrounding wind microclimate and can create comfortable pedestrian areas and public spaces.

Table 8-24: Identification of Impact of Proposed Development on On-site and Off-site receptors (Proposed Development Scenario).

Potential Receptors (on-site)	Baseline Conditions	Proposed Development Conditions	Impact Significance
Roads	Conditions are “suitable” for the intended pedestrian use.	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	<i>Beneficial</i>
Entrances	Not applicable	Conditions are “suitable” for the intended pedestrian use.	<i>Negligible</i>
Pedestrian circulation areas	On the location designated for this use conditions are “suitable” for the intended pedestrian use.	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	<i>Beneficial</i>
Courtyards	Not applicable	Conditions are “suitable” for the intended use. (short/long-term sitting especially in relation to the balconies facing the podium area and considering the wind roses of the spring/summer season).	<i>Beneficial</i>
Roof terraces	Not applicable	Conditions are “suitable” for the intended use. (short/long-term sitting especially in relation to the terraces of Block A while the terraces of Block B are suitable for long term sitting considering the wind roses of the spring/summer season).	<i>Beneficial</i>
Potential Receptors (off-site)	Baseline Conditions	Proposed Development Conditions	Impact Significance
<i>Off-Site Area-North</i>	Conditions are suitable for the pedestrian activity intended.	Conditions become calmer than required for the intended pedestrian use (by at least one comfort category).	<i>Beneficial</i>
<i>Off-Site Area-South</i>	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	Conditions remain the same as in the baseline scenario.	<i>Negligible</i>
<i>Off-Site Area-East</i>	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	Conditions remain the same as in the baseline scenario.	<i>Negligible</i>
<i>Off-Site Area-West</i>	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	Conditions remain the same as in the baseline scenario.	<i>Negligible</i>

8.2.5.3 Potential Cumulative Impacts

In accordance with the guideline cited in section 8.2.1.1, the wind microclimate study should consider the effect of the Proposed Development together with buildings (existing and/or permitted) that are within 400m from the centre of the site. Other taller buildings outside of this zone that could have an influence on wind conditions within the Proposed Development Site should be included for wind directions where they are upwind of the Proposed Development Site.

Having considered the above there are no further schemes proposed at the moment of this planning application within the area of interest of the wind microclimate assessment for the Proposed Development.

8.2.5.4 “Do Nothing” Impact

In case the development will not be constructed, the wind conditions on the site will be in line with those obtained with the Baseline scenario wind microclimate.

8.2.6 Avoidance, Remedial & Mitigation Measures

8.2.6.1 Construction Phase

Not applicable.

8.2.6.2 Operational Phase

Not applicable.

8.2.6.3 “Worst Case” Scenario

Not applicable.

8.2.7 Residual Impacts

Wind cannot be eliminated or totally mitigated as it depends on weather conditions which could vary. The data of the historical wind conditions collected and reported in the previous sections, show that the wind speeds likely to occur on the site are below critical values, and that pleasant and comfortable microclimate can be maintained for most of the time and under the most frequent wind scenarios.

Gusts and storms can still occur however, and they can create unpleasant and sometimes unsafe conditions. The pedestrian activities concerning the Lawson Comfort and Distress Criteria are not in general carried out during those weather conditions.

Having considered the above, no further changes to the development design and further increasing of the landscaping is suggested, as safety and pedestrian comfort is maintained in accordance with Lawson Comfort and Distress Criteria.

8.2.8 Monitoring

8.2.8.1 Construction Phase

There is no requirement to monitor wind impact during construction phase for pedestrian comfort and distress as the designated amenity areas will not be in use during this phase of the project and pedestrian are not accessing construction sites.

8.2.8.2 Operational Phase

The Proposed Development has been designed to conform to acceptable Lawson Criteria for Comfort and Distress in accordance with the Wind Beaufort Scale and considering the historical wind conditions of the Proposed Development Site, there is no further element to monitor for this scope as far as the landscaping is maintained in place as designed.

8.2.9 Interactions

The wind microclimate analysed in this Chapter has considered the location of the proposed public and communal designed spaces and proposed terraces.

8.2.10 Difficulties Encountered When Compiling

No difficulties were encountered in compiling this Chapter.

8.2.11 References

- Lawson, T.V., 2001, 'Building Aerodynamics', Imperial College Press, London.
- Simiu, E., 2011, 'Design of buildings for wind: a guide for ASCE 7-10 Standard users and designers of special structures', 2nd Edition, John Wiley and Sons, Inc., Hoboken, New Jersey, U.S.A.
- Building Aerodynamics, Tom Lawson FEng. Imperial College Press, 2001.
- Blocken, B., 2015. Computational Fluid Dynamics for Urban Physics: Importance, scales, possibilities, limitations and ten tips and tricks towards accurate and reliable simulations. Building and Environment.
- Blocken, B., Janssen, W.D. and van Hooff, T., 2012. CFD simulation for pedestrian wind comfort and wind safety in urban areas: General decision framework and case study for the Eindhoven University campus. Environmental Modelling and Software, 30, pp.15–34.
- Franke, J., Hellsten, A., Schlunzen, H., Carissimo, B, Ed. (2007); Best Practice Guidelines for the CFD Simulation of Flows in the Urban Environment, University of Hamburg.

Appendix 8.2

This appendix reports the numerical details of the CFD model implemented for the study of the wind microclimate conditions of this Chapter.

A.1 CFD Modelling Method

The wind microclimate study is conducted through Computational Fluid Dynamics (CFD).

This is a numerical technique to simulate fluid flow, heat and mass transfer, chemical reaction and combustion, multiphase flow, and other phenomena related to fluid flows. Wind flow is described by Navier-Stokes equations which are solved within the CFD analysis using a finite volume algorithm based on the volumetric mesh/grid in which the geometry is divided. CFD modelling includes three main stages: pre-processing, simulation, and post-processing as described in Figure 8-78.

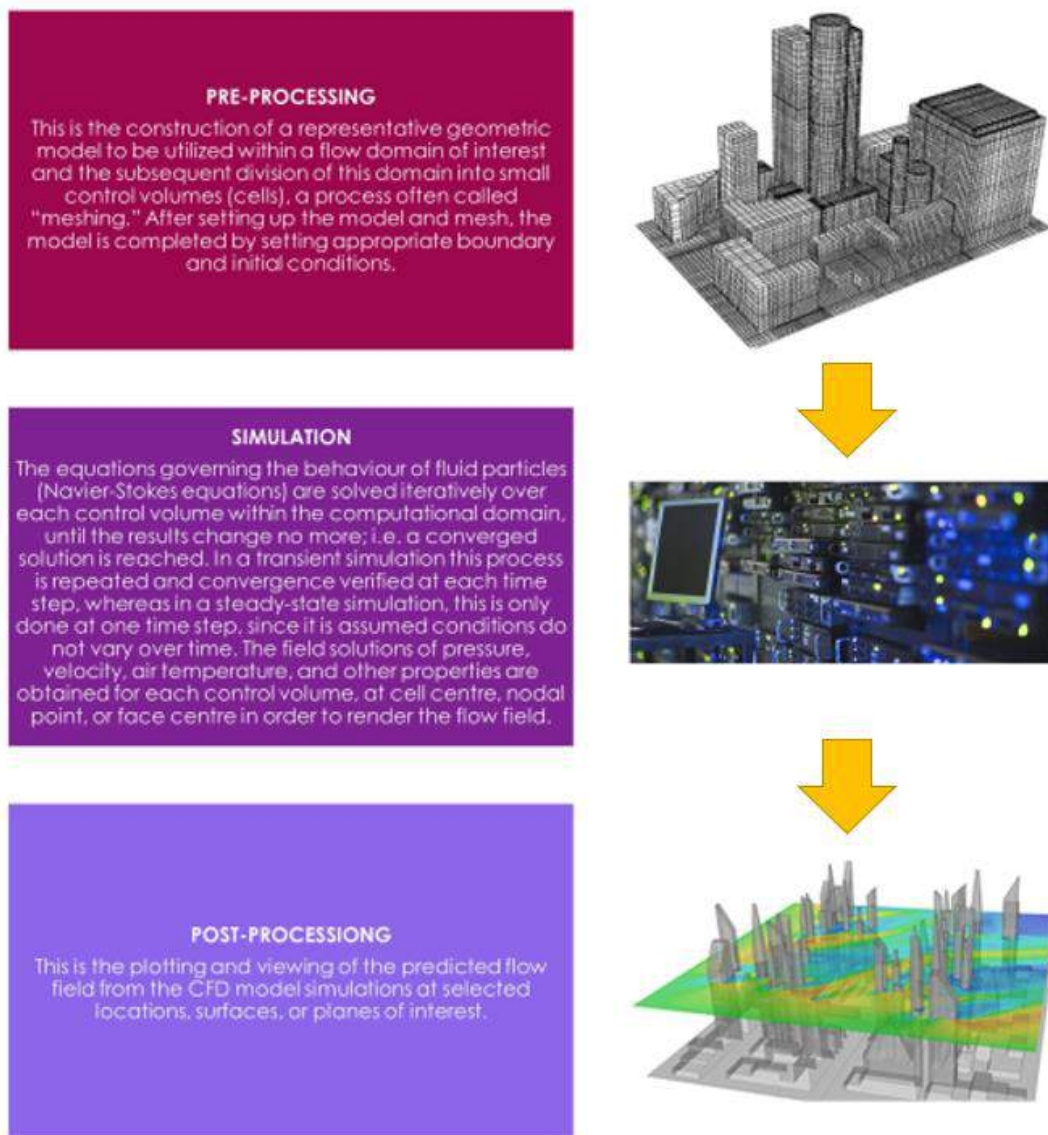


Figure 8-78: CFD method and process

A.2 OpenFOAM - CFD Software Details

The analysis of this Chapter employs OpenFoam Code, which is based on a volume averaging method of discretization and uses the post-processing visualisation toolkit Paraview version 5.5. OpenFoam is a CFD software code released and developed primarily by OpenCFD Ltd., since 2004. It has a large user base across most areas of engineering and science, from both commercial and academic organisations.

OpenFOAM CFD code has capabilities of utilizing a Reynolds Averaged Navier-Stokes (RANS) approach, Unsteady Reynolds Averaged Navier-Stokes (URANS) approach, Detached Eddy Simulation (DES) approach, Large Eddy Simulation (LES) approach or the Direct Numerical Simulation (DNS) approach, which are all used to solve anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to acoustics, solid mechanics and electromagnetics.

Quality assurance is based on rigorous testing. The process of code evaluation, verification and validation includes several hundred daily unit tests, a medium-sized test battery run on a weekly basis, and large industry-based test battery run prior to new version releases. Tests are designed to assess regression behaviour, memory usage, code performance and scalability. The OpenFOAM solver algorithm directly solves the mass and momentum equations for the large eddies that comprise most of the fluid's energy. By solving the large eddies directly no error is introduced into the calculation.

To reduce computational time and associated costs the small eddies within the flow have been solved using the widely used and recognised Smagorinsky Sub-Grid Scale (SGS) model.

The small eddies only comprise a small proportion of the fluids energy therefore the errors introduced through the modelling of this component are minimal. The error introduced by modelling the small eddies can be considered of an acceptable level. Computational time will be reduced by modelling the small eddies (compared to directly solving).

A.2.1 CFD Model Details of the Wind Microclimate Study

This subsection describes all features included in the geometrical and physical representation of the Proposed Development CFD model. Any objects which may have significant impact on the wind movement and circulation are represented within the model. To be accurate, the structural layout of the building being modelled should include only the obstacles, blockages, openings and closures which can impact the wind around the building. It is important to remember that a CFD simulation approximates reality, so providing more details of the geometry within the model will not necessarily increase the understanding of the bulk flows in the real environment.

A.2.1.1 Modelled Geometry and Computational Mesh

In accordance with the guideline cited in section 8.2.1.1, when a wind study is carried out using CFD modelling the modelled area must include a detailed three-dimensional representation of the Proposed Development and the numerical calculation should take place using a model mesh a maximum cell sizes near critical locations (e.g. entrances, corners, etc.) in the order of 0.3m or smaller. Sufficient mesh cells should also be used between buildings with a minimum of 10 cells across a street canyon. However, the cell size of buildings away from the target can be larger to allow for wind modelling efficiency.

To represent reality and consider the actual wind impacting on the site, the modelled area for the wind modelling study comprises a wider urban area of over 0.5 km of radius around the

Proposed Development This to include the recommended dimensions (400m radius from the site centre) as outlined in section 8.2.1.

Table 8-25: CFD Model Details

	MODELLED CFD ENVIRONMENT DIMENSIONS		
	Width	Length	Height
CFD Mesh Domain	1600m approx.	1600m approx	160m approx



Figure 8-79: View of CFD Model of the Proposed Development in the existing environment



Figure 8-80: View of CFD Model of the Proposed Development in the existing environment

Boundary Conditions for The CFD Model A rectangular computational domain was used for the analysis. The wind directions were altered without changing the computational mesh. For each simulation scenario, an initial wind velocity was set according to the statistical weather data collected in order to consider the worst-case scenario. Building surfaces within the model are specified as ‘no slip’ boundary conditions. This condition ensures that flow moving parallel to a surface is brought to rest at the point where it meets the surface. Air flow inlet boundaries possess the ‘Inlet’ wind profile velocity patch boundary condition with its appropriate inflow turbulence intensity and dissipation rates. Air exits the domain at the ‘pressure outlet’ boundary condition.

Due to aerodynamic drag, there is a wind gradient in the wind flow just a few hundred meters above the Earth’s surface – “the surface layer of the planetary boundary layer”.

Wind speed increases with increasing height above the ground, starting from zero, due to the no-slip condition. In particular, the wind velocity profile used for the analysis is parabolic. Flow near the surface encounters obstacles that reduce the wind speed and introduce random vertical and horizontal velocity components. This turbulence causes vertical mixing between the air moving horizontally at one level, and the air at those levels immediately above and below it.

For this reason, the velocity profile is given by a fluctuating velocity along a mean velocity value which are both numerically simulated by mean of inlet velocity profile and turbulence intensity values assigned to the model.

The equation used for the wind velocity profile within the model, as described above is shown below.

$$v_2 = v_1 \cdot \frac{\ln \frac{h_2}{z_0}}{\ln \frac{h_1}{z_0}}$$

where:

- v_1 = wind speed measured at the reference height h_1
- h_1 = reference height to measure v_1
- h_2 = height of the wind speed v_2 calculated for the wind profile
- $z_0 = 0.4$ [m] roughness length selected (see Table 8-26)

A.2.2. Computational Mesh

The level of accuracy of the CFD results are determined by the level of refinement of the computational mesh. Details of parameters used to calculate the computational mesh are presented in Table 8-26.

The grid follows the principles of the 'Finite Volume Method', which implies that the solution of the model equations is calculated at discrete points (nodes) on a three-dimensional grid, which includes all the flow volume of interest. The mathematical solution for the flow is calculated at the centre of each of these cells and then an interpolation function is used by the software to provide the results in the entire domain.

Table 8-26: Mesh and Boundary Conditions details

PARAMETERS TO CALCULATE COMPUTATIONAL MESH	
Air Density ρ	1.2kg/m ³
Ambient Temperature (T)	288K (approx.15C°) isothermal analysis
Gravity Acceleration (g)	9.8m/s ²
dx	0.3 m at the building 1m in the surroundings 2m elsewhere
Mesh cells size	0.1 m (ratio 1:1)
Total mesh size	Approx. cells number = 20 millions

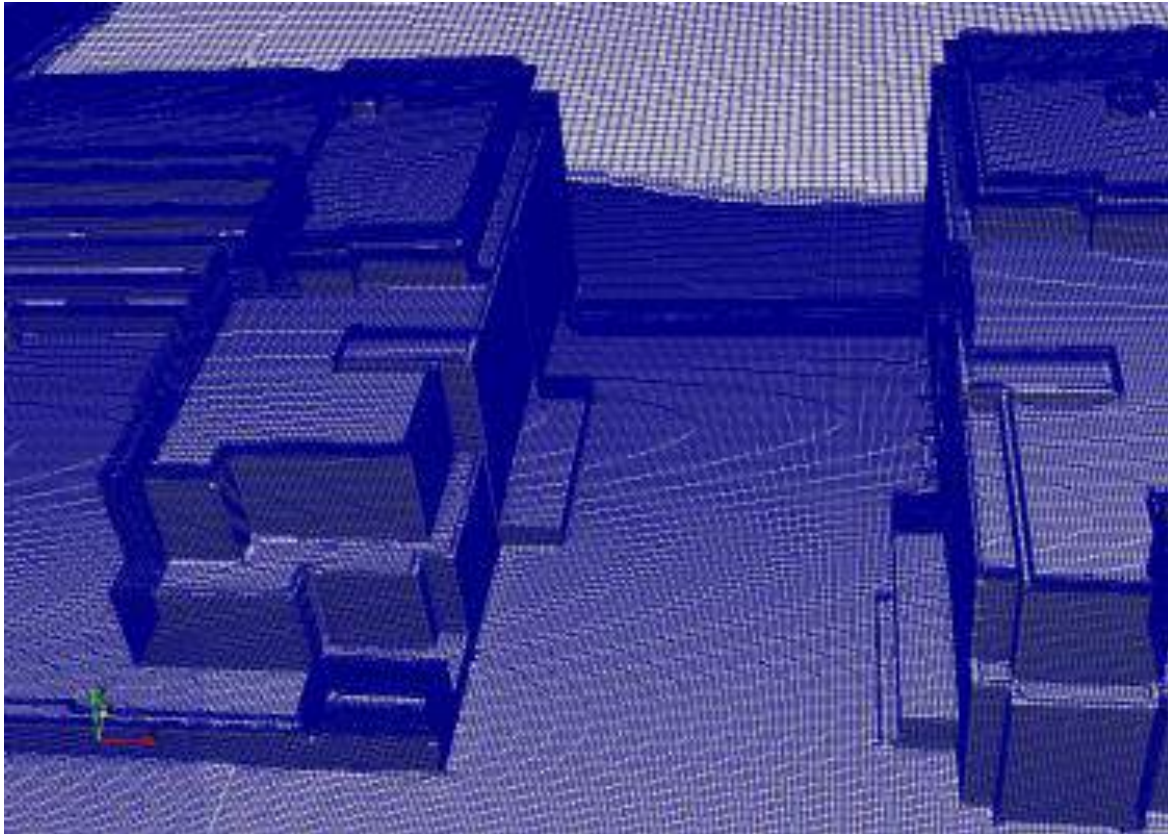


Figure 8-81: Mesh for the CFD Model

9 NOISE & VIBRATION

9.1 Introduction

This Chapter of the EIAR provides a description and assessment of the likely impact of the Proposed Development from noise. The Chapter will discuss the existing ambient noise levels at nearby sensitive receptors, the potential impacts of the Proposed Development on the existing ambient noise environment and the mitigation measures that may be employed to reduce or eliminate any potential impact.

This Chapter was prepared by Mairéad Foran (BA Hons Environmental Sciences, Advanced Diploma in Planning & Environmental Law), Environmental Consultant, Enviroguide Consulting. Mairéad has experience working on a large number of EIARs and EIA Screening Reports for SHD projects of a similar scale to the Proposed Development.

9.2 Study Methodology

This assessment will examine the likely impacts of sound pressure levels generated by the Proposed Development located in the townland of Kilmoney within the town of Carrigaline, Co. Cork. Noise calculations will be used to predict and assess the likely impact of the Proposed Development on noise sensitive receptors.

For the purpose of the assessment 'sensitive receptors' terminology used describes any persons, locations or otherwise that may be susceptible to changes as a consequence of the Proposed Development.

The primary noise impacts associated with this Proposed Development is noise due to:

- Development construction works;
- General facility operations; and
- Vehicular traffic such as trucks entering and exiting the site.

With respect to the listed noise impacts, the key objective of the Proposed Development is to manage activities to ensure any significant increase in noise emissions are minimised.

Documents consulted during the preparation of this EIAR Chapter are listed in the References section. The acoustics section has been compiled taking cognisance of:

- *Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 (HD 213/11 – Revision 1) (The Highways Agency et al., 2011);*
- *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise;*
- *ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures;*
- *ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise Part 2: Determination of sound pressure levels;*
- *ISO 9613-1:1993 Acoustics - Attenuation of sound during propagation outdoors -- Part 1: Calculation of the absorption of sound by the atmosphere;*

- *ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors -- Part 2: General method of calculation;*
- *Environmental Protection Agency (2016) Guidance Note for Noise (NG4): Licence Applications, Surveys and Assessments in Relation to Scheduled Activities;*
- *Guidelines for the Treatment of Noise & Vibration in National Road Schemes, National Roads Authority, Revision 1, 25th October 2004.*

The following noise indices, analysis and observations were reviewed.

- LA_{eq} - The A-weighted, equivalent continuous sound level of the measurement period. Represents an 'energy average' of the sound pressure levels measured.
- LA₉₀ - The A-weighted, noise level exceeded for 90% of the measurement period. Calculated by statistical analysis of the measurement data.
- LA₁₀ - The A-weighted, noise level exceeded for 10% of the measurement period. Calculated by statistical analysis of the measurement data.

9.2.1 Desk Study

A desktop study was carried out to collate and review available information relating to the site and its environs for the completion of this noise assessment. The desktop study relied on the following:

- An evaluation of the Proposed Development Site and the surrounding area to assess certain changes to noise that are likely to impact the surrounding environs.
- Identification of sensitive receptors for assessment (see Section 9.5.1).
- BS 5228 2009 +A1 2014 Code of practice for noise and vibration control on construction and open sites with respect to the controlling noise and vibration impacts. In this instance, appropriate criteria relating to permissible construction noise levels are taken from Part one of the standard Noise.

9.3 The Existing and Receiving Environment (Baseline Situation)

The Proposed Development is located in the townland of Kilmoney within the town of Carrigaline which is identified as a 'Metropolitan Town' in the Bandon-Carrigaline Municipal District Local Area Plan 2017. The Proposed Development Site is situated to the west of the Carrigaline town centre and approximately 10km southeast of Cork City Centre. The Site lies to the south of the N28 Cork to Ringaskiddy route. The total Site area comprises 3.7 hectares (Ha) and has a sloped topography. There is a net developable area of 1.9 Ha. The Proposed Development Site is bounded on the west by agricultural lands, to the north by Owenabue River and mature trees and hedgerows, to the east by the Dairygold Co-op Superstore and associated car park and to the south by a number of detached bungalows with the Kilmoney Road beyond. The site is within easy walking distance of a number of commercial and community facilities including local shops, churches and schools. Access to the site is via the inner relief road (currently under construction) and the Kilmoney Road which runs to the south of the Site.

9.3.1 Quiet Area Screening

Screening was carried out to identify the potential of the Proposed Development located in or near an area that could be considered a 'Quiet Area' in open country in accordance with the Environmental Protection Agency's publication "Environmental Quality Objectives – Noise in Quiet Areas, 2003.

The criteria used to assess this determination comprised of the following

- At least 3 km from urban areas with a population >1,000 people;
- At least 10 km from any urban areas with a population >5,000 people;
- At least 15 km from any urban areas with a population >10,000 people;
- At least 3 km from any local industry;
- At least 10 km from any major industry centre;
- At least 5 km from any National Primary Route, and;
- At least 7.5 km from any Motorway or Dual Carriageway.

If the Proposed Development Site does not meet the above criteria, it is considered to be a non-quiet area as per the definition of the Environmental Protection Agency. 'Quiet Areas', according to NG4 (2016). Before relevant noise criterion can be applied, 'Quiet Area Screening' must be performed to identify or rule out the site as a Quiet Area. Quiet Area screening results can be viewed in Table 9-1.

Table 9-1: Quiet Area Screening of the Proposed Development Location

Quiet Area Screening of the Proposed Development Location			
Screening Question	Answer (Yes/No)		Screening Results
Is the site >3km away from urban areas with a population >1,000 people?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	The Proposed Development Site is located in the townland of Kilmoney within the town of Carrigaline which is identified as a 'Metropolitan Town' in the Bandon-Carrigaline Municipal District Local Area Plan 2017, and a population >1,000 people.
Is the site >10km away from urban areas with a population >5,000 people?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	The Proposed Development Site is located within 10km of Carrigaline which has a population >5,000 people.
Is the site >15km away from urban areas with a population >10,000 people?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	The Proposed Development Site is located within 15km of Carrigaline which has a population of over 15,000 people.
Is the site >3km away from any local industry?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	The Proposed Development Site is located within 3km of local industry.
Is the site >10km away from any major industry centre?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	The Proposed Development is site located within 10km of a major industry centre.
Is the site >5km away from any national primary route?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	The N28 lies 2km north of the Proposed Development Site.
Is the site >7.5km away from any motorway or dual carriageway?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	The M8 is located over 7.5km north of the Proposed Development Site.
QUIET AREA?	No		The Proposed Development Site does not meet these criteria therefore it is not considered to be a quiet area.

According to the EPA Guidance, NG4, where an area is determined not to be a 'quiet area', baseline monitoring should be conducted to determine if there is a low background noise. As such, baseline noise monitoring for the Proposed Development Site is recommended.

9.3.2 Recommended Noise Limits

There is no published statutory Irish Guidance relating to the maximum permissible noise level that may be generated during the Construction Phase of a project.

No specific construction noise limits are set by Cork County Council with respect to noise. Cork City Council produced the Noise Action Plan 2018-2023. This Noise Action Plan has been prepared in accordance with EU directive 2002/49/EC commonly referred to as the 'END'

Directive and the Environmental Noise Regulations 2006 (S.I. No. 140 of 2006), as revoked by European Communities (Environmental Noise) Regulations 2018. The purpose of the Noise Action Plan (NAP) is to act as a means of managing environmental noise, and to meet the aim of the END Directive of preventing, and reducing where necessary, environmental noise through the adoption of the action plan. The Noise Action Plan 2018-2023 suggests that, in accordance with Environment Protection Agency (EPA) recommendations, the proposed onset levels for assessment of noise mitigation are as follows:

- 70 dB Lden (day evening night average sound level)
- 57 dB Lnight (night time average sound level)

These levels are consistent and comparable with other Local Authorities who had adopted the EPA recommended onset levels. These levels provide for a concentration of efforts on those areas at the higher noise levels.

The Proposed Development is located in Carrigaline, classified as the largest town in Cork. Given the suburban context, a limit value of 70dB Lden for construction works is considered to be reasonable.

This limit value is also in agreement with those set by Transport Infrastructure Ireland (TII) for construction projects. The 2004 TII document “*Guidelines for the Treatment of Noise and Vibration in National Road Schemes*” outlines the following construction noise limit values, as outlined in Table 9-2:

Table 9-2 Construction Noise Limits (Source: TII, 2004)

Days and Times	LAeq	LAmax
Monday to Friday (07:00 to 19:00 hours)	70	80
Monday to Friday (07:00 to 20:00 hours)	60*	75*
Saturdays (08:00 to 16:30 hours)	65	75
Sundays & Bank Holidays (08:00 to 16:30 hours)	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the local authority.

9.3.3 Noise

Noise is defined as any sound that has the potential to cause disturbance, discomfort, or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it. In summary, noise can be defined as any unwanted sound. Sound levels are expressed in decibels (dB) on a logarithmic scale, where 0dB is nominally the "threshold of hearing" and 120dB is nominally the "threshold of pain" (refer to Figure 9-1).

Background noise is defined as ‘*the steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T (LAF90, T)*’. According to the EPA Noise Guidance NG4, an area of low background noise is one where

the existing background noise levels measured during an environmental noise survey are as follows:

- Average Daytime Background Noise Level $\leq 40\text{dB LAF90}$; and
- Average Evening Background Noise Level $\leq 35\text{dB LAF90}$; and
- Average Night-time Background Noise Level $\leq 30\text{dB LAF90}$.

The Proposed Development, situated in a suburban area, is considered to be a non-quiet area as per EPA screening guidelines.

Figure 9-1 depicts typical sounds and their noise levels on a decibel scale.

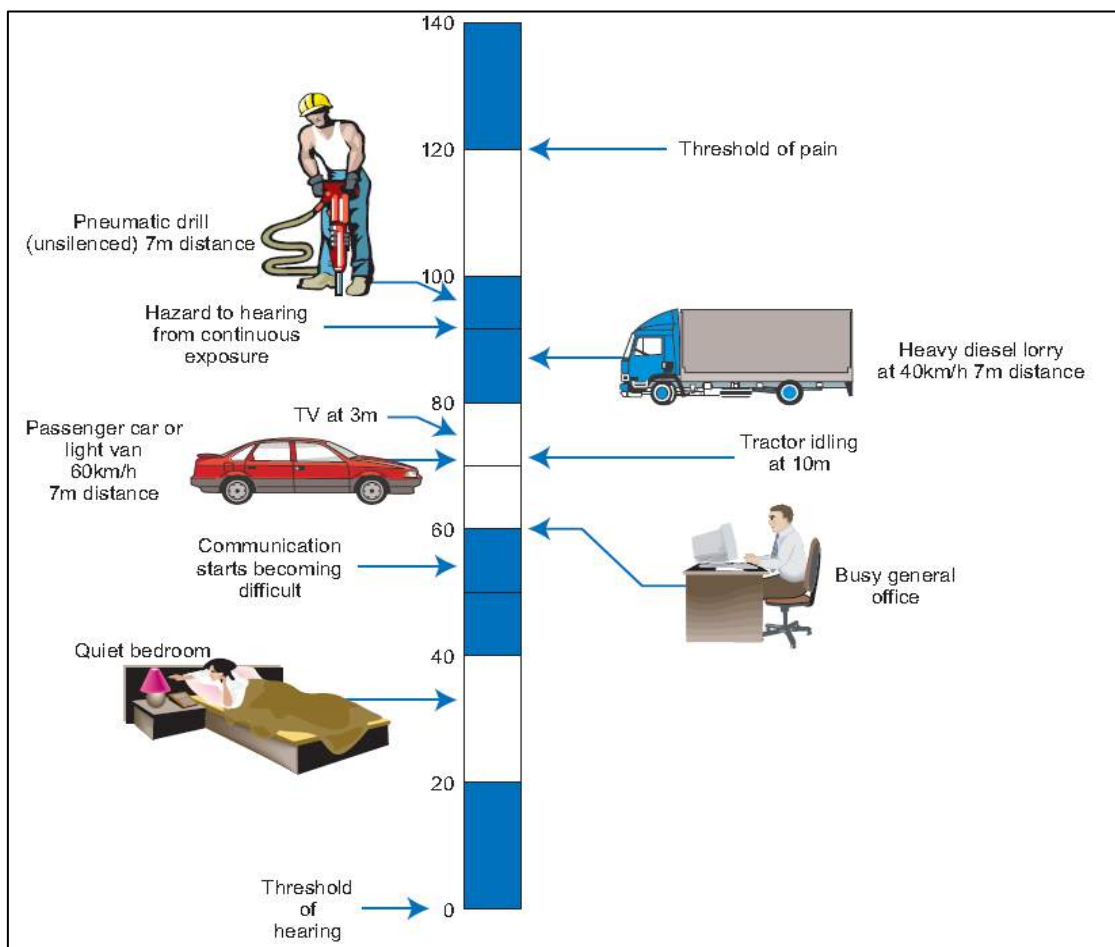


Figure 9-1: Scale and Indicative Noise Levels on the dB(A) Scale (Based on guidance taken from: Design Manual for Roads and Bridges, Volume 11 Consolidated Edition 1993)

9.4 Characteristics of the Proposed Development

9.4.1 Construction Phase

In summary, the Proposed Development Construction Phase consists of the following:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units:

- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

All construction works are estimated to take 18 months to complete. For the duration of the proposed infrastructure works it is envisaged that the maximum working hours will be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 13:00 Saturdays, subject to the restrictions imposed by the local authorities. No working will be allowed on Sundays and Public Holidays unless express permission is obtained from the Local Authority.

It may be necessary to work outside these hours at times, for example for early morning concrete pours and late evening concrete finishing. The Contractor will consult with Cork County Council regarding out of hours working and local residents and businesses will be informed of any out of hours works required.

9.4.2 Operational Phase

During the Operational Phase of the Proposed Development, no significant sources of noise or vibration are expected with the development. The primary source of outward noise in the Operational Phase context relates to any changes in traffic flows along the local road network and any operational plant noise used to serve the ancillary elements within the Proposed Development.

Once the development is completed, the potential noise impacts to the surrounding environment are minimal. The residential element of the development is not expected to generate any significant noise sources over and above those which form part of the existing environment at neighbouring residential areas (estate vehicle movements, children playing etc.) and hence no significant impact are expected from this area of the development site.

The main potential noise impact associated with the Proposed Development is considered therefore to relate to the generation of additional traffic to and from the site as a result of the Proposed Development. Potential noise impacts also relate to operational plant serving the apartment buildings such as heat pumps. Once operational, there are no vibration sources associated with the Proposed Development Site.

9.5 Potential Impact of the Proposed Development

This section assesses the impact of the Proposed Development on the human environment. The noise and vibration generating activities associated with the site are as follows:

- Site clearance;
- Building construction works; and

- Trucks and vehicles entering and exiting the site.

9.5.1 Noise Sensitive Locations

The EPA define noise sensitive locations as ‘any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels’.

In identifying sensitive receptors, consideration has been given to residential properties or noise sensitive premises such as schools or hospitals, or recreational spaces within a close proximity of the Proposed Development.

The nearest noise sensitive locations are residential properties which are located approximately 6m from the Proposed Development southern site boundary. Table 9-3 details the nearest noise sensitive locations.

Table 9-3: Noise Sensitive Locations

Name	Type	Coordinates		Orientation Relative to Site Boundary	Distance from the Site Boundary
Alandale	Residential	51.81215	-8.39564	South	6m
Abbey Lodge	Residential	51.81209	-8.39685	South	6m
Cahirmore	Residential	51.81165	-8.39738	South	13m
Saint Raphael's	Residential	51.81168	-8.39675	South	44m
Bella Vista	Residential	51.81172	-8.39652	South	49m
Greenaun	Residential	51.81173	-8.39631	South	48m
Rockboro	Residential	51.81174	-8.39613	South	48m
Kilmoney Rd Lower	Residential	51.81175	-8.39582	South	40m
Carrigaline Chiropractic	Health	51.81173	-8.39564	South	25m
Owenabue Lodge	Residential	51.81180	-8.39527	South	24m

9.5.2 Noise from Operational Traffic

The traffic data used in this assessment has been provided by Martin Hanley Consulting Engineers in Volume 2, Chapter 12 of this EIAR ‘Traffic’.

The Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 7 (HD 213/11 – Revision 1) (The Highways Agency et al., 2011) states that “changes in traffic volume on existing roads or new routes may cause either of the threshold values for noise to be exceeded. A change in noise level of 1dB LA10, 18h is equivalent to a 25% increase or a 20%

decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB LA10, 18h is equivalent to a 100% increase or a 50% decrease in traffic flow”.

No traffic routes are predicted to experience increases of more than 25% in total traffic flows as a result of the Proposed Development and therefore no detailed assessment is required as per the DMRB Guidelines. In addition, the Traffic and Transport Assessment (6th October 2021, Martin Hanley Consulting Engineers) submitted as part of the Pre-Application Assessment states that “Given the nature of the development a reduction in car trips would be expected over time as further improvements to public transport are developed.” Refer to Chapter 12 of the EIAR for a detailed traffic assessment report.

The impact of noise from operational traffic will be negligible and will not have a negative impact.

9.5.3 Noise from Onsite Plant & Equipment

Noise and vibration can arise from the operation of fixed or mobile machinery used for the Construction Phase and from vehicular traffic during the Operational Phase. Noise prediction calculations have been completed for sound pressure levels from the use of external onsite plant and equipment up to 250m from the source. According to the inverse square law, it can be shown that for each doubling of distance from a point source, the sound pressure level decreases by approximately 6 dB. Table 9-4 details the noise emissions from the plant or machinery items to be used in the Proposed Development and the relevant L_{Aeq} values at the reference distances. The reference levels were calculated and projected for a range of distances from the source to the appropriate receptor using the following formula:

$$L_{\text{Source}} \approx L_{\text{Ref}} - 20 \cdot \text{Log}_{10}(R2/R1)$$

Where:

L_{Source} = Sound Pressure Level at Initial Location

L_{Ref} = Sound Pressure Level at the new Location

R1 = Distance from the noise source to initial location

R2 = Distance from noise source to the new location

The calculations make a number of assumptions such as:

1. There is a straight line between the source and observer.
2. Meteorological conditions are static.
3. There are no natural barriers that affect attenuation of noise other than distance.
4. All plant items are operating from a single source simultaneously and at full capacity.
5. All plant items are operating at the edge of the work area closest to the sensitive receptor.

The inverse square law is the logical first estimate of the sound you would get at a distant point in a reasonably open area. It is noted that the sound intensity from a point source will

obey the inverse square law if there are no reflections or reverberation. If there are barriers between the source and the point of measurement, you are likely to get less than what the inverse square law predicts.

Table 9-4 sets out the equipment associated with the Proposed Development and associated dB(A) levels according to BS 5228-1, and the inverse square law:

Table 9-4: Equipment associated with proposed construction activities

Plant Item	Ref	dB(A) @ 10m	dB(A) @ 6m	dB(A) @ 13m	dB(A) @ 24m	dB(A) @ 40m	dB(A) @ 48m	dB(A) @ 150m	dB(A) @ 200m	dB(A) @ 250m
Loading Shovel	BS 5228-1	76.5	80.9	74.2	68.9	64.5	62.9	53	50.5	48.5
Excavator	BS 5228-1	75	79.4	72.7	67.4	63	61.4	51.5	49	47
Mobile Crane	BS 5228-1	70	74.4	67.7	62.4	58	56.4	46.5	44	42
Generator	BS 5228-1	65	69.4	62.7	57.4	53	51.4	41.5	39	37
Dozer	BS 5228-1	81	85.4	78.7	73.4	69	67.4	57.5	55	53

Table 9-4 outlines the predicted noise levels at reference distances using *BS 5228-1* recommendations. The predicted noise levels from on-site activities up to 250m from the Site have been included. The nearest noise sensitive locations are located approximately 6m from the Proposed Development Site boundary, however the noise generating activity will be further away than the Site boundary. There is the potential for the adopted criteria to be exceeded by some of the equipment during construction works at the nearest sensitive receptors. However, there will be proposed groups of native trees informally arranged in the intervening distance between these residential dwellings and the Site of the Proposed Development, as per the proposed Landscape Masterplan (Cunnane Stratton Reynolds, September 2021). It is important to recognise that the sound intensity from a point source will obey the inverse square law if there are no reflections or reverberation. If there are barriers between the source and the point of measurement, the actual intensity is likely to be less than what the inverse square law predicts. Therefore, when taking account of local terrain, predicted noise levels at the closest residential noise sensitive locations are expected to be lower than outlined in Table 9-4. Nevertheless, mitigation measures, as outlined in Section 9.6.1, will be implemented to reduce any potential impacts.

It is not envisaged that any excessively noisy activities will be carried out over extended periods of time during the construction stage.

9.5.4 Operational Phase Noise Impact Assessment

RSK Ireland Limited (RSK) was instructed by Reeside Investments Ltd to conduct a ProPG: Acoustic Design Statement in respect of the Proposed Development (Appendix E of this EIAR).

This Acoustic Design Statement considers the potential impact of the existing and future noise sources on future residents of the Proposed Development. It also assesses the potential Operational Phase noise impact of the Proposed Development to nearby existing receptors.

The Acoustic Design Statement considers the potential impact of existing traffic and the future Carrigaline Western Relief Road (CWRR) traffic noise on the Proposed Development. A baseline noise survey has been used to assess the sites noise risk category, as per the ProPG “Stage 1” assessment.

In the developments Operational Phase, criteria have also been set for any new building services plant items associated with the Proposed Development, in accordance with the methodologies outlined in BS 4142:2014+A1:2019. This Acoustic Design Statement has concluded that the likely noise impact of the Proposed Development in its Operational Phase are not significant.

In summary, the Acoustic Design Statement concludes that “once consideration is given to the range of mitigation measures outlined in this Report, the expected noise impact of the Proposed Development, on existing and future residents, is not significant.”

Baseline Noise Survey

Environmental noise surveys have been conducted on site in order to establish the baseline noise environment. Noise surveys have been conducted in accordance with ISO 1996-2:2017 “Acoustics -- Description, measurement and assessment of environmental noise -- Part 2: Determination of sound pressure levels”.

Unattended noise measurements were conducted at Location N1. Attended noise measurements were conducted at locations N2 – N4. The approximate noise measurement locations are shown in Figure 9-2. This noise survey took place over an extended period of 7-days, between 6th and 12th May 2022.

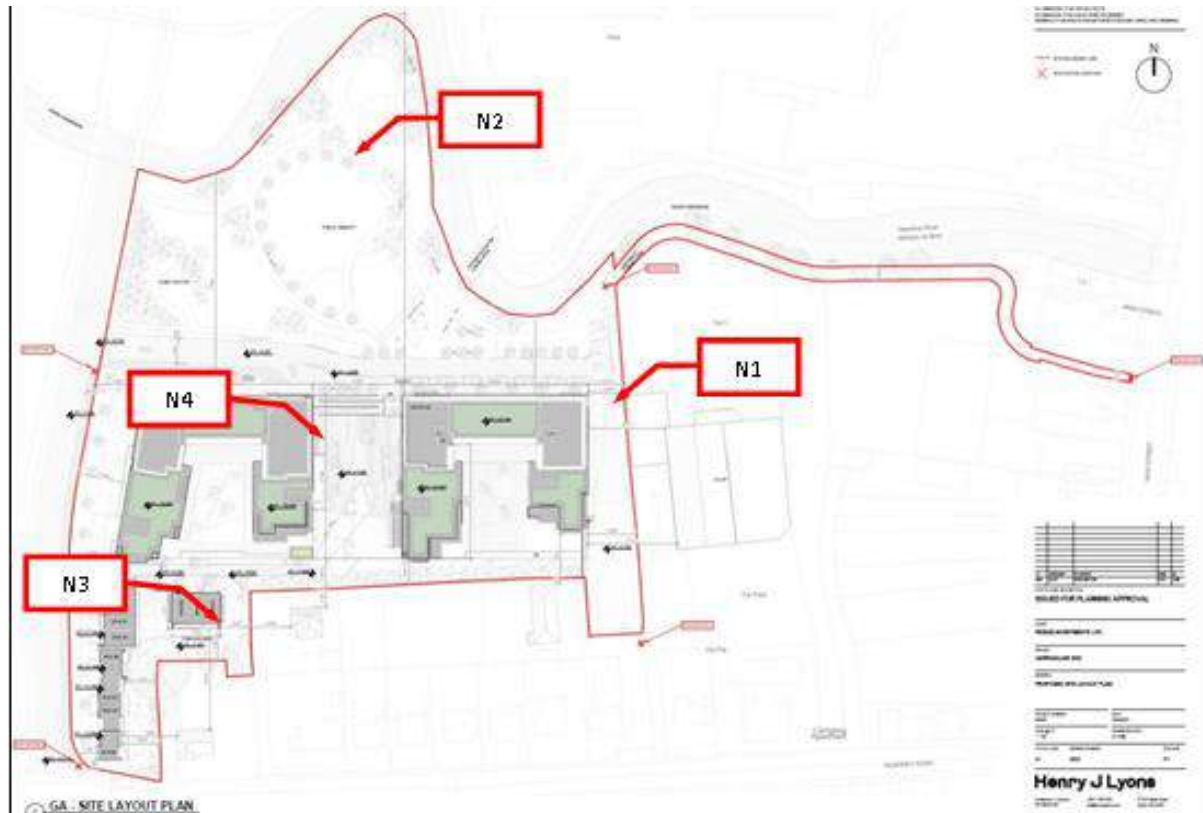


Figure 9-2 Proposed Site Layout showing Baseline Noise Monitoring Locations (ProPG: Acoustic Design Statement, RSK Ireland Limited, May 2022)

Further details are available in the ProPG: Acoustic Design Statement (RSK Ireland Limited, May 2022), however overall, it was concluded that road traffic movements were noted to be the dominant source of noise at the four measurement position locations (ie. N1-N4). “Baseline monitoring has found pre-existing noise levels are typical of a suburban location in the vicinity of a busy road network. Future noise emissions from the Carrigaline Western Relief Road (CWRR) have been taken into account and resultant expectant future noise levels on site established via modelling.” The Acoustic Design Statement concluded that the ProPG noise risk categories, for façades most exposed to road traffic, are **Low to Medium** for daytime and **Low to Medium/High** for night-time periods. This indicates that the site is likely to be acceptable from a noise perspective subject to the inclusion of suitable noise conditions.

This Acoustic Design Statement recommends noise mitigation measures for future residents of the Proposed Development. These measures include:

- Provision of glazing with minimum sound insulation properties; and
- Provision of acoustically attenuated ventilation with minimum sound insulation properties.

In summary, it is considered that the site is suitable for residential development subject to the provision of the noise control recommendations as outlined in the Acoustic Design Statement.

9.5.5 Potential Cumulative Impacts

Cumulative Impacts can be defined as “*impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project*”. Effects

which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the cumulation of different effects that are individually minor. Such effects are not caused or controlled by the project developer.

The cumulative effects of noise and vibrations from the Proposed Development and other existing developments have been considered, in particular through the generation of nuisance noise. There are no planned or proposed projects located in close proximity to the Proposed Development with the potential to result in cumulative impacts. Adherence and full implementation of the appropriate control and mitigation measures will ensure there is no potential for cumulative impacts to arise. Therefore, cumulative impacts have been assessed in this regard and the impact has been determined as negligible.

Table 9-5: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part Planning 8	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	<p>The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence.</p> <p>The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians, cyclists and vehicular traffic).</p> <p>The noise from this road has been assessed in the ProPG Noise Assessment that was prepared by RSK. Adherence and full implementation of the appropriate control and mitigation measures will ensure there is no potential for cumulative impacts to arise.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
217464	Aldi Stores (Ireland) Ltd	<p>On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.</p>	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
214818	Ruden Homes Ltd	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
205230	Barry Collins (Supermarket) Ltd	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
196065	Athena Private Assets Ltd	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
194642	Piton Properties Ltd	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

9.5.6 “Do Nothing” Impact

A ‘Do Nothing’ scenario would result in the Proposed Development Site remaining undeveloped. Noise and vibration levels would remain unchanged onsite and at nearby sensitive receptors.

9.6 Avoidance, Remedial & Mitigation Measures

9.6.1 Construction Phase

In order to sufficiently ameliorate the likely noise, dust, litter and other environmental impacts, a schedule of suggested control measures has been formulated and outlined within the Construction Environmental Management Plan (Enviroguide Consulting, May 2022) for the Construction Phase.

- Limiting the hours during which site activities likely to create high levels of noise, vibration or dust are permitted.
- Establishing channels of communication between the contractor/developer and Local Authority.
- Appointing a site representative responsible for matters relating to noise, vibration, dust and other impacts of site activity
- Notifying the neighbouring community of any forthcoming unusual construction activities
- All complaints will be recorded and investigated. If it is found that the complaint is legitimate, amelioration measures will be introduced to negate the re-occurrence.

Furthermore, it is also proposed that a variety of practicable control measures will be employed. This will include the following:

- Selection of plant of low inherent potential for generation of noise and / or vibration.
- Plant and equipment will be properly maintained.
- Erection of barriers as necessary around plant of high impact.
- Situate noisy/vibratory plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated structures where necessary.
- Any plant that is not in use for extended periods of time will be switched off.
- All access roads will be kept as level as possible so as to mitigate the potential for vibration from lorries.
- Appropriate signs will be erected both reminding and requesting site personnel to keep noise to a minimum within the construction site.

For controlling vibration reference should be made to BS 5228:2009+A1:2014 which offers detailed guidance on the control of vibration from demolition and construction activities. In general, BS5228:2009+A1:2014 advises the following:

- Use rubber linings in, for example, chutes and dumpers to reduce impact noise.
- Minimize drop height of materials.
- Regular and effective maintenance by trained personnel to be carried out to reduce vibration from plant and machinery.

- Hand demolition, cutting of the separate on joints of the buildings in advance and small robotic breakers and ‘munchers’

9.6.2 Operational Phase

During the Operational Phase of the Proposed Development, noise mitigation measures with respect to the outward impact of the development are not deemed necessary.

9.6.3 “Worst Case” Scenario

The worst-case scenario is where mitigation measures fail for the Proposed Development. There is the potential for short-term intermittent significant impacts in the absence of mitigation measures. The worst-case predicted noise levels from the equipment at the closest off-site receptors range from 72.7-85.4. Predicted levels at the closest off-site receptors are external and actual noise levels within buildings will be lower. Assuming open-window transmission a reduction of 15 dB to construction noise levels may be assumed, or approximately 30 dB for closed window transmission. The sound intensity from a point source will obey the inverse square law if there are no reflections or reverberation. If there are barriers between the source and the point of measurement, the actual intensity is likely to be less than what the inverse square law predicts. Therefore, when taking account of local terrain, predicted noise levels at the closest residential noise sensitive locations are expected to be lower in reality than outlined in this worst-case scenario.

9.7 Residual Impacts

Residual Impacts are defined as *‘effects that are predicted to remain after all assessments and mitigation measures’*. They are the remaining ‘environmental costs’ of a Proposed Development and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts. Potential residual impacts from the Proposed Development were considered as part of this environmental assessment.

No residual impacts are anticipated.

9.8 Monitoring

On commencement of construction, a noise and monitoring specialist will be appointed to carry out quarterly monitoring of noise and vibration for the duration of the Construction Phase. The first monitoring commencing the first week of construction. The monitoring will be carried out at the nearest sensitive locations which are presented in Table 9-3.

No noise monitoring is proposed for the Operational Phase.

9.9 Interactions

9.9.1 Population and Human Health

The impact assessment of noise and vibration has concluded that additional noise associated with the operation of on-site machinery will be intermittent and will not create any major negative impacts beyond the site boundary. Mitigation and monitoring measures will be

incorporated to further reduce the potential for noise generation from the Proposed Development.

It is noted that specific issues relating to Population and Human Health associated with the Proposed Development are set out in Chapter 4 of this EIAR.

9.9.2 Biodiversity

Interactions between noise and vibration and biodiversity have been considered as the Proposed Development has the potential to cause short-term impacts on biodiversity as a result of noise and vibration.

Otter activity was observed on the banks of the Owenboy River on the northern Site boundary. Although no Otter holts or couches were recorded on the northern boundary, Otter are likely use this stretch of river for hunting and commuting. Therefore, noise or vibrations experienced during the Construction Phase has the potential to cause *negative, local, short-term, moderate* effects in the form of disturbance to Otter at a local level, should they be present.

An assessment of the potential impact of the Proposed Development on biodiversity is included in Chapter 5 of this EIAR.

9.9.3 Traffic

The Proposed Development will have no significant impact on overall traffic volumes and therefore traffic will not result in any significant increases of noise at sensitive receptors.

9.10 Difficulties Encountered

No difficulties were encountered.

9.11 References

BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.

Dept. of Housing, Planning and Local Government (DHPLG), 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018.

Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 (HD 213/11 – Revision 1) (The Highways Agency et al., 2011);

Environmental Protection Agency (2006) Environmental Management in the Extractive Industry (Non-Scheduled Materials).

Environmental Protection Agency (2016) Guidance Note for Noise (NG4): Licence Applications, Surveys and Assessments in Relation to Scheduled Activities.

Guidelines for the Treatment of Noise & Vibration in National Road Schemes, National Roads Authority, Revision 1, 25th October 2004.

ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures.

ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise Part 2: Determination of sound pressure levels.

ISO 9613-1:1993 Acoustics - Attenuation of sound during propagation outdoors -- Part 1: Calculation of the absorption of sound by the atmosphere.

ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors -- Part 2: General method of calculation.

10 LANDSCAPE AND VISUAL

10.1 Introduction

This Landscape and Visual Impact Assessment Chapter has been prepared in respect of an application for a Proposed Strategic Housing Development at a site located at Kilmoney Road, Carrigaline, Co. Cork.

This Chapter assesses the effects of the Proposed Development on the landscape and visual amenities of the area and details the potential direct and indirect effects of the Proposed Development on landscape fabric, character and quality, and the resulting impact on visual amenity.

The aim of a landscape and visual assessment is to identify the elements of the landscape which make it unique and the extent to which it is possible to alter these landscapes before unacceptable consequences arise. Landscape character represents the individuality of an area based on its particular combination of features and elements. The purpose of this assessment is to evaluate the existing landscape character of the site and surroundings, to assess the visual impact of the Proposed Development and to identify landscape designations and planning policies that may concern the subject site and its environs.

A judgement on the sensitivity of the landscape is made from a combination of the susceptibility of the landscape to development, and therefore change, and the value attached to that landscape. This is determined by way of existing designations, both legislative and non-legislative for scenic beauty, landscape quality, recreational value, significant importance, rarity etc. Visual sensitivity is determined by a combination of judgements about the susceptibility of visual receptors such as dwellings, roads, scenic spots etc. to changes in visual amenity and the value attached to these views. The *Guidelines for Landscape and Visual Impact Assessment* state that the aim is "to establish the area in which the development will be visible, the different groups of people who may experience views of the development, the places where they will be affected and the nature of the views and visual amenity at those points".

This chapter was written by Jim Kelly B.Agr.Sc. Land. Hort., Dip LA, MILI, CMLI. Jim is a chartered landscape architect with 35 years experience, 20 of which have included the preparation of landscape and visual impact assessments.

10.2 Study Methodology

In Section 10.5 the landscape effects of the Proposed Development are assessed. Landscape impact assessment considers the likely nature and scale of changes to the main landscape elements and characteristics, and the consequential effect on landscape character and value. Existing trends of change in the landscape are taken into account. The potential effect is assessed based on measurement of the landscape sensitivity against the magnitude of change which would result from the development.

10.2.1 Sensitivity of the Landscape Resource

Landscape sensitivity is a function of its land use, landscape patterns and scale, visual enclosure and distribution of visual receptors, scope for mitigation, and the value placed on the landscape. It also relates to the nature and scale of development proposed. It includes consideration of landscape values as well as the susceptibility of the landscape to change.

Landscape values can be identified by the presence of landscape designations or policies which indicate particular values, either on a national or local level. In addition, a number of criteria are used to assess the value of a landscape. These are described further in Section 10.3.

Landscape susceptibility is defined in the GLVIA as the ability of the landscape receptor to accommodate the Proposed Development without undue consequences for the maintenance of the baseline scenario and/or the achievement of landscape planning policies and strategies. Susceptibility also relates to the type of development – a landscape may be highly susceptible to certain types of development but have a low susceptibility to other types of development.

For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment.

Sensitivity is therefore a combination of landscape value and susceptibility.

Table 10-1: Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principle management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principle management objective is to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.

Magnitude of Landscape Change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as '*landscape receptors*'). Five categories are used to classify magnitude of landscape change.

Table 10-2: Categories of Landscape Change

Magnitude of Change	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape (i.e. landscape receptors), and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape with loss of landscape quality and perceived value.
High	Change that is moderate to large in extent, resulting in major alteration or compromise of important landscape receptors, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape with loss of landscape quality and perceived value.
Medium	Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value.
Low	Change that is moderate or limited in scale, resulting in minor alteration of landscape receptors, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape and no reduction in landscape quality and perceived value.
Negligible	Change that is limited in scale, resulting in no alteration to landscape receptors, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character, quality or perceived value.

Significance of Effects

The terminology used to describe the significance or importance of effects is that which is set out in the EPA's Guidelines (Draft 2017) which include seven categories.

In order to classify the significance of effects (both landscape and visual), the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide. There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Table 10-3: Significance of Effect

		Sensitivity of the Resource				
		Very High	High	Medium	Low	Negligible
Magnitude of Change	Very High	Profound	Profound-Very Significant	Very Significant-Significant	Moderate	Slight
	High	Profound-Very Significant	Very Significant	Significant	Moderate-Slight	Slight-Not Significant
	Medium	Very Significant-Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate-Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight-Not Significant	Not significant	Imperceptible	Imperceptible

Table 10-3 indicates how sensitivity of the resource / receptor, and the magnitude of the change, are combined to assess the significance of the effect. It should however be noted that this is a guide only and a degree of professional judgement is also applied.

Landscape effects are also classified as positive, neutral or negative/adverse. Development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

Methodology for Visual Assessment

In Section 10.4 the visual effects of the development are assessed. Visual assessment considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. Visual receptor sensitivity is a function of two main considerations:

Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention or interest is focussed on the views or visual amenity they experience at that location.

Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g., trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience.

Visual receptors less susceptible to change include travellers on road, rail and other transport routes (unless on recognised scenic routes which would be more susceptible), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

The significance of the visual effects experienced at these locations is assessed by measuring the visual receptor sensitivity against the magnitude of change to the view resulting from the development. Five categories are used to classify a viewpoint's sensitivity:

Table 10-4: Categories of Visual Receptor Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for accommodating change in the form of development is very low. The principal management objective for the view is its protection from change.
High	Viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features focussed on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating compositional change in the form of development may or may not be low. The principal management objective for the view is its protection from change that reduces visual amenity.
Medium	Viewpoints representing people travelling through or past the affected landscape in cars or on public transport, i.e., viewing but not focused on the landscape which is regarded as moderately scenic. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.
Low	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, or on heavily trafficked routes etc. The view may present an attractive backdrop to these activities but is not regarded as particularly scenic or an important element of these activities.
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g., people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality.

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e., its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g., in full view, partial or peripheral, or glimpses). It also considers the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view.

Table 10-5: Magnitude of Visual Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes the dominant the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Significance of Visual Effects

As for landscape effects, in order to classify the importance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint. This is set out in Table 10-3, though as noted this table is a guide only.

Quality and Timescale

The predicted effects are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse – Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;
- Neutral - Scheme complements the scale, landform and pattern of the landscape (townscape)/view and maintains landscape quality;

- Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Effects are also categorised according to their longevity or timescale:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term –Lasting seven to fifteen years;
- Long Term – Lasting fifteen years to sixty years;
- Permanent – Lasting over sixty years.

A statement is made as to the appropriateness of the Proposed Development based on the combined assessment of the predicted landscape and visual effects. This methodology, in accordance with the various guidelines for LVIA, results in a conclusion as to the appropriateness of the Proposed Development based on objective assessment of its likely landscape and visual impacts.

Photomontages contained in Appendix F were used to assist in the assessment of visual effects.

10.3 The Existing and Receiving Environment (Baseline Situation)

10.3.1 Cork County Council Development Plan 2014

The following section includes policies and objectives from the Cork County Development Plan 2014, hereafter referred to as the Plan.

These include policies relating to town centre development, cultural heritage, landscape character, value and scenic routes.

A number of objectives relating to the landscape and developments in general are as follows:

GI 6-1: 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 proactive view of development is undertaken while maintaining respect for 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.

Landscape Character and High Value Landscapes

The Draft Cork County Landscape Strategy, produced in 2007, has informed the Cork County Development Plan policy, and the information in terms of landscape character areas and types are referred to within the plan. This document identified 76 character areas in County Cork, but amalgamated these into 16 landscape character types, which are a more general categorisation of the landscape based on similarities between the areas. Landscape Character Types (LCTs) are described in some detail in the Strategy, and detailed characteristics, opportunities and pressures are listed for each LCT.

The assessment also ascribes a landscape value to each character area, ranging from Low to Very High. Sensitivity of each LCT is also identified, ranging from Low to Very High. It should however be noted that as in Landscape and Visual Assessment, sensitivity is directly related to the type of development or change proposed.

Landscape Character Types which have a High or Very High Value, and High or Very High Sensitivity, and are also considered to be of County or National Importance, are classified as High Value Landscape (HVL). Figure 13.2 of the Cork County Development Plan contains an illustration of these areas, and indicates that the Proposed Development Site is within an area of HVL. This is shown in Figure 10-1.

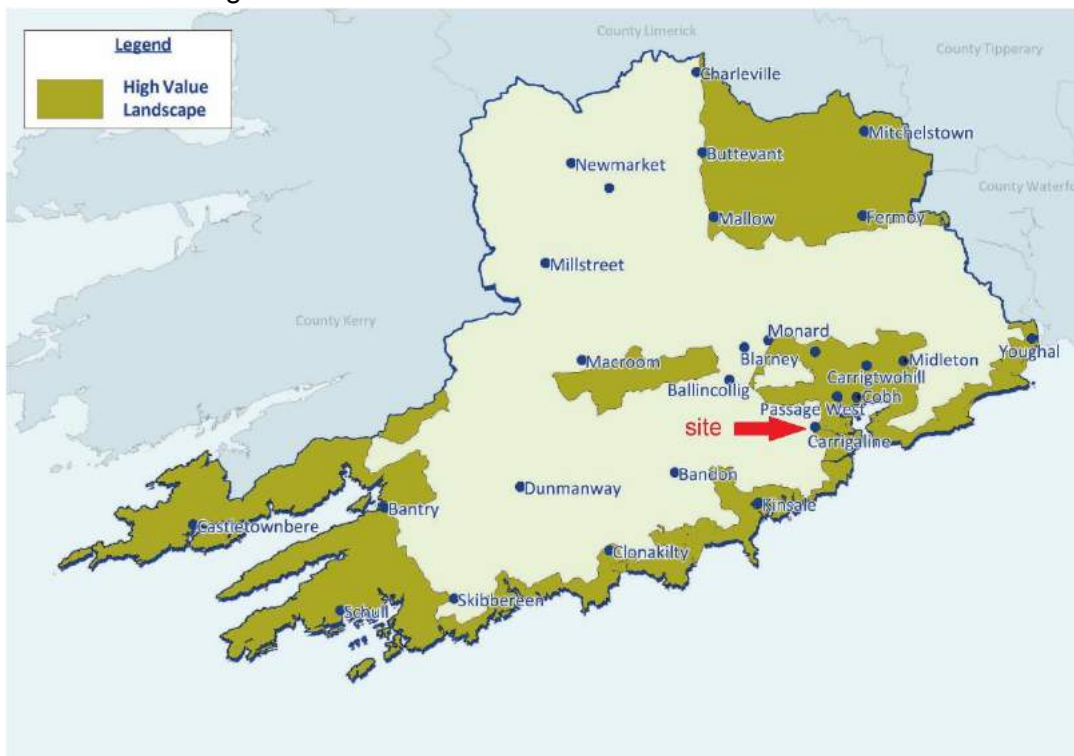


Figure 10-1: High Value Landscape in County Cork | source: Cork County Development Plan 2014 | not to scale

The Cork County Development Plan (CCDP) notes that within these areas of HVL, considerable care is needed in locating large scale developments without them becoming unduly obtrusive. It notes that such developments should generally be supported by visual impact assessment and involve an evaluation of the visibility and prominence of the Proposed Development in its immediate environs and in the wider landscape.

The following objective is relevant:

GI 6-2: Draft Landscape Strategy: *Ensure that the management of development of the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.*

Trees and vegetation

Chapter 12 of the Cork County Development Plan notes the importance of trees and woodlands, noting that particular trees or groups of trees can be important components of the local landscape/townscape, the setting of buildings, or to the successful integration of new development into the landscape. Objective HE2-5 states the following in relation to trees not subject to a Tree Preservation Order:

'Preserve and enhance the general level of tree cover in both town and country. Ensure that development proposals do not compromise important trees and include an appropriate level of new tree planting and where appropriate to make use of tree preservation orders to protect important trees or groups of trees which may be at risk or any tree(s) that warrants an order given its important amenity or historic value.

Where appropriate, to protect mature trees/groups of mature trees and mature hedgerows that are not formally protected under Tree Preservation Orders.'

10.3.2 Ballincollig Carrigaline District Local Area Plan 2017-Volume 1 Main Policy Material

3.4 Carrigaline

Vision and Context

3.4.1 The strategic aim for Carrigaline is to consolidate the rapid growth of recent years broadly within the town's existing development boundary, protecting its important green belt setting while maintaining its distinctiveness as a self-contained Metropolitan Town with improvement of the town centre and the town's residential amenities.

Local Context

3.4.4 Carrigaline has a distinctive identity as a thriving Metropolitan Town with a strong village character, unique setting, history and community spirit. It is located at the mouth of the Owenboy River and at the Head of Owenboy Estuary which forms part of Cork Harbour. The estuary is of considerable scenic beauty and is designated part of an extensive area of high value and much of it is a proposed Natural Heritage Area. The landscape is dominated by the River and Estuary and gently rolling hills to the North and South of the Town.

3.4.6 The location of the settlement in the heart of the Metropolitan Area has made Carrigaline an important residential alternative to Cork City and its environs. The towns setting adjacent to Cork Harbour and a designated scenic landscape provide excellent opportunities to create a high-quality living environment.

Environment and Heritage

3.4.45 Carrigaline's attractive location where the Owenboy River enters the Estuary has produced a variety of important areas of local biodiversity. There are two natural heritage designations at this location, namely, the Cork Harbour Special Protection Area (SPA-004030) and the Owenboy River proposed Natural Heritage Area designation (Site Code pNHA 001990), west of the town.

3.4.46 The future development of the town offers enormous opportunities to develop an integrated open space strategy which can perform a number of functions including passive and active amenity areas, wildlife corridors and carbon filters to offset impacts of increased development and traffic within the town. The attractive estuary and river valley setting of the town offers opportunities for the development of new east-west recreational spine for the town which would enhance the overall quality of life for residents. Within the green fringes of the town there are clusters of attractive historic hedgerows and tree-lines which should be retained as part of any future town development.

Landscape & Visual Amenity

3.4.48 In terms of Landscape type Carrigaline almost entirely lies within the 'Indented Estuarine Coast', an area of very high landscape value, very high sensitivity and an area of national importance. Its character area is designated as 'Incised Patchwork and Wooded Estuary with Mudflats and Islands'.

3.4.49 In terms of landcover, fertile soils predominantly of brown podzolics allow undulating landscape to be framed relatively intensively. Fields of moderate size gently rise and fall with topography, creating a patchwork further articulated by bounding broadleaf hedgerows of generally low height as well as post and wire fencing.

10.3.3 Landscape Character – Site and Surrounding Environment



Figure 10-2: Landscape Character Map | not to scale. Source: From Google Maps

Site Description

The Proposed Development Site is a greenfield site located at the south-western extremity of Carrigaline Town and is accessible via the R611 Kilmoney Road Lower. It adjoins built-up areas of the town, abutting residential houses along Kilmoney Road Lower to the south and retail premises to the east. The site slopes from high ground along its southern boundary to low ground along the banks of the River Owenabue which runs along the northern extremity of the site. To the west the site has a low post and rail fence along its boundary which facilitates expansive views westward across the open fields. The commercial premises immediately to the east of the site is prominent from the Proposed Development Site comprised of warehouse style retail units with a palisade security boundary fence.



Figure 10-3: Plate 10.1 View across the site from the western boundary



Figure 10-4: Plate 10.2 View across the site from the southern boundary



Figure 10-5: Plate 10.3 View across the Owenboy River from the northern site boundary

Site Surroundings

Land Use

The Proposed Development Site is surrounded by a range of town centre and suburban developments to the north south and east while the landscape to the west of the site has a rural character. Town centre uses include the adjacent Dairygold Co-Op Superstore to the east of the site and Carrigaline Shopping Centre immediately to the north of the River Owenboy. Main Street is aligned on a north-south axis immediately to the east of the shopping Centre. The town centre is otherwise defined by a range of shopping facilities to the eastern side of Main Street, a public library, residential housing areas to the north, south, east and west of the town centre core area and a public park and community centre at the eastern extremity of the town.



Figure 10-6: Plate 10.4 View westward along Kilmoney Road Lower



Figure 10-7: Plate 10.5 View eastward along Kilmoney Road Lower showing works associated Western Relief Road



Figure 10-8: Plate 10.6 View south-westward toward Proposed Development Site from Carrigaline Shopping Centre car park



Figure 10-9: Plate 10.7 View eastward toward Proposed Development Site from Captain's Boreen



Figure 10-10: Plate 10.8 View south-eastwards toward Proposed Development Site from Western Relief Road corridor adjacent to the Owenboy River

Landcover, Vegetation, Topography and Views - Cultural Heritage

Carrigaline town centre and suburbs are interspersed with established areas of tree cover which have a softening effect on the town centre and suburban neighbourhoods of the town. Outside of the town boundary there is an immediate transition to the rural hinterland and the Owenboy River Estuary. The local countryside is generally characterised by agricultural fields with boundary hedgerows comprised of native tree species. The Owenboy River corridor and estuary give rise to a range of linear and panoramic views from a range of vantage points along the water's edge. Topography rises away from the river valley to the north and south of the town. There are a range of locations along the local road network which facilitate panoramic views across the rural and urban landscapes.

Landscape Designations

Landscape Typology and Value: The Proposed Development Site is located in a 'High Value' landscape as defined by Cork County Council Development Plan 2014 and represented in Figure 10-2. The local landscape forms part of landscape character Type 3, Indented Estuarine Coast, as set out in Cork County Draft Landscape Strategy 2007. Type 3 landscapes have the following attributes;

Landscape Value: Very High

Landscape Sensitivity: Very High

Landscape Importance: National

Scenic Routes: There are two designated scenic routes in the vicinity of the town as shown in Figure 10-2.

S57: Road along Bellea Woods and river, Carrigaline.

S58: Road from Carrigaline to Crosshaven.

Summary – Landscape Character

In summary, the Proposed Development Site is located at the south-western edge of Carrigaline Town where the urban environment transitions to the wider rural hinterland. The site is a greenfield site which adjoins the River Owenboy to the north and a large expanse of open field to the west which includes the corridor for Carrigaline Western Relief Road, currently under construction. The site is surrounded to the north, south and east by commercial and residential developments. The topography of the site rises from low ground along the floor of the Owenboy river valley to high ground along the Kilmoney Road Lower to the south.

Landscape Value

The landscape values of a site and surrounds can be identified through formal designations which infer landscape value, as well as values which are not enshrined in policy but are evident on the site.

The Proposed Development Site itself forms part of an area of High Value Landscape. It is a greenfield site at the edge of Carrigaline Town in a location of mixed-use character. To the west there is a strong rural character comprised of hedge-bound fields while to the north, south and east of the site the character is defined by town centre commercial/retail premises and areas of residential development.

In addition to formal designations at international, nation and local level, the GLVIA 3rd edition (2013) recommend the use of a number of criteria which can help to describe landscape values. These are listed below.

- *Landscape Quality/Condition:* A measure of the physical state of the landscape. The site is greenfield site comprised of a single large field rising from low ground along the River Owenboy to high ground to the south along Kilmoney Road Lower. The southern boundary of the site is defined partially by roadside hedgerow, the remainder comprised of walls, fences, hedges and trees along the garden boundaries of houses which front onto Kilmoney Road Lower. The riverbank along the north of the site has some existing trees but there are views of the river along much of the boundary. The eastern boundary of the site is defined by a palisade security fence associated with the adjoining retail outlet and the western boundary has a low timber post and rail fence which affords pleasant views westward across open fields.
- *Scenic Quality:* The landscape may appeal primarily to the senses (primarily but not wholly visual senses): From the adjoining Kilmoney Road Lower the site is largely screened from view by existing mature hedgerow along the approach from the west. Closer to the site, works associated with the Western Relief Road are evident where a gap in the hedgerow occurs.

- *Perceptual aspects:* A landscape may be valued for its perceptual qualities, such as wildness or tranquillity. The interface between the Proposed Development Site and the river Owenboy has a tranquil character imparted by the river waters and the high ground at the southern end of the site accommodates panoramic views northward across the town. To the west there are pleasant views across the open fields. From areas outside the Proposed Development Site, the site is generally screened from view with the exception of sections of Captain's Boreen to the west where there are gaps in the roadside vegetation.

Conservation values

The conservation values indicate those aspects of the receiving environment which are sensitive and could be negatively impacted on by the Proposed Development. These values form the potential landscape and visual constraints to the Proposed Development. These include:

- The adjacent Owenboy River corridor.
- Existing northern and southern site boundary trees and hedges.
- Landscape designations including *High Value Landscape*.

Enhancement Values

The enhancement values reflect change that is occurring in the landscape and its inherent robustness and identify elements which could be enhanced.

- The opportunity to demonstrate successful intervention in a high value landscape by means of a well-considered design strategy which conserves existing elements of the landscape.
- Opportunity to deliver residential development, a riverside recreational route and a town park in fulfilment of the objectives of Cork County Council Development Plan 2014.
- Opportunity to provide a positive intervention at the urban edge of Carrigaline Town.

10.4 Characteristics of the Proposed Development

The Proposed Development will consist of:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units;
- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tiered seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and

- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage

10.5 Potential Impact of the Proposed Development

10.5.1 Construction Phase

The development will generate traffic to and from the site associated with the delivery of materials to the Proposed Development Site and would be required throughout much of the construction phase.

10.5.2 Operational Phase

10.5.2.1 Operational Phase Landscape Effects

Magnitude of Change

The magnitude of change as a result of the Proposed Development is considered Medium:

Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value.

Internally and externally, the Proposed Development will constitute a significant intervention in the local suburban landscape which will change the character of the site and influence the character of the locality. The Proposed Development Site will be transformed from its greenfield condition to a residential neighbourhood, retail outlet and town park. The new development will provide a range of outdoor spaces including public plaza and internal courtyard spaces with active edges addressing the town park/riverside walkway and the Western Relief Road.

A comprehensive tree, shrub and groundcover planting strategy is proposed for the site. Buffer planting will be provided along adjoining boundaries to the south and west of the site. High quality hard and soft landscape treatments will be applied throughout the new scheme to provide attractive and uplifting public and private environments which will have seasonal variety and interest and will contribute to the biodiversity of the locality.

Significance of Effect

The landscape effect is considered to be **significant**, on the landscape of the site and its immediate vicinity. The Proposed Development will deliver a new neighbourhood, retail offer and town park with a hierarchy of public and private spaces. The development will provide a distinctive intervention at the edge of the town and define a new sense of place in the context of the town and its amenities and pedestrian/cyclist connectivity. These attributes are **beneficial** aspects of effect on the suburban landscape.

10.5.2.1 Operational Phase Visual Effects

A series of viewpoints were chosen in order to represent a variety of viewers from a range of locations. These include residential viewers as well as viewers from the local road network and publicly accessible destinations in the locality. The viewpoints represent viewers of High to Low sensitivity, and are as follows:

Table 10-6: Viewpoints

Viewpoint	Description
1	View from R613 Bellea Road
2	View from R611 Cork Road
3	View from R613 Bellea Road Junction with Nova Court
4	View from Nova Court
5	View from Carrigaline Shopping Centre Car Park
6	View from Main Street at River Owenboy Bridge
7	View from Western Bypass Road
8	View from R611 Kilmoney Road Lower
9	View from R611 Kilmoney Road Lower
10	View from Captain's Boreen
11	View from Droim an Oir Residential Area
12	View from Church Hill
13	View from R611 Kilmoney Road Lower
14	View from R611 Kilmoney Road Lower
15	View from R611 Kilmoney Road Lower
16	View from Dairygold Co-Op Superstore Access Road
17	View from Dairygold Co-Op Superstore Car Park



Figure 10-11: Viewpoint Location Plan | not to scale. Source: From Google Maps

The photomontages from Viewpoints 1-17 assist in the assessment of operational phase visual effects.

The viewpoints are described below:

Viewpoint 1- Ballea Road R613

Existing View

This view southward from this location shows the local sports pitches facility with high perimeter walls, flood lighting and local housing in the background.

Visual Receptor Sensitivity

Viewers will be primarily those who use the local road network regularly going to and from places of work, education or shopping in Carrigaline who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows that the Proposed Development will not be visible from this location.

Magnitude of Change

There will be **no change** experienced from this location.

Significance of Effect

There is no significance of effect to be considered for this viewpoint.

Viewpoint 2 – Cork Road R611

Existing View

This view southward shows Carrigaline Court Hotel and a number of established mature specimen trees along the local road corridor which partially block the view southward towards the town centre and the distant ridge.

Visual Receptor Sensitivity

Viewers will be primarily those who use the local road network regularly going to and from places of work, education or shopping in Carrigaline who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows that the Proposed Development will not be visible from this location.

Magnitude of Change

There will be **no change** experienced from this location.

Significance of Effect

There is no significance of effect to be considered for this viewpoint.

Viewpoint 3 – Junction R611 Ballea Road and Nova Court

Existing View

This view southward shows the variation in the local topography from the elevated ground in the foreground to the distant ridge. In the middle distance, a large roof structure of a local commercial unit is visible.

Visual Receptor Sensitivity

Viewers will be primarily those who use the local road network regularly going to and from places of work, education or shopping in Carrigaline who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows that the Proposed Development will not be visible from this location.

Magnitude of Change

There will be **no change** experienced from this location.

Significance of Effect

There is no significance of effect to be considered for this viewpoint.

Viewpoint 4 – Nova Court

Existing View

This view southward shows existing residential development along Nova Court.

Visual Receptor Sensitivity

Viewers will be primarily local residents who are considered to be of High sensitivity.

Proposed View

The proposed view shows that the Proposed Development will not be visible from this location.

Magnitude of Change

There will be **no change** experienced from this location.

Significance of Effect

There is no significance of effect to be considered for this viewpoint.

Proposed View along with permitted buildings in the locality – (Cumulative)

There are no cumulative effects arising for this view.

Viewpoint 5 – Carrigaline Shopping Centre Car Park

Existing View

This view south-westward from this location shows the shopping centre car park and the backdrop of the local hillside which has significant residential development interspersed with some tree cover.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows the scale and form of the Proposed Development. The development constitutes a significant intervention in the suburban setting. It introduces a clearly defined built form which defines the urban edge of the town whilst also restricting views southward.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context,

to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Significant**, and the quality of the effect is **Neutral**. The Proposed Development blocks the view of the hillside and introduces a distinctly urban form at the edge of the town centre. Loss of the view southward may be perceived as adverse but not unexpected in the context of the zoning of the site and current trends toward the delivery of more compact and higher density development in town centres. The development will change the character of the setting reflective of change that goes hand in hand with the evolving urban environment. The design qualities of the Proposed Development are expressed in its form and materiality.

Viewpoint 6 – View from Main Street at River Owenboy Bridge

Existing View

This view westward from the bridge shows the Owenboy River corridor with development along its northern and southern banks. The built environment is softened by the established riverbank vegetation.

Visual Receptor Sensitivity

Viewers will be primarily local residents who are considered to be of High sensitivity.

Proposed View

The proposed view shows that the Proposed Development will not be visible from this location.

Magnitude of Change

There will be **no change** experienced from this location.

Significance of Effect

There is no significance of effect to be considered for this viewpoint.

Proposed View along with permitted buildings in the locality – (Cumulative)

There are no cumulative effects arising for this view.

Viewpoint 7 – Western Bypass Road

Existing View

This view south-eastward from the bypass corridor shows the high ground to the south Kilmoney Road Lower which has housing and intermittent tree cover. The Proposed Development Site is visible in the middle distance along with the neighbouring retail site to the east defined by the large warehouse style units. The southern boundary of the Proposed Development Proposed Development Site comprises a mixture of hedges, fences, walls and

trees which are part of the back gardens of houses located immediately north of Kilmoney Road Lower. There is a large mature tree on the boundary to the right of the view.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows the scale and form of the Proposed Development. The development constitutes a significant intervention in the suburban setting. It introduces a clearly defined built form which defines the urban edge of the town whilst also restricting views southward.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Significant**, and the quality of the effect is **Beneficial**. The Proposed Development blocks the view of the hillside and introduces a distinctly urban form at the edge of the town centre. Loss of the view southward may be perceived as adverse but not unexpected in the context of the zoning of the site and current trends toward the delivery of more compact and higher density development in town centres. The development will change the character of the setting reflective of change that goes hand in hand with the evolving urban environment. The design qualities of the Proposed Development are expressed in its form, materiality and the delivery of a town park with circulation paths, amenities and a comprehensive tree planting programme which has a softening effect on the built environment which will enhance local sense of place on this strategic bypass route around the town.

Viewpoint 8 – R611 Kilmoney Road Lower

Existing View

This view eastward shows the end of the Western Relief Road corridor in the foreground where it will join Kilmoney Road Lower. There are a number of mature tree cover which screen existing residential development aligned along the north side of the road. The subject Site is partially visible to the left of the mature trees and development at the top end of Cork Road is visible in the distant background.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity and local residents those who are considered to be of High sensitivity.

Proposed View

The proposed view shows the scale and form of the Proposed Development along the western edge of the Proposed Development Site. The development constitutes a significant intervention in the suburban setting. It introduces a clearly defined built form at the urban edge of the town adjacent to a strategic road junction associated with the new Western Relief road.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Very Significant**, and the quality of the effect is **Beneficial**. The development will change the character of the Proposed Development site but complement the local residential setting. The photomontage image reveals how the development has been adapted to the local topography to provide town house units at the south-western extremity of the site where they integrate favourably with existing residential in the locality in terms of scale and height. The higher density part of the development is located at the northern end of the development footprint to the left-hand side of the image. The design qualities of the Proposed Development are expressed in its form and selections of materials in elevations which are comprised of stone cladding and glass. A comprehensive strategy for tree, shrub and groundcover planting will complement the development and have a softening effect on it. Furthermore, the Proposed Development will make a positive contribution towards the new strategic junction of the Western Relief Road providing passive supervision and sense of place.

Viewpoint 9 – R611 Kilmoney Road Lower

Existing View

This view westward along Kilmoney Road Lower shows the nature of existing development along the northern side of the road which includes a mixture of commercial and residential development prior to transition to the tree-lined stretch of road in the distance.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity and local residents those who are considered to be of High sensitivity.

Proposed View

The proposed view shows part of the Proposed Development located to the rear of the petrol-filling station and the houses along the Kilmoney Road. It is substantially screened by the forecourt canopy.

Magnitude of Change

The magnitude of change is considered Low.

High is defined as:

Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.

Significance of Effect

The effect is considered **Moderate-Slight**, and the quality of the effect is **Neutral**. The Proposed Development is evident but recedes in the view by virtue of the prominence of the petrol-filling canopy and totem sign.

Viewpoint 10 – Captain’s Boreen

Existing View

This view eastward shows the open fields along the southern banks of the River Owenabue and the manner in which the topography transitions to higher ground to the right of the view along Kilmoney Road Lower. Construction works associated with the Western Relief Road corridor are visible in the middle distance while built elements of the town appear among the distant tree cover.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows the scale and form of the Proposed Development. The development constitutes a significant intervention in the local landscape. It introduces a clearly defined built form at the urban edge of the town. The tallest and higher density element of the development is located to the left of the development footprint.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context,

to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Significant**, and the quality of the effect is **Neutral**. The development constitutes a significant intervention by virtue of its scale and form. This outcome is not surprising in the context of the zoning for the site and current trends toward the delivery of more compact and higher density development in towns. The development will change the character of the setting reflective of change that goes hand in hand with the evolving urban environment which includes the provision of the Western Relief Road. The design qualities of the Proposed Development are expressed in its form, materiality and the delivery of a comprehensive tree planting programme which has a softening effect on what will be a well-defined urban edge.

Viewpoint 11 – Droim an Oir

Existing View

This view northward from this elevated location shows some town centre development at the top end of Cork Road as well as areas of residential development in the suburban areas of Carrigaline and distant Cobh. There is a significant amount of tree cover in the panoramic view.

Visual Receptor Sensitivity

Viewers will be primarily local residents who are considered to be of High sensitivity.

Proposed View

The proposed view shows that the Proposed Development will not be visible from this location.

Magnitude of Change

There will be **no change** experienced from this location.

Significance of Effect

There is no significance of effect to be considered for this viewpoint.

Proposed View along with permitted buildings in the locality – (Cumulative)

There are no cumulative effects arising for this view.

Viewpoint 12 – Church Hill

Existing View

This view northward from this elevated location shows some town centre development at the top end of Cork Road as well as areas of residential development in the suburban areas of Carrigaline. There is a significant amount of tree cover in the panoramic view.

Visual Receptor Sensitivity

Viewers will be primarily local residents who are considered to be of High sensitivity.

Proposed View

The proposed view shows that the Proposed Development will not be visible from this location.

Magnitude of Change

There will be **no change** experienced from this location.

Significance of Effect

There is no significance of effect to be considered for this viewpoint.

Proposed View along with permitted buildings in the locality – (Cumulative)

There are no cumulative effects arising for this view.

Viewpoint 13 – R611 Kilmoney Road Lower

Existing View

This view eastward along Kilmoney Road Lower shows existing residential properties along the northern side of the road which are mostly bungalows with front gardens and access drives off the road.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity and local residents those who are considered to be of High sensitivity.

Proposed View

The proposed view shows part of the Proposed Development located to the rear of the existing houses along the road and the mature roadside vegetation in the foreground.

Magnitude of Change

The magnitude of change is considered Low.

High is defined as:

Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.

Significance of Effect

The effect is considered **Moderate-Slight**, and the quality of the effect is **Neutral**. The Proposed Development is evident but recedes in the view by virtue of existing roadside screen vegetation.

Viewpoint 14 – R611 Kilmoney Road Lower

Existing View

This view northward across Kilmoney Road lower adjacent to MauraLand residential estate shows bungalow houses along the opposite side of the road and parts of the distant suburbs of Carrigaline. The relative elevation of the viewpoint is evident and the distant ridge is part of the Owenboy River valley landscape.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity and local residents those who are considered to be of High sensitivity.

Proposed View

The proposed view shows the scale and form of the Proposed Development. The development constitutes a significant intervention to the rear of the existing houses along Kilmoney Road Lower.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Very Significant**, and the quality of the effect is **Neutral**. The development will change the character of the view by virtue of the scale and building typologies proposed, and the manner in which the appreciation of the distant landscape will be affected. These changes are likely to be perceived by local residents as adverse effects. However, in the context of the zoning for the site for residential development, the nature of the changes incurred are not unusual. The principle of compact and higher density development in town centre location is well-established. Design standards in respect of separation distances from existing houses have been applied and there is a comprehensive tree planting strategy for the site which will deliver screen planting along the southern site boundary. This will provide a visual screen as it matures and enhance the sense of separation between the existing and Proposed Development.

Viewpoint 15 – R611 Kilmoney Road Lower

Existing View

This view westward along Kilmoney Road Lower shows the nature of existing development along the northern side of the road which consists of residential development prior to transition to the tree-lined stretch of road in the distance.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity and local residents those who are considered to be of High sensitivity.

Proposed View

The proposed view shows part of the Proposed Development to the rear of the houses along Kilmoney Road Lower as well as the town houses in the distance which are located in the south-western corner of the Proposed Development Site. The development constitutes a significant intervention to the rear of existing houses.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Very Significant**, and the quality of the effect is **Neutral**. The Proposed Development will change the character of the view by virtue of the scale and building typologies proposed. However, in the context of the zoning for the site for residential development, the nature of the changes incurred are not unusual. The principle of compact and higher density development in town centre location is well-established. Design standards in respect of separation distances from existing houses have been applied and there is a comprehensive tree planting strategy for the site which will deliver screen planting along the southern site boundary. This will provide a visual screen as it matures and enhance the sense of separation between the existing and Proposed Development.

Viewpoint 16 – Access Road to Dairygold Co-Op Superstore

Existing View

This view eastward across the fields along the southern banks of the River Owenabue located to the west of Carrigaline Town. Construction works associated with the Western Relief Road are visible in the middle distance while built elements of the town are visible among the distant tree cover.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows the scale and form of the Proposed Development. The development constitutes a significant intervention in the local landscape to the rear of the store and houses along Kilmoney Road Lower.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Significant**, and the quality of the effect is **Neutral**. The Proposed Development provides well-defined urban form at the south-western extremity of the town. The design qualities of the Proposed Development are expressed in its form and materiality. Separation distances between the Proposed Development and existing houses along Kilmoney Road Lower are demonstrated in the photomontage. Tree planting along the southern boundary of the site is also shown which will provide a visual screen as it matures, softening the built environment and enhancing the sense of separation between existing houses to the south of the site. There are no windows along the western elevation of the superstore building.

Viewpoint 17 – Dairygold Co-Op Superstore Car Park

Existing View

This view eastward across the fields along the southern banks of the River Owenabue located to the west of Carrigaline Town. Construction works associated with the Western Relief Road are visible in the middle distance while built elements of the town are visible among the distant tree cover.

Visual Receptor Sensitivity

Viewers will be primarily those going to and from places of work or shopping who are considered to be of Medium sensitivity.

Proposed View

The proposed view shows the scale and form of the Proposed Development. The development constitutes a significant intervention in the local landscape. It introduces a distinctive urban form at the edge of the town.

Magnitude of Change

The magnitude of change is considered High.

High is defined as:

Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Significance of Effect

The effect is considered **Significant**, and the quality of the effect is **Neutral**. The Proposed Development provides a distinctive urban form at the south-western extremity of the town in response to the zoning of the site. The design qualities of the Proposed Development are expressed in its form and materiality. The development will change the character of the view reflective of change that goes hand in hand with the zoning for the site and the evolving toWn centre environment.

Table 10-7: Visual Effects Summary

Viewpoint	Description	Visual Effect
1	View from R613 Bellea Road	None
2	View from R611 Cork Road	None
3	View from R613 Bellea Road Junction with Nova Court	None
4	View from Nova Court	None
5	View from Carrigaline Shopping Centre Car Park	Significant, Neutral
6	View from Main Street at River Owenboy Bridge	None
7	View from Western Bypass Road	Significant, Beneficial
8	View from R611 Kilmoney Road Lower	Very Significant, Beneficial
9	View from R611 Kilmoney Road Lower	Moderate/Slight, Neutral
10	View from Captain's Boreen	Significant, Neutral

11	View from Droim an Oir Residential Area	None
12	View from Church Hill	None
13	View from R611 Kilmoney Road Lower	Moderate/Slight, Neutral
14	View from R611 Kilmoney Road Lower	Very Significant, Neutral
15	View from R611 Kilmoney Road Lower	Very Significant, Neutral
16	View from Dairygold Co-Op Superstore Access Road	Moderate/Slight, Neutral
17	View from Dairygold Co-Op Superstore Car Park	Significant, Beneficial

Summary

Viewpoints 1-17 represent a range of views at varying locations, elevations, distances and directions. They represent both sensitive visual receptors such as residents and other visual receptors in the vicinity of the Proposed Development Site.

There are eight visual effects which are found to be significant (views 5, 7, 8, 10, 13, 14, 15 & 17). Of these, six are considered to be neutral in quality and the remaining two (views 7 & 8) are considered to be beneficial.

Neutral - Scheme complements the scale, landform and pattern of the landscape (townscape)/view and maintains landscape quality.

Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform, and pattern, and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Visual effects are most pronounced in close proximity to the site, including along Kilmoney Road Lower. Beneficial results reflect those views in which positive aspects of the Proposed Development are evident, such as distinctiveness, contribution towards sense of place, quality of materials and finishes.

For views 9 & 13 visual effects are Moderate/Slight & Neutral.

The Proposed Development will have no effect from the remaining viewpoints (views 1, 2, 3, 4, 6, 11 & 12).

10.5.3 Potential Cumulative Impacts

Cumulative effects relate to the potential combined impact of the Proposed Development in association with other recent developments or Proposed Developments in the vicinity of the site. Developments considered in this regard are presented in Table 10-8.

Cumulative effects in respect of these other developments in the locality are found to be Medium and Neutral in quality.

Table 10-8: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part 8 Planning	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	<p>The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence.</p> <p>The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians, cyclists and vehicular traffic).</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
217464	Aldi Stores (Ireland) Ltd	<p>On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.</p>	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
214818	Ruden Homes Ltd	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
205230	Barry Collins (Supermarket) Ltd	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
196065	Athena Private Assets Ltd	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
194642	Piton Properties Ltd	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

10.5.4 “Do Nothing” Impact

Do nothing would involve the retention of the site in its current state. The development potential of the site would, therefore, remain unfulfilled.

10.6 Avoidance, Remedial & Mitigation Measures

10.6.1 Construction Phase

The proposed remedial measures relate to implementation of appropriate site management procedures – such as the control of site lighting, delivery of materials and site boundary hoarding to minimise impacts on receptors in the vicinity of the Proposed Development Site.

10.6.2 Operational Phase

Mitigation by design was carried out during the design development process.

The development has been designed to deliver a high-quality residential, retail and town park development in response to the zoning of the site. The primary objective has been to deliver attractive and safe neighbourhoods with excellent amenities for residents. The development will have distinctive landmark qualities at the edge of town and will provide a new town park and riverside pedestrian/cyclist link to the main street of the town. Remedial mitigation includes a comprehensive tree, shrub and groundcover planting programme to enhance the environment across the site.

10.6.3 “Worst Case” Scenario

The worst-case scenario would be partial completion of the Proposed Development leaving the site abandoned and unusable.

10.7 Residual Impacts

Residual impacts associated with the Proposed Development relate to the scale and height of the buildings which will remain visible in views locally. The buildings will be evident in the local landscape into the future which would be expected for developments of this scale. The extent of residual effect will reduce as the tree planting matures around the site.

10.8 Monitoring

10.8.1 Construction Phase

The contract works will be supervised by a suitably qualified landscape architect as required by conditions of the planning grant. The planting works will be undertaken in the planting season after completion of the main civil engineering and building work.

10.8.2 Operational Phase

Monitoring of the mitigation measures will form part of the landscape management plan. Replacement trees, replacement planting and pruning measures will be captured in landscape maintenance plans, and are intrinsically linked to the proposed mitigation measures. All

landscape works will be in an establishment phase for the initial year of operation. A landscape maintenance plan accompanies the planning application. Prior to completion of the landscape works, a competent landscape contractor will be engaged and a detailed maintenance plan, scope of operation and methodology will be put in place.

10.9 Interactions

10.9.1 Population and Human Health

During the Construction Phase there will be visual changes associated with removal of trees and hedgerows and emerging plant and machinery. During the Operational Phase there will be permanent visual changes to the landscape which may impact residential dwellings surrounding the Proposed Development.

10.9.2 Land and Soil

During the construction phase the site landscape will undergo a change from agricultural land to a mixed residential development with extensive landscaping. Excavation of soil and subsoils will be required to an anticipated maximum depth of 2.0mbGL at the Proposed Development Site. The removal of surplus soil offsite will be undertaken in accordance with applicable statutory requirements.

10.9.3 Archaeology and Cultural Heritage

As there are no known archaeological or architectural remains found during the desk top survey or field survey is not predicted that any changes in landscape or visual impact will affect in any way the archaeology of the area.

10.10 Difficulties Encountered

No difficulties were encountered.

10.11 References

Cork County Council Development Plan 2014

Cork County Council Draft Landscape Strategy 2007

Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA) published by the UK Landscape Institute and the Institute for Environmental Management and Assessment

11 ARCHAEOLOGY AND CULTURAL HERITAGE

11.1 Introduction

This Chapter assesses the impacts of the Proposed Developments as described in Chapter 2 on the known and potential cultural heritage resource which encompasses assets relevant to both the tangible resources (archaeology and architecture heritage); and non-tangible resources (history, folklore, tradition, language, placenames etc.). The recorded and potential cultural heritage resource within the study area described in Section 11.3, which encompass the various elements of the project and surrounding lands, was assessed in order to compile a comprehensive cultural heritage baseline and context.

11.1.1 Quality Assurance and Competence

This Chapter was prepared by John Cronin and David Murphy of John Cronin & Associates. Mr. Cronin holds qualifications in archaeology (BA (University College Cork (UCC), 1991), regional and urban planning (MRUP (University College Dublin (UCD) 1993) and post-graduate qualifications in urban and building conservation (MUBC (UCD), 1999) and Mr. Murphy holds a BA degree in archaeology (UCC 2003). Both of these individuals have extensive experience in preparing archaeological, architectural and cultural heritage assessments for residential projects.

11.2 Study Methodology

The methodology used for this assessment is in accordance with Environmental Protection Agency (EPA 2003) *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* and EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*; as well as more recent guidance methods have also been utilised per EPA (2015) *Draft Advice Notes for Preparing an EIS* and (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports EIAR*. The Chapter complies with the requirements of Directive 2011/92/EU as amended by Directive 2014/52/EU, the Planning and Development Act, 2000 (as amended) and the Planning and Development Regulations, 2001 (as amended). The assessment has also been carried out in accordance with guidelines for the assessment of impacts on the cultural heritage resource as published by the International Council on Monuments and Sites (ICOMOS 2011).

The assessment was based on a programme of desk-based research combined with a fieldwalking inspection of the Proposed Development Site. These studies were undertaken to identify any features of archaeological, architectural or cultural heritage significance likely to be impacted by the Proposed Development. The study area reviewed for the assessment of the area within the Proposed Development Site as well as lands extending for 1km in all directions from its boundary.

11.2.1 Desktop Study

The assessment presents the results of a desktop study of relevant published sources and datasets undertaken in order to identify all recorded and potential archaeological, architectural and other cultural heritage sites/features/areas within the study areas. The principal sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP). The Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH) were consulted for assessing the designated architectural heritage resource. Details on the legal and planning frameworks designed to protect these elements of the cultural heritage resource are also provided.

Other sources consulted as part of the assessment included the following:

Development Plans

The *Cork County Development Plan 2014* was consulted as part of this assessment. This publication outlines the Council's policies for the conservation of the archaeological and architectural heritage resource within the county and includes a list of Record of Protected Structures (RPS) as well as designated Architectural Conservation Areas (ACA). The *Draft Cork County Development Plan 2022-2028* was also consulted.

Archaeological Inventory of County Cork Volume 2: East and South Cork

This publication present summary descriptions of the recorded archaeological sites within this area of the county and the relevant entries are included within the chapter. In addition, the current national online database resources pertaining to same were reviewed on the National Monuments Service's Historical Environment Viewer (www.archaeology.ie) in April 2022.

Heritage Council of Ireland: Heritage Map Viewer

This online mapping source (www.heritagemaps.ie) collates various cultural heritage datasets provided by, among others, the National Monuments Service, the National Museum of Ireland, local authorities, the Royal Academy of Ireland and the Office of Public Works. Relevant datasets were reviewed in April 2022.

Database of Irish Excavation Reports

The Database of Irish Excavation Reports contains summary accounts of all archaeological excavations carried out in Ireland (North and South) from 1969 to 2020. Current data was accessed via www.excavations.ie in April 2022.

Literary Sources

Various published sources were consulted in order to assess the archaeological, historical, architectural heritage and folklore record of the study area and these are listed in Section 11.11 of this Chapter.

Historic Maps

A review of available historic cartographic sources was undertaken, and these included the 17th-century Down Survey and various map editions published by the Ordnance Survey from the mid-19th century onward. These sources can indicate the presence of past settlement patterns, including features of archaeological and architectural heritage significance that no longer have any surface expression. Extracts from the reviewed maps are presented in section 11.3.3.2 of this Chapter.

Aerial and Satellite imagery

A review of available imagery of the study area was undertaken in order to review the extent of modern interventions and to ascertain if any traces of undesignated cultural heritage features, including sub-surface archaeological sites, were visible.

Irish National Folklore Collection

Transcribed material from the National Folklore Collection archive has been digitised and published online at www.duchas.ie. This online archive was reviewed in April 2022.

UNESCO designated World Heritage Sites and Tentative List

There are two designated World Heritage sites in Ireland and a number of other significant examples have been included in a Tentative List (2010) that has been put forward by Ireland for inclusion. None of these designated or tentative sites are located within 20km of the Proposed Development Site.

11.2.2 Field Surveys

A suitably qualified archaeologist (David Murphy) carried out an inspection of the Proposed Development Site on Friday 3rd September 2021. The site was assessed in terms of historic landscape, land use, vegetation cover, presence and potential for undetected archaeological and architectural heritage sites/features. Weather conditions were dry and bright at the time of survey and this provided excellent landscape visibility. No difficulties were encountered during the survey, though a portion of the site was in use as part of works associated with a nearby development. The results of the site inspection are detailed in Section 11.3 and extracts from the photographic record are presented in Appendix 11.1 which can be found at the end of this Chapter.

11.2.3 Assessment of Impacts

The following provides a summary of the criteria used to assess impacts in order to concisely outline the methodology specifically applied to the cultural heritage resource which complies with relevant EPA and ICOMOS guidelines (see Section 11.2).

Duration of Effect

The duration of effects is assessed based on the following criteria:

- Momentary (seconds to minutes)
- Brief < 1 day
- Temporary <1 year
- Short-term 1-7 years

- Medium Term 7-15 years Long Term 15-60 years
- Permanent > 60 years
- Reversible: Effects that can be undone, for example through remediation or restoration

Quality of Effect

The quality of an effect on the cultural heritage resource can be positive, neutral or negative:

- *Positive Effect* – a change which improves the quality of the cultural heritage environment (e.g., increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation/restoration and re-use of an otherwise vulnerable derelict structure).
- *Neutral Effect* – no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- *Negative Effect* – a change which reduces the quality of the cultural heritage resource (e.g., visual intrusion on the setting of an asset, physical intrusion on features/setting of a site etc.)

Type of Effect

The type of effect on the cultural heritage resource can be direct, indirect or no predicted impact.

- *Direct Impact* – where a cultural heritage site is physically located within the footprint of the Proposed Development, which will result in its complete or partial removal.
- *Indirect Impact* – where the setting of a cultural heritage site located within the environs of Proposed Development is impacted.
- *No predicted impact* – where the Proposed Development will not adversely or positively affect a cultural heritage site.

Magnitude of Effect

This is based on the degree of change, incorporating any mitigation measures, on a cultural heritage asset and can be negative or positive. The magnitude is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible and has been informed by criteria published in the International Council on Monuments and Sites *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011) (Table 11-1).

Table 11-1: Magnitudes of Effect on Cultural Heritage Assets

Magnitude	Description
High	<p>Most or all key archaeological or architectural materials affected such that the resource is totally altered</p> <p>Comprehensive changes to setting</p> <p>Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character unit</p> <p>Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation</p>

Magnitude	Description
Medium	<p>Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified.</p> <p>Considerable changes to setting that affect the character of the archaeological asset.</p> <p>Changes to the setting of a historic building, such that it is significantly modified.</p> <p>Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character.</p> <p>Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.</p>
Low	<p>Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different.</p> <p>Slight changes to setting of an archaeological monument.</p> <p>Change to setting of a historic building, such that it is noticeably changed.</p> <p>Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character.</p> <p>Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.</p>
Negligible	<p>Very minor changes to key archaeological materials or setting.</p> <p>Slight changes to historic building elements or setting that hardly affect it.</p> <p>Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; resulting in very small change to historic landscape character.</p> <p>Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.</p>

Value assessment criteria

There are no formal guidance or legal criteria for grading the values of Irish cultural heritage assets and the evaluations used in this assessment (Table 11-2) have been informed by criteria presented in the International Council on Monuments and Sites *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, p. 14-17). The evaluation of the values of cultural heritage assets is, therefore, not intended as definitive but rather as an indicator which contributes to a wider judgment based on the individual circumstances of each asset. The application of values included a consideration of the condition/preservation; documentary/historical significance, group value, rarity, visibility in the landscape, fragility/vulnerability and amenity value of the cultural heritage assets on a case-by-case basis. The value of all known or potential assets that may be affected by development are ranked according to the following scale: Very High; High; Medium; Low, Negligible and Unknown. The values assigned to identified assets within the study areas were determined following the completion of the desktop research combined with subsequent site inspections and are presented in Section 11.3 of this chapter.

Table 11-2: Factors applied for assessing the Value of Cultural Heritage Assets

Value	Example of Asset Types
Very High (International Significance)	World Heritage Sites (including Tentative List properties) Sites, buildings or landscapes of acknowledged international importance Intangible associations with individuals or innovations of global significance
High (National Significance)	Nationally designated sites, buildings and landscapes of significant quality, rarity, preservation and importance Undesignated assets of the quality and importance to be designated Assets that can contribute significantly to acknowledged national research objectives Archaeological Landscapes with significant group value Intangible associations with individuals or innovations of national significance
Medium (Regional Significance)	Designated or undesignated assets that can contribute significantly to regional research objectives, including buildings that can be shown to have exceptional qualities in their fabric or historical associations Conservation Areas and historic townscapes containing buildings that contribute significantly to its historic character Intangible associations with individuals or innovations of regional significance
Low (Local Significance)	Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives Historic Townscape or built-up areas of limited historic integrity in their buildings and settings Intangible associations with individuals or innovations of local significance
Negligible	Assets with very little or no surviving archaeological interest Landscapes little or no significant historical interest Buildings or urban areas of no architectural or historical note; buildings of an intrusive character
Unknown Potential	Assets whose importance has not been ascertained Buildings with some hidden (i.e., inaccessible) potential for historic significance

Significance of Effects

The significance of effect can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Table 11-3) and is assigned based on the combined evaluation of effect magnitude and asset values (Table 11-4).

Table 11-3: Significance of Effects (per EPA Draft EIAR Guidelines 2017)

Significance	Description
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	An effect which causes noticeable changes in the character of the environment but without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline 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 most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

Table 11-4: Significance of Effects Matrix (after EPA Draft EIAR Guidelines 2017)

Magnitude of Impact	High	Not Significant/ Slight	Moderate/ Significant	Significant/ Very Significant	Very Significant/ Profound
	Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
	Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
	Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight
		Negligible	Low	Medium	High/Very High
Value/Sensitivity of the Asset					

11.3 The Existing and Receiving Environment (Baseline Situation)

11.3.1 Introduction

The Proposed Development Site is contained within the townland of Kilmoney and is located to the west of the southern end of Main Street, Carrigaline and is bound by the new Carrigaline Relief Road (currently under construction) to the west. The northern portion of the site is bound by the Owenabue River, while the Dairygold Co-op is situated to the immediate east and a number of individual residential dwellings bound the site to the south. The Proposed Development Site comprises an undeveloped parcel of agricultural land and also includes a greenway path (c.215m long and c.3m wide) which will link the main area of the development site with Main Street, to the east. The greenway connection follows the southern bank of the Owenabue (Owenboy) River and extends through existing yards and a laneway at its eastern end. The underlying soil profiles within the area largely consist of a mix of river alluvium (north end of site) and coarse loamy drift with siliceous stones (south end of site), while the underlying geology of the area is composed of fluvio-deltaic & basinal marine (turbiditic): shale, sandstone, siltstone & coal.



Figure 11-1: Aerial image depicting the location and extent of the Proposed Development (red outline)

11.3.2 Legal and Planning Context

The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the European Convention on the Protection of Architectural Heritage (Granada Convention, 1985), ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015. The locations of World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO were reviewed and none are located within the region of the country which contains the study area.

The national legal statutes and guidelines relevant to this assessment include:

- National Monuments Acts 1930 (as amended)
- Heritage Act 1995 (as amended)
- National Cultural Institutions Act 1997
- The Architectural Heritage (National Inventory) and Historic Monuments (Misc) Provisions Act 1999
- Planning and Development Act 2000, as amended
- Department of Arts, Heritage and Gaeltacht 2011 *Architectural Heritage Protection: Guidelines for Planning Authorities*.

- Department of Arts, Heritage, Gaeltacht and the Islands 1999 *Framework and Principles for the Protection of Archaeological Heritage*

Relevant Archaeological Legislation and Planning Policies

The administration of national policy in relation to archaeological heritage management is the responsibility of the National Monuments Service (NMS) which is currently based in the Department of Housing, Local Government and Heritage. The National Monuments Act of 1930, and its Amendments, are the primary means of ensuring the satisfactory protection of the archaeological resource. They include a number of provisions that are applied to secure the protection of archaeological monuments. These include the designations of nationally significant sites as National Monuments, the Register of Historic Monuments (RHM), the Record of Monuments and Places (RMP), the Sites and Monuments Record (SMR), and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites. Section 2 of the National Monuments Act, 1930 defines a National Monument as 'a monument or the remains of a monument, the preservation of which is a matter of national importance'. The State may acquire or assume guardianship of examples through agreement with landowners or under compulsory orders while monuments within the ownership of local authorities are also deemed to be National Monuments. There are no National Monuments located within the study area. The nearest National Monument in State Care to the Proposed Development is Spike Island (CO087-065003-) and this is located circa 7.5km to the northeast of the Proposed Development.

The National Monuments (Amendment) Act, 1994 made provision for the establishment of the RMP, which comprises the known archaeological sites within the State. The RMP, which is based on the earlier Register of Historic Monuments (RHM) and Sites and Monuments Record (SMR), provides county-based lists of all recorded archaeological sites with accompanying maps. All RMP sites receive statutory protection under the National Monuments Act 1994 and the NMS must be given two months' notice in advance of any work proposed at their locations. There are no recorded archaeological sites (as recorded by the Archaeological Survey of Ireland (ASI)) located on the footprint of the Proposed Development Site, while there are twelve recorded sites located within 1km of its boundaries, the nearest of which (CO087-033---; Mill - unclassified) is located circa 195m to the northeast of the north-eastern portion of the site. These sites are listed in Table 11-5 and mapped in Figure 11-2.

The Cork County Development Plan 2014 includes the following policies and objectives in relation to the protection of the archaeological resource:

Objective HE 3-1: Protection of Archaeological Sites

a) Safeguard sites and settings, features and objects of archaeological interest generally.

b) Secure the preservation (i.e. preservation in situ or in exceptional cases preservation by record) of all archaeological monuments including the Sites and Monuments Record (SMR) (see www.archeology.ie) and the Record of Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act, 1994, as amended and of sites, features and objects of archaeological and historical interest generally. In securing such preservation, the planning authority will have regard to the

advice and recommendations of the Department of Arts, Heritage and Gaeltacht as outlined in the Frameworks and Principles for the Protection of the Archaeological Heritage.

HE3-3: Zones of Archaeological Potential - Protect the Zones of Archaeological Potential (ZAPs) located within historic towns and other urban areas and around archaeological monuments generally. Any development within the ZAPs will need to take cognisance of the potential for subsurface archaeology and if archaeology is demonstrated to be present appropriate mitigation (such as preservation insitu/buffer zones) will be required.

HE3-4: Industrial and Post-Medieval Archaeology -Protect and preserve the archaeological value of industrial and post-medieval archaeology such as mills, limekilns, bridges, piers, harbours, penal chapels and dwellings proposed for refurbishment, works to or redevelopment/conversion of these sites should be subject to careful assessment.

HE 3-6: Archaeology and Infrastructure Schemes- Have regard to archaeological concerns when considering proposed service schemes (including electricity, sewerage, telecommunications, water supply) and proposed roadwork's (both realignments and new roads) located in close proximity to Recorded Monuments and Places and their known archaeological monuments.

Relevant Architectural Heritage Legislation and Planning Policies

Protection of architectural heritage is provided for through a range of legal instruments that include the Heritage Act 1995, the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999, and the Planning and Development Act 2000. Section 2(1) of the Heritage Act 1995, defines architectural heritage as including:

All structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents, and, without prejudice to the generality of the foregoing, includes railways and related buildings and structures and any place comprising the remains or traces of any such railway, building or structure.

The Planning and Development Act 2000 requires Planning Authorities to keep a 'Record of Protected Structures' (RPS) of buildings and other structures that are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. All structures listed for protection in current Development Plans, have become Protected Structures and planning permission is required for any works to such structures that would affect their character. A protected structure also includes the land and other structures within its curtilage. While the notion of curtilage is not defined by legislation, the *Architectural Heritage Protection Guidelines for Local Authorities* (Department of Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. The Planning and Development Act 2000 also provides for the inclusion of objectives for preserving the character of places, areas, groups of structures or townscapes of special interest designated as Architectural Conservation Areas

(ACAs). There are no Protected Structures within the Proposed Development Site while nine examples are located within the surrounding 1km study area (Table 11-7).

The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 established the National Inventory of Architectural Heritage (NIAH), including the NIAH Historic Gardens and Designed Landscapes, to create a record of built heritage structures and associated lands within the State. While inclusion in a NIAH inventory does not provide statutory protection to a structure, the inventory is used to advise local authorities on compilation of their Records of Protected Structures. There are no NIAH listed structures within the site of the Proposed Development while there are eight examples within the surrounding 1km study area (Table 11-7).

The current RPS for County Cork is published in the *County Cork Development Plan 2014*. A review of the *Draft County Cork Development Plan 2022* revealed that no additional Protected Structures are proposed within the study area. The relevant objectives in relation to the protection of the architectural heritage resource outlined in the Cork County Development Plan 2014-2000 are:

HE 4-1: Record of Protected Structures: The identification of structures for inclusion in the Record will be based on criteria set out in the Architectural Heritage Protection - Guidelines for Planning Authorities (2005)

HE 4-2: Protection of Structures on the NIAH: Give regard to and consideration of all structures which are included in the NIAH for County Cork, which are not currently included in the Record of Protected Structures, in development management functions.

HE 4-3: Protection of Non- Structural Elements of Built Heritage: Protect important non-structural elements of the built heritage. These can include designed gardens/garden features, masonry walls, railings, follies, gates, bridges, and street furniture. The Council will promote awareness and best practice in relation to these elements.

HE 5-1: Cultural Heritage: Protect and promote the cultural heritage of County Cork as an important economic asset.

The term 'designated architectural heritage resource' is hereafter used to describe structures listed in the NIAH and the County Cork RPS.

11.3.3 Desktop Study

11.3.3.1 Archaeological Heritage

The following section presents summary details of the main periods within the Irish archaeological record with references to the recorded archaeological sites located within the study area. Relevant datasets have been interrogated and retrieved from current state and local authority sources and are considered accurate at the time of writing in April 2022. The dating framework used for each period is based on the National Monument Service's Guidelines for Authors of Reports on Archaeological Excavations as published by the National Monuments Service (2006).

The Archaeological Survey of Ireland (ASI) records no known archaeological sites within the boundary of the Proposed Development Site or within its immediate surrounds. There are twelve recorded archaeological sites located within the surrounding 1km study area (see Table 11-5 and Figure 11-2), the nearest of which is the site of a recorded mill (CO087-033----) located circa 195m to the northeast.

Table 11-5: Recorded archaeological sites located within 1km of the Proposed Development

SMR No.	Class	Townland	ITM E, N	Distance from development
CO086-057----	Ringfort - rath	Carrigaline West	572386, 562946	c.535m to NNW
CO086-094----	Souterrain	Carrigaline West	572386, 562946	c.535m to NNW
CO087-033----	Mill - unclassified	Carrigaline Middle	573015, 562535	c.195m to NNE
CO098-015----	Ringfort - rath	Kilmoney	571711, 562004	c.875m to WSW
CO098-016----	Country House	Kilmoney	571915, 562250	c.650m to West
CO098-017001-	Ringfort - rath	Kilmoney	571841, 561636	c.930m to SW
CO098-017002-	Souterrain	Kilmoney	571841, 561636	c.930m to SW
CO098-018----	Ringfort - rath	Kilmoney	572037, 561657	c.775m to SW
CO098-019----	Ringfort - rath	Kilmoney	572478, 561985	c.240m to SSW
CO098-020----	Religious house – Augustinian canon	Kilmoney	571992, 562329	c.550m to West
CO099-095----	Country house	Kilnaglery	573104, 562045	c.360m to SE
CO099-108----	Excavation miscellaneous	Kilnaglery	573355, 561644	c.850m to SE



Figure 11-2: Recorded archaeological sites within the 1km study area

Prehistoric Periods

Until the recent identification of Palaeolithic human butchery marks on animal bones recovered from cave sites in Counties Clare and Cork, the earliest recorded evidence for human activity in Ireland dated to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers arrived on the island. The archaeological record indicates that these mobile groups favoured coastal, lake and river shores which would have provided food and water resources and also likely formed transport routes through the heavily wooded island. While the Mesolithic communities did not construct settlements or monuments that have left any above ground traces, their presence can often be identified by scatters of worked flint in ploughed fields.

The Neolithic period (c.4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns. As a consequence of the more settled nature of agrarian life, new site-types, such as more substantial rectangular timber houses and various types of megalithic tombs, begin to appear in the archaeological record during this period.

The Irish Bronze Age (c.2400–500 BC) commenced with the arrival of metal-working techniques to the island and this technological advance resulted in the introduction of a new artefactual assemblage into the Irish archaeological record. This period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles, barrows and fulachta fia.

The arrival of iron-working technology in Ireland saw the advent of the Iron Age (600 BC – 400 AD). This period has been traditionally associated with a Celtic 'invasion' but this view is no longer widely accepted as recent archaeological evidence points instead to a gradual acculturation of the Irish Bronze Age communities following centuries of contacts with Celtic-type cultures in Europe. Relatively little has been traditionally known about Iron Age settlement and ritual practices until recent decades when the corpus of evidence has been greatly increased by the discovery of sub-surface remains of Iron Age sites during modern development projects.

While the SMR/RMP do not list any recorded extant prehistoric archaeological monuments within the study area, a 2006 programme of archaeological test trenching in Kilnaglery, c.850m to the southeast of the site, did reveal an area prehistoric activity which has been added to the SMR (CO099-108---) and is described as follows by the ASI:

Archaeological test-trenching was carried out in 2006 in advance of the construction of 486 houses with ancillary services at a location c. 0.6km south of Carrigaline town. Two possible burnt features and a number of charcoal-rich deposits as well as a linear spread were revealed in trench 7. Four sherds of prehistoric pottery were recovered from the surface of the features. The burnt features were covered with polythene and were not investigated further at this stage. (Purcell 2006a).

Further archaeological investigations undertaken in the townlands of Kilmoney and Carrigaline West in advance of the construction of the Carrigaline Relief Road have also revealed evidence of Bronze Age and Iron Age activity within the wider area and these are described in Table 11-6.

Medieval and Post-Medieval periods

The early medieval period began with the introduction of Christianity and continued up to the arrival of the Anglo-Normans in the late 12th century (c.400–1169 AD). While the medieval period saw the emergence of the first phases of urbanisation around the larger monasteries and the Hiberno-Norse ports, the dominant settlement pattern was still rural-based and centred around enclosed farmsteads known as ringforts (earth/timber built) and cashels (stone built). Ringforts are one of the most numerous monuments in the Irish landscape, with some 45,000 recorded examples (Stout 1997, 53). These sites comprise broadly circular enclosures delimited by one or more concentric banks and ditches in the case of ringforts and drystone walls in the case of cashels. They were formerly known by the names ráth/lios/cathair/dún, which still form some of the most common place-name elements within the Irish landscape. The majority of excavated examples have produced evidence for the remains of timber houses, outbuildings and stockades as well as a variety of agricultural and craft activities such as grain processing and metalworking. There are five ringforts, two of which have associated souterrains, within 1km of the Proposed Development Site, the nearest of which (CO098-019---) is c.240m to the south-southwest and is the closest recorded site to the Proposed Development. The presence of these sites provides evidence of early medieval settlement activity within the study area and are described by the ASI as follows:

Ringfort CO098-019---

In pasture, on N-facing slope. Heavily overgrown circular area (diam. c. 30m) defined by earthen bank (int. H 1.55m); external fosse SE->N; with second bank (H 0.85m) SE->N.

Ringfort CO086-057---

On small patch of ground, on SW-facing slope, within housing estate. Circular area (33.8m N-S; c. 32m E-W) defined by overgrown earthen bank (H 1.2m) NE->SSE; stone faced in parts; scarp (H 0.4m) SSE->SSW; footpath and road to W; field fence to N.

Souterrain CO086-094---

Near ringfort (CO086-057---). According to O'Leary (198, 122) 'ploughman discovered a deep hole near the lios, which points to the presence of a souterrain'.

Ringfort CO098-015----

In pasture, on N-facing slope of E-W ridge. Slightly raised, circular area (40m E-W; 37.8m N-S) enclosed by scarp (H 0.9m) crowned by low lip, planted with deciduous trees. Appears to have been modified and used as tree ring in the past on Kilmoney Abbey estate.

Ringfort CO098-017001-

In pasture, on N-facing slope. Slightly raised, circular area (30.8m N-S; 30.1m E-W) enclosed by earthen bank (int. H 0.7m; ext. H 1.7m); external fosse (D 0.65m). Entrance (With c. 6m) to WNW; gap to N. Souterrain (CO098-01702-) in interior.

Souterrain CO098-017002-

McCarthy (1977, 363) records tradition of souterrain in interior of ringfort (CO098-01701-). No visible surface trace.

Ringfort CO098-018----

In pasture, on N side of E-W ridge, overlooking Owenboy river valley to N. Shown on 1842 OS 6-inch map as circular enclosure (diam. c. 30m). Levelled; no visible surface trace.

The study area is located in the Barony of Kerrycurrihy, which along with much of the wider regions, was part of the ancient territory of the *Uí Liatháin* during the early medieval period. The *Uí Liatháin* were likely originally a branch of the *Corcu Lóegde*, powerful rulers of the Munster region at the beginning of the early medieval period. The *Uí Liatháin* managed to retain considerable power subsequent to the fragmentation of the *Corcu Lóegde*, under pressure from the *Eóganachta Caisil*, from the 7th century onwards. The progenitor of the clan, *Eochu Liatháin*, had six sons, among whose septs his lands were divided. The placename Carrigaline, *Carraig Uí Leighin*, is thought to derive from the area's connection with the *Uí Liatháin*, who are said to have had a fortification at the rock outcrop where the 13th century Carrigaline Castle (CO087-037----) would later be built by Philip de Prendergast.

The arrival and conquest of large parts of Ireland by the Anglo-Normans in AD 1169 marks the advent of the late medieval period which continued until approx. AD 1550. This period saw the continuing expansion of Irish urbanisation as many of the port cities developed into international trading centres and numerous villages and towns developed as local or regional market centres. Following the arrival in Ireland of Henry II to Cork in 1171, Gaelic ruler Diarmuid McCarthy submitted to the Anglo-Normans and a feudal system was introduced into the area. The area surrounding Carrigaline came to be controlled by Milo de Cogan following grant from Henry II in 1177. De Cogan and his descendants had control of Carrigaline Castle until the late 14th century when the castle and surrounding area lands were held by the Fitzgeralds, Earls of Desmond.

The Augustinians arrived in Ireland during the late 13th century and one of their foundations, Kilmoney Abbey (CO098-020----), is located c.550m to the west of the Proposed Development Site. The exact date of the foundation of the Abbey is unknown, but it likely represents late medieval activity within the area and has been described as follows by the ASI:

S of Carrigaline, in area cordoned-off from pasture field, on grounds of Kilmoney Abbey House (CO098-016----); ivyclad W gable of church. Point of gable fallen. Surviving wall (L 6.5m; Wth 1m) broken off to N whereas to S short return (L 0.35m) of S wall survives, though exterior SW corner fallen. Set high on gable lintelled opening (H 1.15m; Wth 0.7m) with straight sides, may be remains of window ope. According to Gwynn and Hadcock (1988, 183) 'a small cell' of the Gill Abbey (CO074-036--) in Cork, 'probably merely a vicarage after the mid-fourteenth century'; foundation date not known.

The post-medieval period (1550+) saw the development of high and low status stone houses throughout the Irish country. During this period any given settlement cluster is likely to have consisted primarily of single-storey thatched cottages with associated farm buildings while two-story farmhouses became more common in the 19th-century. The original village settlement at Carrigaline was located adjacent to the castle and remnants of same area evident on the first edition 6-inch Ordnance Survey map. Following abandonment of the castle in the late 17th century, settlement at Carrigaline came to be focused on the bridging point of the Owenabue River. The settlement remained small into the 19th century, with its main focus being the milling of flour at the two mills established by Michael Roberts and Co. These water-powered mills were located in lands to the northeast of the Proposed Development Site and were fed by two mill races. One of these flour mills (CO087-033----) is a recorded archaeological site. It is located c.195m to the northeast of the Proposed Development and has been described by the ASI as follows:

Late 18th/early 19th century flour mill in Carrigaline town. Shown as L-shaped structure on 1842 OS 6-inch map. Rectangular 4-storey mill (long axis N-S), now used as a store. Roof double-half-hipped. Wooden floor intact; also remains of hoist system and winnower. Courtyard to N enclosed on three sides by additional buildings.

Into the 20th century, the more northerly flour mill complex was transformed into a pottery works, home of the well-known Carrigaline Pottery. The pottery works were founded by Hodder Walworth Blacker Roberts (1878-1952), of Mount Rivers, Carrigaline in 1928. They provided the main source of employment in the village throughout the mid-20th century. Pottery production eventually ceased at the complex in 1979 at which time Carrigaline was developing into a satellite town of Cork City.

Mount Rivers House, Kilnaglery (CO099-095----), which is located within the study area, c.360m southeast of the Proposed Development Site, is a recorded archaeological monument and is described as follows by the ASI:

On SE side of Carrigaline. According to owner built in 1760s by James Morrison, Entrance front (N) of 4-bays, 3-storeys; central ground floor door set in recess with convex sides containing large window; recess framed by wooden portico with slim doric columns. Rounded corner of front elevation, framed by blocked quoins; windows in curve at same level as front windows but one light wider. Hipped roof with projecting eaves. Elevation weatherslated. Bence Jones (1978, 216) suggest the house originally 'had a front consisting of a centre recessed between two projections with rounded corners. At a later date, the centre in the two upper storeys was filled in'. According to the owner the recess was filled in 1830s when 2nd floor was added. Remains of square 2-storey gate tower in walled garden to S with remains of bellcote on top.

Kilmoney Abbey House (CO098-016----) is another 18th century house within the study area and is described as follows by the ASI:

Mid-late 18th century 2-storey house. Entrance front (E) of 9 bays, central 5 bays framed by rusticated pilasters (one now missing). Central doorway with single-storey Doric portico. Rear has

central Venetian stairway window at 1st floor level and 2-storey projecting wings giving U-shaped ground plan. Hipped roof with widely spaced off-centre chimneys. Formerly weatherslated. Site of Abbey (CO098-020---) to NE.

The *Topographical Dictionary of Ireland* (Lewis 1837) provides descriptions of Irish parishes prior to the famine period and often provides information on contemporary land use patterns, historical events and the locations of archaeological sites and other built structures of note. The Proposed Development Site is within the townland of Kilmoney. The entry in Lewis' *Topographical Dictionary of Ireland* for Kilmoney is as follows:

KILMONEY, a parish, in the barony of KERRICURRIHY, county of CORK, and province of MUNSTER, 8 miles (S. E. by S.) from Cork, on the road from Robert's Cove to Carrigaline, containing 716 inhabitants. This parish, which is bounded on the north by the river Ownabuy, comprises 1400 statute acres, as apportioned under the tithe act; about 50 acres are woodland, 100 bog and waste, and the remainder good arable land. The soil is generally fertile and most of the land under cultivation, but the system of agriculture is in a very unimproved state. The principal manure is sea-sand, which is brought from Crosshaven; but in some places lime obtained from Carrigaline is used. The surrounding scenery is finely varied, and in many parts beautifully picturesque. Kilmoney House is the handsome residence of M. Roberts, Esq. It is an impropriate curacy, in the diocese of Cork, forming part of the union of Tracton; the rectory is impropriate in the Earl of Shannon; the tithes amount to £110.

In the R. C. divisions it is part of the union or district of Carrigaline, also called Templebready. About 60 children are taught in a national school, and there is also a private school, in which are about 30 children. In the demesne of Kilmoney House are the ruins of the old church.

Excavations Database

The Database of Excavation Reports (www.excavations.ie) contains summary accounts of licenced archaeological investigations carried out in Ireland (North and South) from 1969 onwards. It has been compiled from the published Excavations Bulletins from 1969 to 2010 and online material from 2011 onward. The Database records three programmes of licensed archaeological investigations undertaken within the townland of Kilmoney. This included a programme of investigations (Licence 14E0370) undertaken in advance of the construction of the Carrigaline Relief Road. Three small sites, comprising pit features and burnt spread activity were excavated. The earliest activity dated to between 2456-2205 BC which places it in Chalcolithic period, the transitional period between the Neolithic and Early Bronze Age periods. The latest dating activity comprised a shallow pit containing smithing residues, indicative of small-scale iron working, which was dated to 372-45 BC, placing it in the Middle Iron Age. Two other programmes of licensed investigation (Licences 02E0823 and 19E0208) undertaken within Kilmoney townland revealed nothing of archaeological significance.

The Database also records two programmes of archaeological investigation as having been undertaken within the townland of Carrigaline West. Both programmes were undertaken in advance of the construction of the Carrigaline Relief Road. Archaeological testing (Licence 13E0006 ext.) of the former Carrigaline Pottery Works uncovered portions of the former mill race, while testing of the route of the road (Licence 13E0006) revealed three small sites consisting of a poorly preserved, dumb-bell shaped cereal-drying kiln (Carrigaline West 1) a potential hearth feature (Carrigaline West 2) and Bronze Age spreads and pits (Carrigaline West 3). These sites were subsequently excavated under Licence 14E0371.

In addition, a review of a National Museum of Ireland Finds Database (2010), published on www.heritagemaps.ie, revealed that it records no artefact discoveries within the study area unassociated with the above investigations.

Table 11-6: Excavation Database descriptions of investigations within environs of study area

Site name	Licence and author	Summary
Kilmoney, Carrigaline, County Cork	02E0823 Sheila Lane	A development of 40 houses was undertaken by Cork County Council at Kilmoney, Carrigaline. The site is within the zone of archaeological potential of a ringfort and a possible souterrain. Monitoring of all ground disturbance was recommended. No finds or features of an archaeological nature were noted during the monitoring. As a result of recommendations from Dúchas, the ringfort was cleared of all overgrowth and debris under archaeological supervision, and it was agreed that regular maintenance of the ringfort would take place.
Carrigaline West, Kilmoney, R611 Carrigaline Western Relief Road, Co. Cork	13E0006 ext. Rob O'Hara	Testing of the site of the former Carrigaline Pottery Works (Carrigaline West Td.) was carried out in October 2014 as part of the proposed western bypass of Carrigaline. A total of 8 trenches were excavated (139 linear metres, 454 sq m) across the site. Made ground was noted across the area to a depth of 2.5m. The remains of a former millrace were noted in Trench 3. The millrace had been previously noted in the initial assessment of the scheme (Hanley 2014). In Trench 3, the mill race was 1.5m below ground. It was recorded for 14m and was c. 1m wide within the trench, extending beyond the northern limit. It was backfilled with light greyish brown clayey silt and a dry stone (limestone) lining was noted on the southern side. Elsewhere on site the survival of the millrace was severely compromised by the post-medieval buildings associated with the mill complex and pottery works. The best surviving portion of the millrace was noted in Trench 7, adjacent to the property/field boundary. Here, a c. 2m-deep cut was noted in the test trench. This appeared to have been cleaned out at some point and subsequently backfilled with pottery wasters. It was not possible to say with certainty that the millrace survived in Trenches 4 and 6 where the depth of site clearance/fill material ranged from 1.5m to 2.5m. Also, a reinforced concrete floor was noted at 1.5m deep in Trench 4. However, a variation in the clay layer at the base of Trench 5 might indicate the location of the expanded millrace as depicted on the 3rd edition OS map.
Kilmoney, R611 Carrigaline Western Relief Road, Co. Cork	14E0370 Rob O'Hara	<p>Three small sites were excavated in Kilmoney, Carrigaline, Co. Cork as part of advanced archaeological works for the proposed Carrigaline Western Relief Road. Previous testing (13E0006) by Ken Hanley of Cork Road Design Office identified five archaeological sites along the scheme.</p> <p>Kilmoney 1 was a cluster of three pits excavated in the floodplain of the Owenboy River. Each pit contained charcoal and heat-fractured stone. Radiocarbon dating of a sample of alder charcoal collected from the fill of one of these pits indicates that this activity was undertaken in the Chalcolithic period between 2456-2205 BC (D-AMS 010555; 3844±22 BP). A similar site was found at Carrigaline West 3 on the northern side of the river (13E0371), although this site was dated to the late Bronze Age.</p> <p>Kilmoney 2 (100m to the south) was a disturbed fulacht fia situated on higher ground overlooking the floodplain, but adjacent to a palaeochannel. Below the disturbed spread (c.30m x 15m), 13 pits of various sizes and shapes were identified. Environmental samples contained hazel, oak, alder, holly, willow, pomoideae and birch charcoal. It appeared that the palaeochannel may have directly filled two of the pits and possibly a cluster of 4 interconnected pits, with a possible overflow channel taking water away from the working area. The overflow channel and 2 of the interconnected pits have been radiocarbon dated to the Early Bronze Age. A third pit in this sequence was dated to the Middle Bronze Age. Of the remaining pits across the site, a further two were dated to the Early Bronze Age. A sample of alder charcoal from the disturbed burnt mound was dated to the Early Iron Age in</p>

Site name	Licence and author	Summary
		the period 771-519 BC, indicating at least three phases of fulacht fia activity at this site. A shallow pit containing smithing residues was also identified and radiocarbon dating of oak charcoal collected from this feature suggests small-scale iron working in proximity to the fulacht fia in the Middle Iron Age during the period 372-45 BC.
Carrigaline West 1-3, Carrigaline Western Relief Road, Co. Cork	14E0371 Rob O'Hara	<p>Three small sites were excavated in Carrigaline West as part of advanced archaeological works for the proposed Carrigaline Western Relief Road. Previous testing (13E0006) by Ken Hanley of Cork Road Design Office identified five archaeological sites along the scheme. Carrigaline West 1 survived as a badly preserved, dumb-bell shaped cereal-drying kiln truncated by later drains and furrows.</p> <p>A tree bole which pre-dated drain F103 and an isolated stone drain were also recorded. A date of AD 988-1147 (D-AMS 010565; 1001±22 BP) was returned from seeds from the drying chamber in the kiln. A sample of ash charcoal from the fire pit returned a date of AD 893-1014 (D-AMS 010564; 1089±26 BP). A sample of pomoideae charcoal collected from a charcoal deposit displaced from the kiln was dated to AD 901-1025 (D-AMS 010566; 1052±26 BP). The charcoal assemblage from the kiln was dominated by hazel and scrubland taxa with smaller quantities of oak, ash and elm, indicating that the contemporary landscape was an area of open farmland. Large quantities of seeds were also identified in samples collected from the kiln. This assemblage was dominated by oat.</p> <p>Carrigaline West 2 was an isolated potential hearth (or possibly root burning/scrub clearance), and an assortment of early modern furrows and drains. The edge of a late 18th- or early 19th-century millrace was also identified.</p> <p>Carrigaline West 3 survived as shallow spreads and pits containing burnt stone probably reflecting Bronze Age activity and further deposits of oxidised clay and charcoal the date and nature of which were unclear. Charcoal collected from one of the pits with burnt mound material was dated to the late Bronze Age (1108-925 BC; 2847±27 BP; D-AMS 010567).</p>
Kilmoney, Carrigaline, County Cork	19E0208 Colm Chambers	Test trenching was carried out on the footprint of a granted housing development at Kilmoney, Carrigaline, Co. Cork. No archaeological features or artefacts were noted in any of the test trenches excavated.
Carrigaline, Cork	03E0471 Miriam Carroll	The laying of an ESB cable across the Owenboy River, Carrigaline, Co. Cork, was monitored. Spoil from the cable trench was also metal-detected (02R196). No archaeological finds or features were uncovered.
Kilnaglery, Cork	06E0864 Avril Purcell RMP (CO099-108--- -)	Twelve test-trenches were excavated across the site in advance of a residential development at Kilnaglery, Carrigaline. Evidence of prehistoric activity was revealed in one trench at the south of the centre of the development, overlooking a small watercourse. Four sherds of pottery and a number of probable features were identified. It is likely that the site will be fully excavated during 2007 following discussions between the developer, the National Monuments Section of the DoEHLG and Cork County Council.
Site 8, Estuary Business Park, Kilnaglery, Cork	18E0408 Aidan Harte	<p>Monitoring was carried out from 19-23 November 2018, at a site within a business park at Kilnaglery, Co. Cork. This was carried out as part of an overall Archaeological Impact Assessment for the proposed construction of a warehouse, offices and parking.</p> <p>A total area of 0.4ha was monitored. The topsoil was found to have been introduced to the site in recent years, as was redeposited natural subsoil with rubble mixed with building materials. The latter was concentrated at the east where it filled a natural depression 1.2m in depth. A large storm-drain traverses the site north-south. Beneath these disturbances the original topsoil remained in places. A mill-stream, marked on all editions of the O.S. six-inch maps, was found to be 1.9m in width, 0.38m in depth, and crossed the site from east to north-west. Intermittent plough furrows and a stone-</p>

Site name	Licence and author	Summary
		lined drain were also noted. Nothing of archaeological significance was identified.
Kilnaglery, Cork	18E0151 Avril Purcell	Monitoring was carried out on an extension to a factory. No features or finds of archaeological significance were revealed.

11.3.3.2 Cartographic and aerial imagery review

The detail on historic cartographic sources demonstrates the nature of past settlements and land use patterns in recent centuries and can also highlight the impacts of modern developments and agricultural practices. This information can aid in the identification of the location and extent of unrecorded or partially levelled features of archaeological or architectural heritage interest. The cartographic sources examined for the study areas include the 17th century Down Survey mapping (Figure 11-3), the First Edition of 6-inch Ordnance Survey (OS) map (surveyed c.1840) (Figure 11-4) and the 25-inch OS map (surveyed c.1900) (Figure 11-5). The Down Survey map provides little detail but does not show any structures within the area of the subject lands. Of interest, however, is the map's depiction of 'Carrigoline towne' at its previous location adjacent to Carrigaline Castle. There is no nucleated settlement depicted at the bridging point of the Owenabue River as the modern location of the town only developed from the late 17th century onwards following the abandonment of the castle.

The Down Survey also recorded the names of landowners in many cases, though not for the townland of Kilmoney, which was recorded as *Lands, Unforfeited (Protestant)* in both 1641 and 1670.

The first edition 6-inch OS map depicts the Proposed Development Site as extending over portions of six separate enclosed agricultural fields. Open demesne lands associated with the mid-18th century Kilmoney House are shown adjoining but outside the western boundary of the site. By the time of the production of the 25-inch map, all of the field boundaries that were depicted straddling the Proposed Development Site in the 6-inch map have been removed, with the site taking its modern form as one large field. Neither of the reviewed historic OS map editions depicts any potentially unrecorded archaeological features on the footprint of, or immediately adjacent to, the Proposed Development Site.

On both of the historic OS maps, the proposed greenway connection is shown to follow the southern bank of the Owenabue River, through undeveloped land, for most of its length. The laneway through which the greenway connection will reach Main Street appears to have been present on both maps and may never have been built on. The greenway connection passes one field boundary that was depicted on the first edition OS map, midway along the riverbank section. It also crosses where two property boundaries were depicted on the second edition OS map; these were to the rear of buildings facing Main Street.

A review of aerial and satellite images detailing the Proposed Development Site was also undertaken. A number of the aerial images appear to show a circa 8m diameter subcircular feature within the subject lands (see Figure 11-6). This feature could potentially represent an unrecorded barrow type archaeological site. The site inspection (Section 11.2.2) revealed that the location of this potential feature has been heavily disturbed due to the construction of a hardstanding area associated with the Carrigaline Relief Road project.

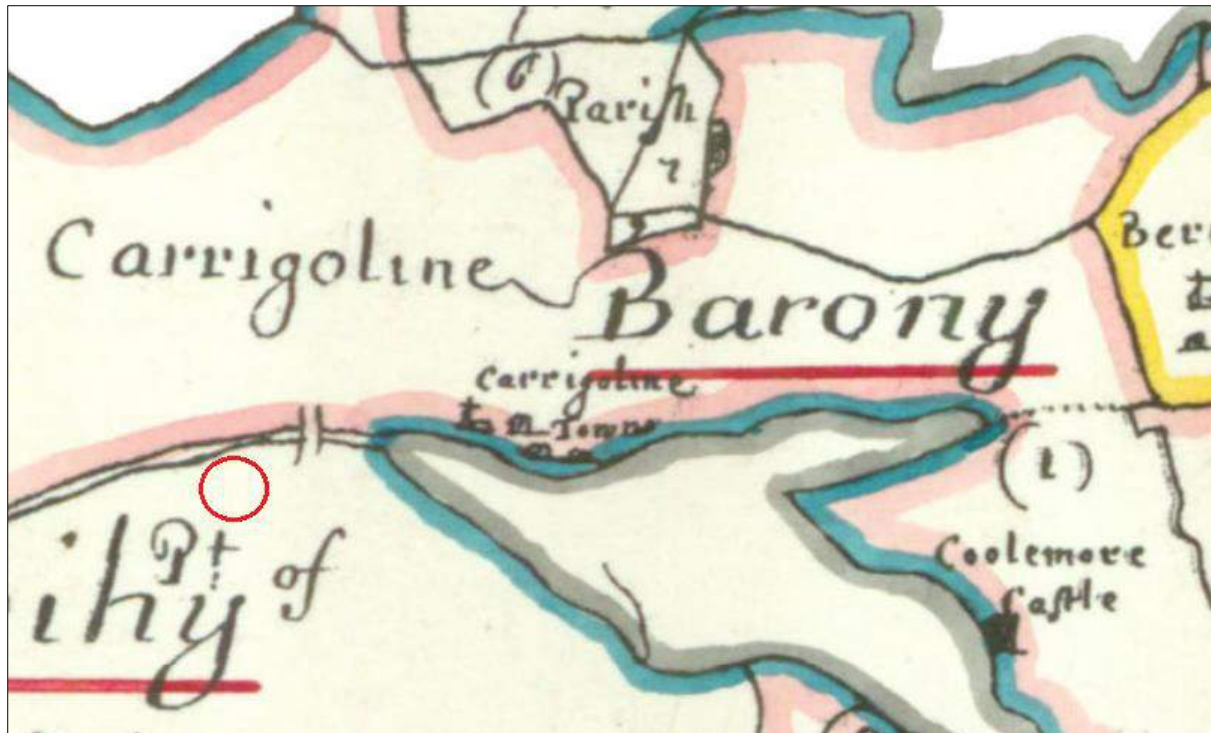


Figure 11-3: Extract from the Down Survey mapping of Kerrycurrihy Barony which depicts 'Carrigaline town' in the vicinity of Carrigaline Castle. While the bridge over the Owenabue River is depicted, no nucleated settlement has yet developed at this location. The approximate location of the Proposed Development Site is marked with a circle.



Figure 11-4: Extract from the First Edition 6-inch OS map with approximate boundary of the Proposed Development Site depicted in blue (Ordnance Survey Ireland Licence No. SU 0003322)

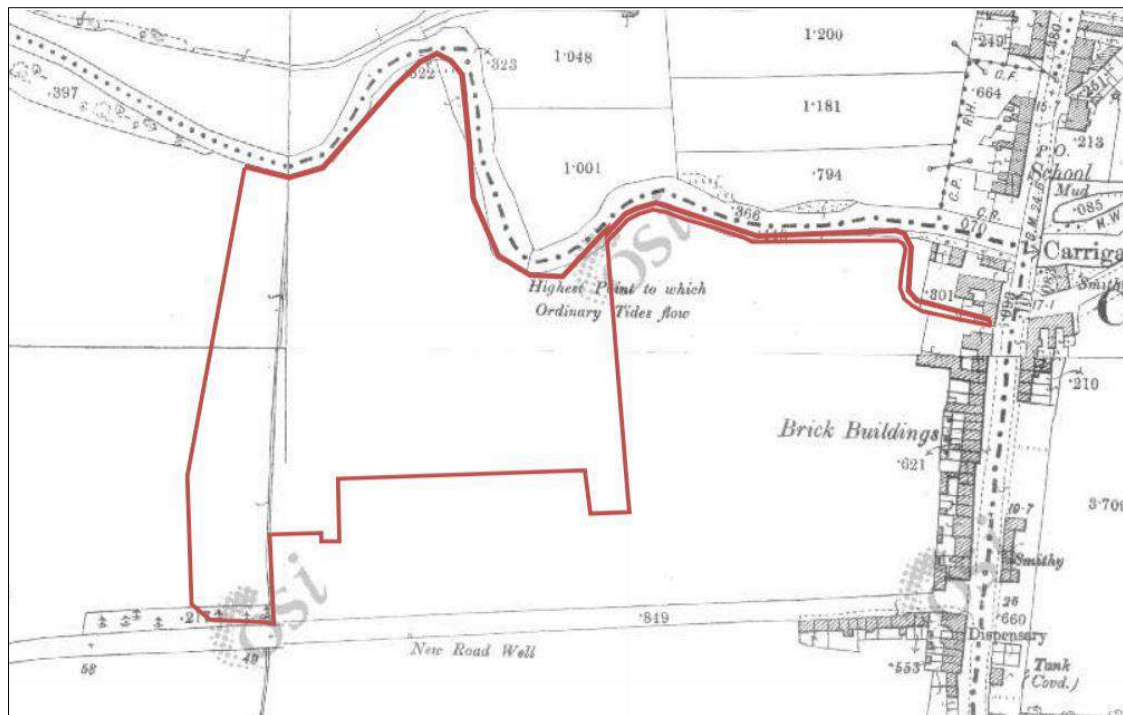


Figure 11-5: Extract from the 25-inch OS map detailing the Proposed Development Site and surrounds (Ordnance Survey Ireland Licence No. SU 0003322)



Figure 11-6: Aerial image with potential archaeological feature circled- prior to Relief Road works at location

11.3.3.3 Architectural Heritage

There are no NIAH-listed buildings or Protected Structures within the boundary of the Proposed Development Site. There are three Protected Structures and eight structures listed

by the NIAH within 1km of the Proposed Development Site and none of these are within 200m of its boundary (see Table 11-7 and Figure 11-7). The Proposed Development Site is not located within an Architectural Conservation Area (ACA) as per the Cork County Development Plan 2014. In addition, there were no structures noted within the site during the review of historic maps and no extant structures of any date exist within its boundary.

Table 11-7: Designated Architectural Heritage structures within 1km study area

NIAH Reg. no., RPS no.	Building	NIAH Rating	ITM E, N	Distance from development
NIAH 20909817 RPS.00634	Kilmoney Abbey	Regional	571909, 562250	c.645m to West
NIAH 20909818	Kilmoney Bridge	Regional	572080, 562254	c.475m to West
NIAH 20909819 RPS.00635	Kilmoney House	Regional	572043, 561853	c.635m to SW
NIAH 20909938	Mount River	Regional	573104, 562049	c.370m to SE
NIAH 20909939	Cilldarragh House	Regional	573189, 561964	c.490m to SE
NIAH 20987048	Ahern Roberts O'Driscoll Solicitors	Regional	573033, 563060	c.665m to NNE
NIAH 20987049	Abbeyville Veterinary Clinic	Regional	573194, 562962	c.640m to NE
NIAH 20987050	Church of Our Lady and Saint John	Regional	573055, 562722	c.370m to NE
RPS.00579	Warehouse	-	573050, 562537	c.215m to NE



Figure 11-7: NIAH-listed structures and Protected Structures within 1km of Proposed Development Site

Undesignated Cultural Heritage Assets

While encompassing the protected archaeological and architectural heritage resources, cultural heritage also includes various undesignated assets such as historic settlements, demesne landscapes, vernacular structures, folklore, placenames, townland boundaries and historical events.

Townlands are the smallest unit of land division in the Irish landscape and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The boundaries and nomenclature of the Irish townlands were recorded and standardised by the Ordnance Survey during the 19th century. The Irish origins of many townland names often refer to natural topographical features, but some name elements may also give an indication of the presence of past human activity within the townland, e.g. *lios* or *rath* indicate the presence of a ringfort while names containing elements such as *kill* or *temple* are often indicative of ecclesiastical activity. The Proposed Development Site is contained within the townland of Kilmoney. The townland of Carrigaline West is to the north of the site, across the Owenabue River, while Carrigaline Middle and Kilnaglery are also in close proximity. The name Kilmoney, gives indication of the historical presence of a church. The abbey (CO098-020----) located within the townland, c.550m to the west of the Proposed Development Site, and it is likely that the 'cill' element of its name records an associated with that ecclesiastical site. Similarly, the name

Kilnaglery also indicates the presence of an ecclesiastical site, and a known church is recorded in the central part of the townland (CO099-002----).

Table 11-8: Translation of townland names

Name	Irish origin	Translation	Indicative potential
Kilmoney	Cill Mhóna	<u>cill</u> church <u>móin</u> (also: mónaidh) bogland	No standalone recorded church in the townland, though <i>Kilmoney Abbey</i> Religious House – Augustinian canons (CO098-020----) is c.550m to west of site. Also topographical description
Carrigaline West	Carraig Uí Leighin Thiar	<u>carraig</u> rock	Topographical description and family association
Carrigaline Middle	Carraig Uí Leighin Láir	<u>carraig</u> rock	Topographical description and family association
Kilnaglery	Cill na gCléireach	<u>cill</u> church	Recorded Church (CO099-002----) in central part of townland

Irish National Folklore Collection

The Irish National Folklore Collection (www.duchas.ie) contains a number of entries related to Kilmoney townland and these include references to known archaeological sites within the area. One particular entry regarding Kilmoney Abbey (recorded 1937-39) makes note of a story about an underground passage between the abbey and Carrigaline Castle (CO087-037---) which also extended to the river. It should be noted that, while local stories throughout the country refer to passages between notable buildings are commonplace, no physical or recorded evidence typically exists as is the case in this instance.

Table 11-9: Summaries of local folklore traditions (source www.duchas.ie)

Source	Summary of transcript	Observations
Miss M. O'Connor	Kilmoney Abbey	Long ago there was an Abbey in Kilmoney Carrigaline Co Cork where Cistercian monks used to live. They had a big school and also a mill where they used to make their flour. At this time there was no poor house so the monks used to feed and clothe the poor. There was a stream running near the Abbey where the monks used to fish. It is said that there is an underground passage from the Abbey to Carrigaline Castle and also to the river. It is also said the monks used to keep a boat near the river so that when the soldiers were hunting the monks they could escape. The abbey is now gone to ruin; only one side of a wall remains standing. The graves are also to be seen. The last person who was buried there was a man by the name of Archdeakon.
James Hosford	Ringforts	There are several old forts in this district. There is an old fort in the farm of Mr. Love Ballea Carrigaline. There is a large stone in the entrance of this fort. It is round in shape. There is another fort in the farm of Mr. Ford Ballea Carrigaline. There is a large fort in the farm of Mr. Reardon Kilmoney Carrigaline. It covers about 1/2 acre of ground. It is round in shape and there is a drain around it about 5 feet deep and 10 feet wide.
William Daunt	Ruined churches – Kilmoney Abbey	There is the ruins of a church in Kilpatrick surrounded by a graveyard, which very few people are now buried. There is a stone in this graveyard and any time of the year there is water on it and people go there to dip their fingers in the water in the graveyard. There is also a hare which when hunted always disappears in the field nearby and nobody has been able to catch it. There is a ruined church in Temple Breedy wit was built by a Mr. Daunt. There is the ruins of an abbey at Kilmoney about 1/4 mile from Carrigaline and a graveyard near by where monks were buried. And people who died in the famine were buried there too. There are trees planted in the graveyard now.
Peter Collins	Local ruins – Kilmoney Abbey	About one mile east of Carrigaline there is the ruins of Carrigaline Castle. It was about the year 1172. It is built on a rock overlooking the district. It was built of stone. It was built by the Normans. It was the stronghold of Milo de Cogan and his army. Milo de Cogan owned all the land around here. The reason it was built on the rock was that the normans could see the whole country around it. It is about four hundred yards from the river, so that the Normans could escape if they were in great danger. Stones were taken from the castle to build other houses. There is the ruins of another castle in Aghamartha about three miles east of Carrigaline. It was built by the Normans a long time ago. It was built of stone. It was built near the river Owenabuee. In Kilnagleary is the ruins of an old church. Only one of the walls is still to be seen. Long ago some priests lived in the church, and that is how the district got the name of Kilnagleary, or Cíll na Gclaorach which means the "Church of the Clergy." About half a mile west of Carrigaline is the ruins of an Abbey. It is called Kilmoney Abbey. It was built a long time ago. It was built of stone. It contains no carvings on the doorways. There is a ruined church in Kilpatrick. The only tradition given is that the ruin is a couple of hundred years old. It was plundered and burned about three hundred years ago. There are no carvings on the doorways. The old R.I.C. barracks near the school were burned during the Black and Tan war. The barracks were completely gutted by the

Source	Summary of transcript	Observations
		fire. There is also the ruins of another castle about four miles east of Carrigaline and near the village of Ringaskiddy. It was built by the Normans a long time ago. It was built of stone. It overlooks the entrance to Cork Harbour.

11.3.4 Field Survey

An inspection of the Proposed Development Site was carried out by David Murphy of John Cronin & Associates on Friday 3 September 2021. The site was assessed in terms of historic landscape, land use, vegetation cover, presence and potential for undetected archaeological and architectural heritage sites/features. Weather conditions were dry and bright at the time of survey and this provided excellent landscape visibility. No difficulties were encountered during the survey. Please consult Appendix 11.1 found at the end of this Chapter for extracts from the photographic record of the site inspection.

The Proposed Development Site comprises a largely fallow, undeveloped parcel of good quality pastoral land in the townland of Kilmoney, County Cork. The site is located to the west of the southern end of Main Street, Carrigaline and to the east of the new Carrigaline Relief Road which was under construction at the time of the inspection. The northern portion of the site is bound by the Owenabue River and the terrain slopes gently upwards to the south where it is bound by a number of individual residential dwellings that front onto the R611 regional road. There is a small parcel of fallow land in the south-easternmost corner of the site. The site borders the Dairygold Co-op site to the east and is separated from same by metal palisade fencing, while the new Relief Road defines the western boundary of the site. This is currently fenced off with Harris fencing. A low voltage overhead power line extends over the north-eastern corner of the site, where there is also evidence of modern services having been installed.

A portion of ground within the site has been fenced off and a hardstanding surface has been recently created within this area. These works appear to have been undertaken as part of the Relief Road construction works and are unrelated to the Proposed Development. The relevant area measures circa 80m east to west by circa 40m north to south (see Plate 11.10 in Appendix 11.1 found at the end of this Chapter). Much of the topsoil across this area has evidently been reduced into the underlying subsoil and a large amount hardcore stone deposited to create the hardstanding area. These works have been undertaken in the exact location where a potential subcircular archaeological feature was noted during a review of aerial imagery (Figure 11-6). This feature was identified at approximate ITM ref. 572620 (E), 562350 (N) and the location of the potential feature has been heavily truncated by the works. While archaeological testing (13E0006) and subsequent archaeological excavation (Licence 14E0370) was undertaken along the route of the Relief Road within Kilmoney townland, it is unclear whether any mitigation was undertaken in the area within the Proposed Development Site that has been impacted by the above-described works.

As previously outlined, the terrain within the site slopes gently upwards from the River Owenabue in the northern portion of the site towards more elevated ground to the south. No in-channel works are proposed within the river as part of the development. The northern area is within the loop of a meander of the river and is slightly more uneven underfoot in comparison

with areas to the south. While these low undulations may be natural or associated with modern disturbance, an archaeological origin can also not be discounted.

No surface traces of any unrecorded archaeological features were observed during the inspection of the Proposed Development Site. However, it should be noted that the fallow nature of the majority of the field negated the identification of potential low relief surface undulations across much of the site.

11.4 Characteristics of the Proposed Development

11.4.1 Strategic Housing Development

This project relates to a Strategic Housing Development (SHD).. The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units:

- A 184 m² creche/childcare facility;
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about area, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage. The main development area is to be located on previously undeveloped agricultural land to the west of the Main Street of Carrigaline, while the greenway connection to Main Street is proposed to extend across a number of existing yards and a laneway at its eastern end.

11.5 Potential Impact of the Proposed Development

11.5.1 Construction Phase

Following consultation of the available and relevant datasets, historic documentary and cartographic sources and site inspection, this assessment has concluded that the proposed scheme will have no predicted impact on the recorded archaeological heritage resource of the area. There are no recorded archaeological sites located within the Proposed Development Site. While there are twelve recorded archaeological sites located within 1km of the Proposed Development, the nearest example (Mill – unclassified CO087-033----) is located circa 195m to the northeast of the north-eastern portion of the site.

There was no definitive evidence identified for the presence of unrecorded archaeological sites or features within the undisturbed sections of the Proposed Development Site during the field survey undertaken as part of this assessment. The field survey revealed that the majority of the site remained largely undisturbed by modern activity. Furthermore, no in-channel works are proposed within the Owenabue River as part of the development, as such, there will be no in-channel riverine impacts.

However, a review of aerial and satellite imagery detailing the Proposed Development Site revealed the potential presence of a circa 8m diameter subcircular feature within the subject lands (approx. ITM refs. 572620, 562350) (see Figure 11-6). This feature could potentially represent an unrecorded barrow type archaeological site. Site inspection revealed that the area of this potential feature has been heavily disturbed due to the construction of a hardstanding area associated with the Carrigaline Relief Road project. These works were not

undertaken as part of the present application. The ground levels in the area of the potential feature appear to have been heavily truncated. It is not known whether any archaeological mitigation was carried out in advance of these works within the Proposed Development boundary. Given the presence of this potential feature, together with those identified along the route of the nearby Relief Road, as well as the good quality and strategic location of the land parcel, it is concluded that the undisturbed lands within the Proposed Development Site have the potential to contain unrecorded, sub-surface archaeological remains. As the existence, nature and extent of any unrecorded archaeological features are unknown; an accurate measurement of the nature and significance of potential impacts is indeterminable. However, ground works during the construction phase will have the likely potential to result in negative, direct, permanent, irreversible impacts of unknown significance on any sub-surface archaeological features that may exist within the footprint of the Proposed Development and this will require mitigation.

11.5.2 Operational Phase

There are no recorded archaeological sites in the Proposed Development Site or within 195m of its boundary. There are also no designated architectural heritage structures located within the Proposed Development Site, or within 200m of its boundary, it is not located within an Architectural Conservation Area, and the surrounding built environment is modern in date. Given these factors, it is concluded that the operational phase of the Proposed Development will not result in any predicted direct or indirect impacts on the cultural heritage resource.

The implementation of the pre-construction mitigation measures outlined in Section 11.6 will provide for either the preservation in situ of any potential unrecorded, sub-surface archaeological features that may exist within green field areas or their preservation by record by systematic archaeological excavation. As a result, the operational phase of the Proposed Development will have no predicted impact on any potential unrecorded, sub-surface archaeological remains.

11.5.3 Potential Cumulative Impacts

A comprehensive list of proposed planning applications within the vicinity of the Proposed Development is presented in Table 11-10.

Table 11-10: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part 8 Planning	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence. No cumulative impacts on archaeology or cultural heritage have been identified.
217464	Aldi Stores (Ireland) Ltd	On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.	Awaiting Decision 19th May 2022 This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
214818	Ruden Homes Ltd	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
205230	Barry Collins (Supermarket) Ltd	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
196065	Athena Private Assets Ltd	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
194642	Piton Properties Ltd	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

11.5.4 “Do Nothing” Impact

A ‘Do Nothing Scenario’ will see to the continued preservation of recorded and potential cultural heritage features within the study area.

11.6 Avoidance, Remedial & Mitigation Measures

11.6.1 Construction Phase

A programme of geophysical survey will be undertaken across the undisturbed portions of the Proposed Development Site prior to the commencement of the Proposed Development. This will be followed by a programme of linear archaeological test trenching which will include targeted investigations of any geophysical anomalies that are of archaeological potential. These investigations will be carried out under licences issued by the National Monuments Service.

The area of hardstand within the site will act as a constraint that will preclude geophysical or trenching investigations. In the event that this feature, which was constructed at the location of a potential subcircular feature identified on aerial imagery as part of this assessment, is removed at any point during or subsequent to the Relief Road construction works or during any works associated with the Proposed Development, then this work will be archaeologically supervised and the underlying surface of the natural subsoil will then be carefully cleaned back and appraised for the presence of any potential unrecorded archaeological features.

If archaeological features are revealed during the testing programme or during any inspection of the hardstanding area (should it be removed), these features will be recorded in written, drawn and photographic formats and left remain *in-situ* within securely cordoned off areas until consultations are undertaken with the National Monuments Service to determine appropriate future mitigation strategies, which may entail preservation by avoidance or preservation by record through full archaeological excavation.

No impacts on the architectural or other elements of the cultural heritage resource are predicted and, therefore, no mitigation measures for these resources are required.

11.6.2 Operational Phase

Given the absence of any identified archaeological, architectural and cultural heritage assets within the Proposed Development Site and its close environs and following the implementation of the mitigation measures presented in Section 11.6.1, the operational phase of the Proposed Development will not result in any predicted impacts on the cultural heritage resource of the area that will require mitigation.

11.6.3 “Worst Case” Scenario

If the Proposed Development were to proceed without the implementation of the archaeological mitigation measures outlined in Section 11.6 then construction works could result in permanent, direct, significant, negative impacts on any unrecorded, sub-surface archaeological features that exist within the site.

11.7 Residual Impacts

11.7.1 Residual impacts of Strategic Housing Development at Kilmoney

Following the successful implementation of the mitigation measures outlined in Section 11.6.1, no residual impacts on the cultural heritage resource are predicted to arise as a result of the Proposed Development.

11.8 Monitoring

11.8.1 Construction Phase

There are a number of obligatory processes to be undertaken as part of archaeological licence applications for site investigation works and these will allow for monitoring of the successful implementation of the pre-construction archaeological mitigation measures. Method statements detailing the proposed strategy for site investigations will be submitted for approval to the National Monuments Service as part of the licence application process. These will clearly outline the proposed extent of works and outline the consultation process to be enacted in the event that any unrecorded archaeological sites or other features of cultural heritage significance are identified. A report will be compiled on all site investigations which will clearly present the results in written, drawn and photographic formats. Copies of these reports will be submitted to the National Monuments Service, Cork County Council and the National Museum of Ireland. In the event that any sub-surface archaeological deposits, features or artefacts are identified during site investigations, the Planning Authority and the National Monuments Service will be consulted to determine further appropriate mitigation measures which may entail preservation *in situ*, by avoidance or preservation by record through full archaeological excavation.

11.8.2 Operational Phase

Following the successful implementation of the mitigation and monitoring measures outlined above no further monitoring measures will be required during the operational phase.

11.9 Interactions

11.9.1 Land and soil

Excavation of soil and subsoils will be required to an anticipated maximum depth of 2.0mbGL at the Proposed Development Site. While there was no definitive evidence identified for the presence of unrecorded archaeological sites or features within the Proposed Development Site, the Archaeological Impact Assessment (John Cronin & Associates Ltd., 2022) identifies that the undisturbed portions of the subject site possess a moderate to high archaeological potential.

11.9.2 Landscape and Visual

As there are no known archaeological or architectural remains found during the desk top survey or field survey is not predicted that any changes in landscape or visual impact will affect in any way the archaeology of the area.

11.10 Difficulties Encountered

A portion of ground that is within the red line boundary of the SHD has been fenced off and a hardstanding surface created within it. These works were undertaken in conjunction with the Relief Road construction works and are unrelated to the subject application, Cork County Council planning ref.194642. The relevant area measures circa 80m east to west by circa 40m north to south (see Plate 11.10 in Appendix 11.1 attached at the end of this Chapter). Much of the topsoil across this area has evidently been reduced into the underlying subsoil and a large amount of hardcore stone deposited to create a hardstanding area. These works have been undertaken in the exact location where a potential subcircular archaeological feature was noted during a review of aerial imagery (Figure 11-6). This feature was identified at approximate ITM co-ordinates 572620 (E), 562350 (N). The location of this potential feature has been heavily truncated by the works. While archaeological testing (Licence 13E0006) and subsequent archaeological excavation (Licence 14E0370) was undertaken along the route of the Relief Road within Kilmoney townland, it is unclear whether any mitigation was undertaken in the area within the Proposed Development Site that has been impacted by the above-described works.

11.11 References

11.11.1 Published works

Cork County Council (2014) *Cork County Development Plan 2014*

Department of Arts, Heritage, Gaeltacht and the Islands (1999) *Framework and Principles for the Protection of the Archaeological Heritage*. Government of Ireland.

Department of Arts, Heritage, and the Gaeltacht (2011) *Architectural Heritage Protection: Guidelines for Planning Authorities*. Government of Ireland.

Lewis, S. 1837 *A Topographical Dictionary of Ireland*, 2 vols, London: Samuel Lewis & Son.

Power, D. *et al.* 1994 *Archaeological Inventory of County Cork, Vol.2: East and South Cork*. Dublin, Stationery Office.

11.11.2 Internet resources

Cork County Council, planning enquiry <https://www.corkcoco.ie/en/planning/planning-enquiry-online-submissions>

Cork County Development Plan (2014) <https://www.corkcoco.ie/cork-county-development-plan-2014>

Cork Genealogical and Historical website <https://www.corkgen.org/baronies/kerrycurrihy.html>

Database of Irish archaeological excavations <http://www.excavations.ie/>

Department of Housing, Local Government and Heritage Historic Environment Viewer
<http://webgis.archaeology.ie/historicenvironment/>

Draft Cork County Development Plan (2022-2028) <https://www.corkcoco.ie/en/cork-county-development-plan-2022-2028>

Geohive Mapviewer resource <http://www.geohive.ie/>

Google Earth Pro <https://www.google.com/earth/versions>

Heritage Map Viewer - various interactive heritage maps
<https://heritagemaps.ie/WebApps/HeritageMaps/index.html>

Irish heritage website <https://heritageireland.ie/>

Landed Estates Database <https://landedestates.nuigalway.ie/LandedEstates>

National Folklore Collection <https://www.duchas.ie/>

Placenames Database of Ireland <https://www.logainm.ie/en/>

Teagasc Soil Map <https://gis.teagasc.ie/soils/map.php>

The Down Survey of Ireland <http://downsurvey.tcd.ie/>

APPENDIX 11.1 PHOTOGRAPHIC RECORD



Plate 11.1: View of the Proposed Development Site, facing northeast



Plate 11.2: View of the southern margin of the site, facing east



Plate 11.3: View of fallow area in the south-easternmost corner of the site



Plate 11.4: View of the eastern margin and boundary of the site



Plate 11.5: View westwards across Proposed Development Site towards the Relief Road which is under construction



Plate 11.6: Evidence of modern services in the eastern margin of the site



Plate 11.7: View of the Owenabue River which forms the northern site boundary, facing west



Plate 11.8: View northwards across the fallow site



Plate 11.9: View of the area within the river meander in the northern flood plain where low surface undulations were noted, facing southwest



Plate 11.10: View of the hardstanding area constructed within the SHD boundary during the Relief Road works. This is the area of the feature noted on aerial imagery of the site



Plate 11.11: *View westwards across the open former demesne lands to the west of the Relief Road towards the locations of Kilmoney House (CO098-016----) and Kilmoney Abbey (CO098-020----) (beyond tree-line in background)*

12 MATERIAL ASSETS: TRAFFIC, WASTE AND UTILITIES

12.1 Traffic and Transport Assessment

12.1.1 Introduction

Martin Hanley Traffic and Transportation Consulting Engineers have been engaged by Reside Investments Ltd, to prepare a Traffic and Transport Assessment (TTA), in the form of a Traffic Chapter of this EIAR, for a proposed Strategic Housing Development Development at Kilmoney, Carrigaline, Co. Cork. This report has been prepared as part of the planning application.

The Chapter was undertaken by Martin Hanley, BE CEng MIEI who is a Chartered Civil Engineer with 38-year post graduate experience in Civil Engineering projects including 30 years' experience in Transportation Engineering including road design, traffic engineering and preparation of Traffic and Transport Assessment Chapter.

The Proposed Development consists of 202 apartments and 22 Townhouse as well as 3 No retail units and a creche with associated underground parking. Parking for the facility will be located in the basement of the complex as well as a small number at surface level. Access to the Proposed Development will be from the new Carrigaline Western Relief Road (CWRR) which is currently under construction.

Traffic counts were undertaken by Traffinomics Ltd. on Thursday 16th September 2021 for the morning peak hours of 07:30 - 09:30 and the evening peak hours of 16:30-18:30. Counts were undertaken at the junctions of R611 Mian Street / Church Hill Junction and Ballea R613 / Nova Court Housing Development. However following discussions with Cork County Council Transport Department, it was agreed that historic counts from 2018 (i.e., pre pandemic) would be used. These counts were supplied by Cork County Council for traffic count undertaken on 1st May 2018.

The expected year of completion for the development is taken to be 2024. In accordance with the "Traffic and Transport Assessment Guidelines, TII 2014", a traffic analysis was undertaken for the AM & PM peak hours for the following time periods.

- Base Year 2018
- Opening Year 2024
- Opening Year + 5 Year Forecast 2029
- Opening Year + 15 Year Forecast 2039

This report has been prepared in accordance with the TII's 2014 publication "Traffic and Transport Assessment Guidelines" and the "Guidelines for Traffic Impact Assessments" as published by the Institution of Highways & Transportation U.K. in 1994. The purpose of a TTA is to assess the traffic impact of a development on the existing road network and propose any

necessary mitigation measures to best accommodate the expected traffic volumes generated by the Proposed Development.

Conclusion Non-Technical Summary

The following are the main conclusions of the LinSig traffic analysis.

Junction 1 – Main Street R611 / R611 Kilmoney Road

- The maximum degree of saturation for the AM peak hour occurs on Church Hill in the design year 2039. The degree of saturation is measured at 71.1% with a mean maximum car queue length of 1.9 vehicles for the morning peak hour 08:15-09:15.
- The maximum degree of saturation for the PM peak hour occurs on the Kilmoney Road in the design year 2039. The degree of saturation is measured at 63.9% with a mean maximum car queue length of 8.9 vehicles for the evening peak hour 17:15-18:15. A short right hand turn lane should be provided on Kilmoney Road. The junction could be signalised from 2029 onwards. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

Junction 2 - Western Relief Road / R611 Kilmoney Road

- The maximum degree of saturation for the AM peak hour occurs on the Kilmoney Road in the design year 2039. The degree of saturation is measured at 80.0% with a mean maximum car queue length of 16.4 vehicles for the morning peak hour 08:15-09:15.
- The maximum degree of saturation for the PM peak hour occurs on the Carrigaline Western Relief Road and the Kilmoney Road in the design year 2039. The degree of saturation is measured at 91.5% with a mean maximum car queue length of 26.1 vehicles for the evening peak hour 17:15-18:15. A short right hand turn lane should be provided on Kilmoney Road if possible. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

Junction 3 - Western Relief Road / Proposed Development

- The maximum degree of saturation for the AM peak hour occurs on the CWRR in the design year 2039. The degree of saturation is measured at 33.0% with a mean maximum car queue length of 0.2 vehicles for the morning peak hour 08:15-09:15.
- For the Design years 2024, 2029,2039 PM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the development access in the design year 2038 . The degree of saturation is measured at 50.2% with a mean maximum car queue length of 1.5 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).
- Junction sight distance of 49m to the north and south will be provided at 2.4m back from road edge measured for design speed of 50km/hr in accordance with DMURs.

- The junction will be provided with both road markings and signage indicating a STOP junction. The Development access will have 2 No exit lanes and 1 No entry lane. Tactile paving will be provided as per the Tactile Paving Guidelines. See drawing CM-RL-P01 (included in Appendix 12E of this Chapter which can be found in Appendix G of this EIAR) for the proposed layout of the access junction.

Junction 4 - Western Relief Road / Internal Link Road

This is a proposed cross roads signalised junction with right turning lanes on all arms of the junction. For the. The maximum degree of saturation for the AM peak hour occurs on the CWRR in the design year 2029. The degree of saturation is measured at 52.4% with a mean maximum car queue length of 2.8 vehicles for the morning peak hour 08:15-09:15.

The maximum degree of saturation in the PM peak hours occurs on the Western Link Road in the design year 2039. The degree of saturation is measured at 57.1.% with a mean maximum car queue length of 10.6 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

Junction 5 - Western Relief Road / R613 Ballea Road

- The maximum degree of saturation for the AM peak hour occurs on the CWRR in the design year 2039. The degree of saturation is measured at 75.3% with a mean maximum car queue length of 10.4 vehicles for the morning peak hour 08:15-09:15.
- The maximum degree of saturation for the PM peak hour occurs on the Ballea Road in the design year 2039. The degree of saturation is measured at 64.8% with a mean maximum car queue length of 8.2 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

Junction 6 – Roundabout Cork Road R611 / Ballea Road R613

- The existing roundabout junction is operating within capacity in the base year 2018 for the morning peak hour. The maximum degree of saturation for the AM peak hour occurs on Arm C Main Street for the design year 2039. The degree of saturation is measured at 79.8% with a mean maximum car queue length of 51. vehicles for the morning peak hour 08:15-09:15.
- The Arcady traffic analysis shows that for the PM peak hour the maximum degree of saturation occurs on Arm D Main Street for the design year 2039. The degree of saturation is measured at 89.6% with a mean maximum car queue length of 7.8 vehicles for the evening peak hour 17:15-18:15. For full Arcady results see Appendix 12D of this Chapter (which can be found in Appendix G of this EIAR).

Junction 7 – Church Road / R612 Crosshaven Road

- The maximum degree of saturation for the AM peak hour occurs on the Crosshaven Road in the design year 2039. The degree of saturation is measured at 104.3% with a mean maximum car queue length of 50.6 vehicles for the morning peak hour 08:15-09:15.
- The maximum degree of saturation occurs on the Cork Road in the design year 2039. The degree of saturation is measured at 92.6% with a mean maximum car queue length of 27.1 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C on the report (which can be found in Appendix G of this EIAR). Modification to the traffic signal stages and timing will be required over time. The traffic signal arrangement involving seven stages as can be seen in Appendix 12C may help to improve traffic flows (see Appendix 12C of this Chapter which can be found in Appendix G of this EIAR).

12.1.2 Study Methodology

12.1.2.1 Introduction

In order to demonstrate that the development of the site complies with current national and local transport planning policy, a review was undertaken of the following documents:

- Cork County Council Development Plan 2022-2028 (Draft)
- Cork County Council Development Plan 2014
- Urban Design Manual: A Best Practice Guide 2009
- Smarter Travel - A Sustainable Transport Future 2009-2020
- Spatial Planning & National Roads – Guidelines for Planning Authorities 2012

12.1.2.2 Urban Design Manual: A Best Practice Guide 2009

This guide “focuses on creating well-designed, sustainable neighbourhoods that will stand the test of time”. This can also extend to industrial developments and provides a strong foundation for the design of such sites in relation to their accessibility – in particular, walking and cycling. The manual follows a set of criteria of which the following are directly linked to this Transport Assessment.

- There are attractive routes in and out for pedestrians and cyclists.
- The development is located in or close to a mixed-use centre.
- The development’s layout makes it easy for a bus to serve the scheme.
- The layout links to existing movement routes and the places people will want to get to
- Appropriate density, dependant on location, helps support efficient public transport.

The manual recognises the need for planners to facilitate connections between new and existing developments, as well as key locations around the sites. These connections should be of high quality, direct, safe, and secure and facilitate existing movement and desired routes. Furthermore, public transport and sustainable transport is prioritised over private cars. Quality

interchanges are highly desirable in promoting the uptake of public transport, including integration with sustainable transport modes, such as cycle parking/storage.

The Proposed Development will be well served by good public transport services with several bus services available within a short walking distance. These services include the 220, 220X, & 225 bus services. The site is ideally located in the centre of Carrigaline within close proximity to schools, shopping, and local services. All of these services can be accessed by pedestrians and cyclists.

12.1.2.3 Smarter Travel – A Sustainable Transport Future 2009-2020

Smarter Travel is “designed to show how Ireland can reverse current unsustainable transport and travel patterns and reduce the health and environmental impacts of current trends and improve our quality of life”. The plan outlines the current transport trends and statistics in Ireland and focuses on policies which aim to increase transport sustainability by 2020.

Key goals of the policy include.

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

In Chapter 3 of the Smarter Travel Document the Government reaffirms its vision for sustainability in transport and sets out five key goals:

- (i) to reduce overall travel demand,
- (ii) to maximise the efficiency of the transport network,
- (iii) to reduce reliance on fossil fuels,
- (iv) to reduce transport emissions and
- (v) to improve accessibility to transport.

To achieve these goals and to ensure that we have sustainable travel and transport by 2020, the Government sets the following key targets:

- Future population and employment growth will predominantly take place in sustainable compact forms, which reduce the need to travel for employment and services.
- 500,000 more people will take alternative means to commute to work to the extent that the total share of car commuting will drop from 65% to 45%.

- Alternatives such as walking, cycling and public transport will be supported and provided to the extent that these will rise to 55% of total commuter journeys to work.
- The total kilometres travelled by the car fleet in 2020 will not increase significantly from current levels.
- A reduction will be achieved on the 2005 figure for greenhouse gas emissions from the transport sector.

12.1.3 The Existing and Receiving Environment (Baseline Situation)

12.1.3.1 Local Road Network

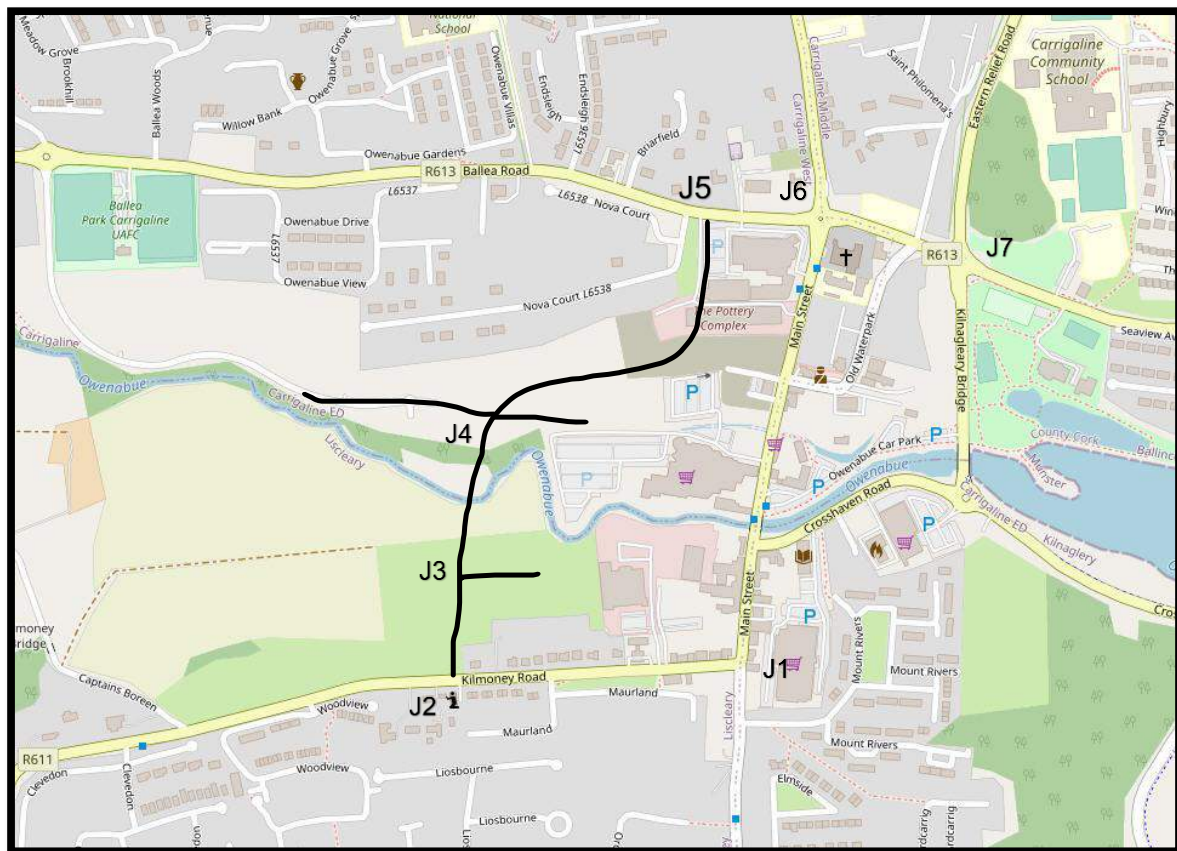


Figure 12-1: Local Road Network, junction locations and route of CWRR.

12.1.3.2 Existing Traffic Conditions

Figure 12-1 shows the 7 No junctions which were agreed as the scope of traffic analysis to be included in this Traffic & Transport Assessment Report. The Transport Department of Cork County Council were consulted to agree the scope of the traffic analysis. Junctions J1, J6, & J7 are existing junctions with junctions J2, J3, J4 & J5 forming part of the Carrigaline Western Relief Road, which is currently under construction.

Traffic counts were undertaken by Traffinomics Ltd. on Thursday 16th September 2021 for the morning peak hours of 07:30 - 09:30 and the evening peak hours of 16:30-18:30. Counts were undertaken at the junctions of Main Street R611 / Church Hill Junction and Ballea R613 / Nova

Court Housing Development. However following discussions with Cork County Council Transport Department, it was agreed that historic counts from 2018 (i.e., pre pandemic) would be used. These counts were supplied by Cork County Council for traffic count undertaken on 1st May 2018. Full traffic count data can be found in Appendix 12A of this Chapter (which can be found in Appendix G of this EIAR).

The existing junctions were analysed using LinSig traffic modelling software for the existing signalised and uncontrolled junctions. Arcady was used to analyse the existing roundabout junction on the Cork Road at the Carrigaline Court Hotel.

The outputs from LinSig and Arcady shows the Degree of Saturation and Queue lengths as indicators of the operational efficiency of the junction. A Degree of Saturation of 100% indicates that the junction is operating at its theoretical maximum capacity, however, a value of 90% is considered to be the maximum optimum Degree of Saturation for a signalised and uncontrolled junctions, allowing a 10% reserve capacity for unusual events.

12.1.3.3 Carrigaline Western Relief Road (CWRR)

Cork County Council have secured €6.4 Million, from Department of Housing, Local Government & Heritage under the Urban Regeneration & Development Fund, for the delivery of the Carrigaline Western Relief Road, Cork County Council, working with BAM. This project commenced construction in April 2021.

The Western Relief Road will be 750m in length and will include a new bridge to cross the Owenabue River. The CWRR will open up lands for development, adjacent to Main Street, which will assist in consolidating the town centre. An important element of the scheme are the facilities for pedestrians and cyclists being provided throughout. The pedestrian and cycle facilities on the CWRR will link with those on the Soccer Club Road, which will be completed and opened as part of this scheme. These facilities will link residential areas to the west of the town with the town centre itself by means of safe, high-quality corridors. These facilities will become a valuable amenity to the people of Carrigaline once complete. It is envisaged that the construction of the road will take approx. 18 months to complete.

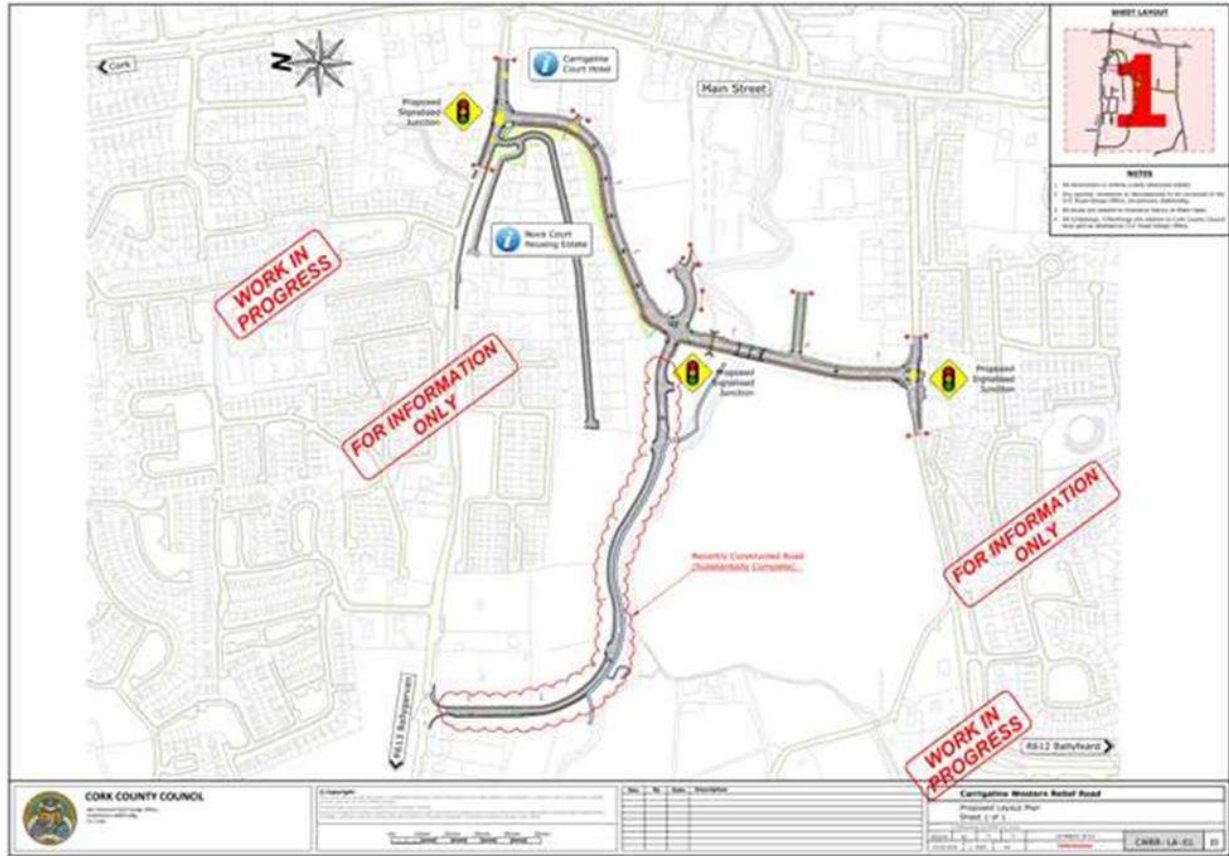


Figure 12-2: Proposed layout of the Carrigaline Western Relief Road

12.1.3.4 Junction 1 - Main Street R611 / Kilmoney Road

The existing Main Street / Kilmoney Road junction is uncontrolled with single lane approached on all arms of the junction. The traffic on Church Hill gives way to traffic on the R613 at a 90-deg bend

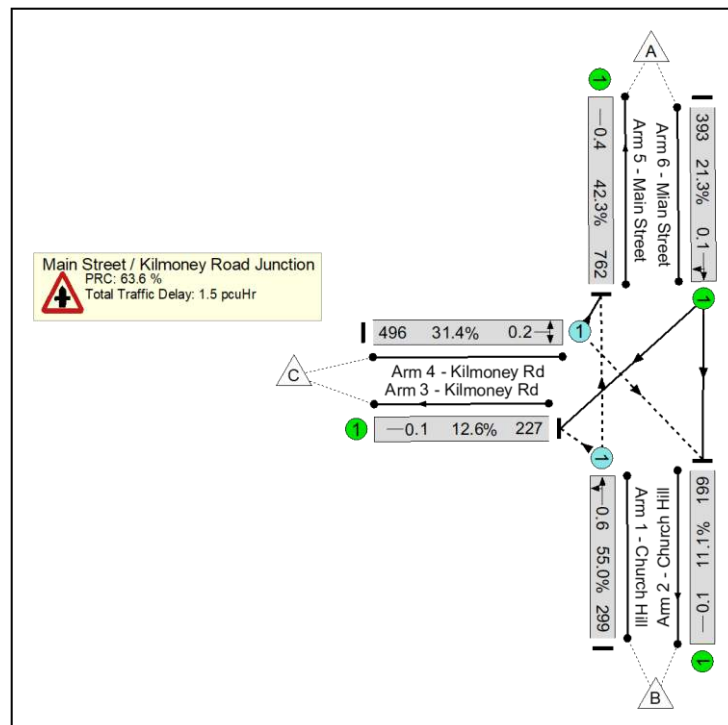


Figure 12-3: Scenario AM 2018. Junction of Main Street / Kilmoney Road.

The existing junction is operating within capacity in the base year 2018 for the morning peak hour. The LinSig traffic analysis shows that the maximum degree of saturation occurs on Arm 1 Church Hill as can be seen in Figure 12-3. The degree of saturation is measured at 55.0% with a mean maximum car queue length of 0.6 vehicles for the morning peak hour 08:15-09:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIA).

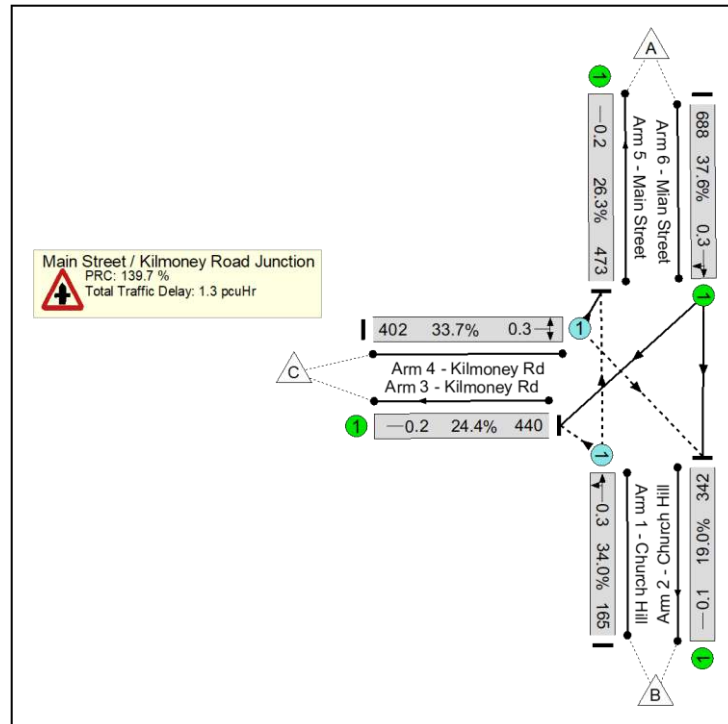


Figure 12-4: Scenario PM 2018. Junction of Main Street / Kilmoney Road.

The existing junction is operating within capacity in the base year 2018 for the evening peak hour. The LinSig traffic analysis shows that the maximum degree of saturation occurs on Arm 6 Main Street as can be seen in Figure 12-4. The degree of saturation is measured at 37.6% with a mean maximum car queue length of 0.3 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

12.1.3.5 Roundabout Junction 6 - Ballea Road R613 / Cork Road R611

The existing roundabout at Ballea Road R612 / Cork Road R611 is a four-arm roundabout junction. There is significant flaring on the approaches from The Cork Road, Church Road, and Main Street with one car flaring on the Ballea Road approach. The roundabout has an inscribed diameter of approx. 30m. The existing roundabout junction is operating within capacity in the base year 2018 for the morning peak hour. The Arcady traffic analysis shows that the maximum degree of saturation occurs on Arm C Main Street as can be seen in Figure 12-5. The degree of saturation is measured at 51.6% with a mean maximum car queue length of 1.1 vehicles for the morning peak hour 08:15-09:15. For full Arcady results see Appendix 12D of the Chapter (which can be found in Appendix G of this EIAR).

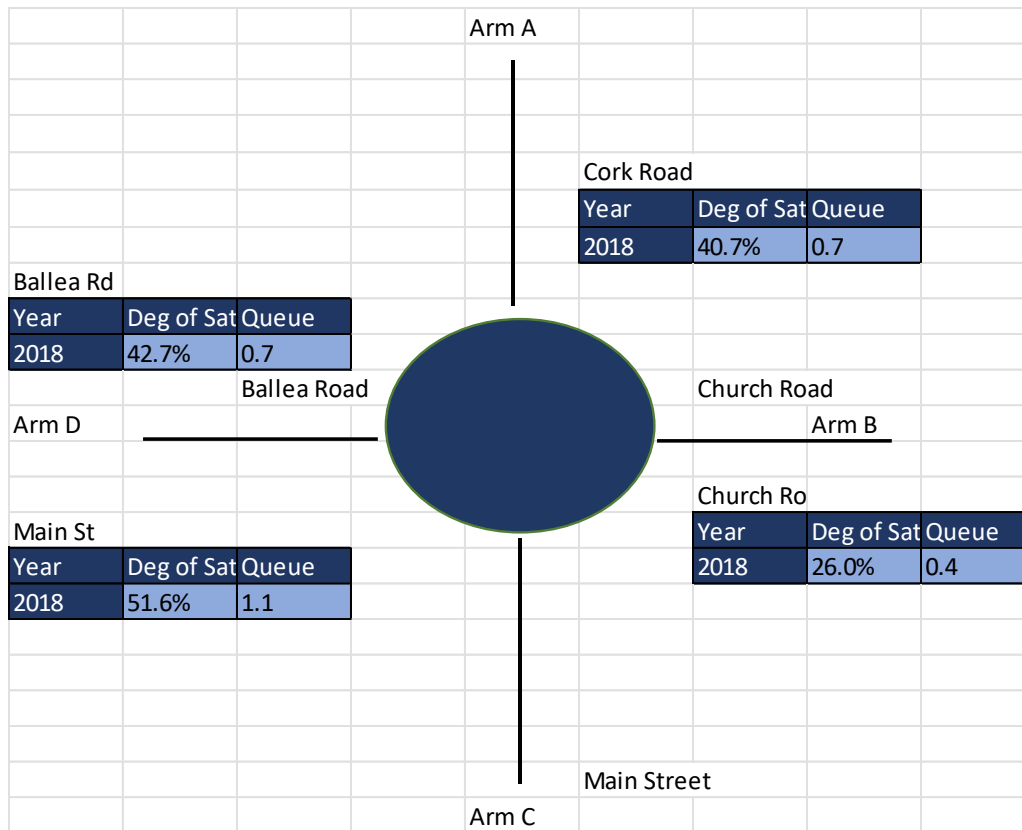


Figure 12-5: Arcady Analysis AM 2018. Roundabout Junction of Ballea Road / Cork Road.

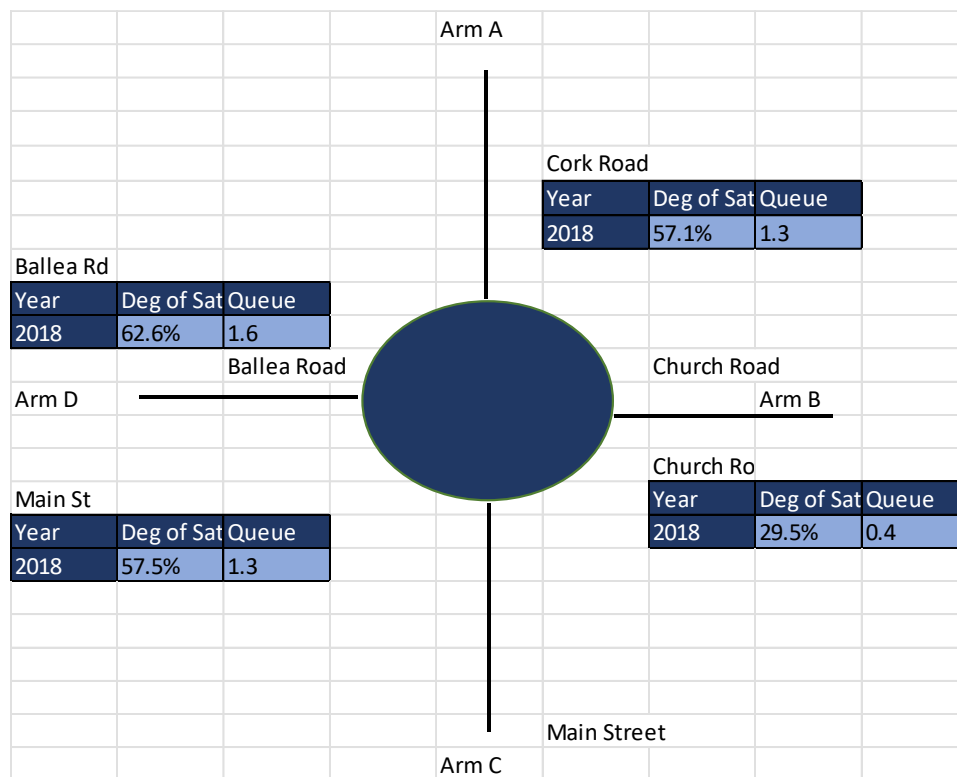


Figure 12-6: Arcady Analysis PM 2018. Roundabout Junction of Ballea Road / Cork Road.

The existing roundabout junction is operating within capacity in the base year 2018 for the evening peak hour. The Arcady traffic analysis shows that the maximum degree of saturation

occurs on Arm C Ballea Road as can be seen in Figure 12-6. The degree of saturation is measured at 62.6% with a mean maximum car queue length of 1.6 vehicles for the evening peak hour 17:15-18:15. For full Arcady results see Appendix 12D of the Chapter (which can be found in Appendix G of this EIAR).

12.1.3.6 Signalised Junction 7- Church Road R613 / Crosshaven Road R612

The existing Church Road R613 / Crosshaven Road R612 is a 4-arm signalised junction. All approaches to the junction have right hand turn lanes. The left turn movements operate on a flashing amber arrow which increase the capacity of the junction.

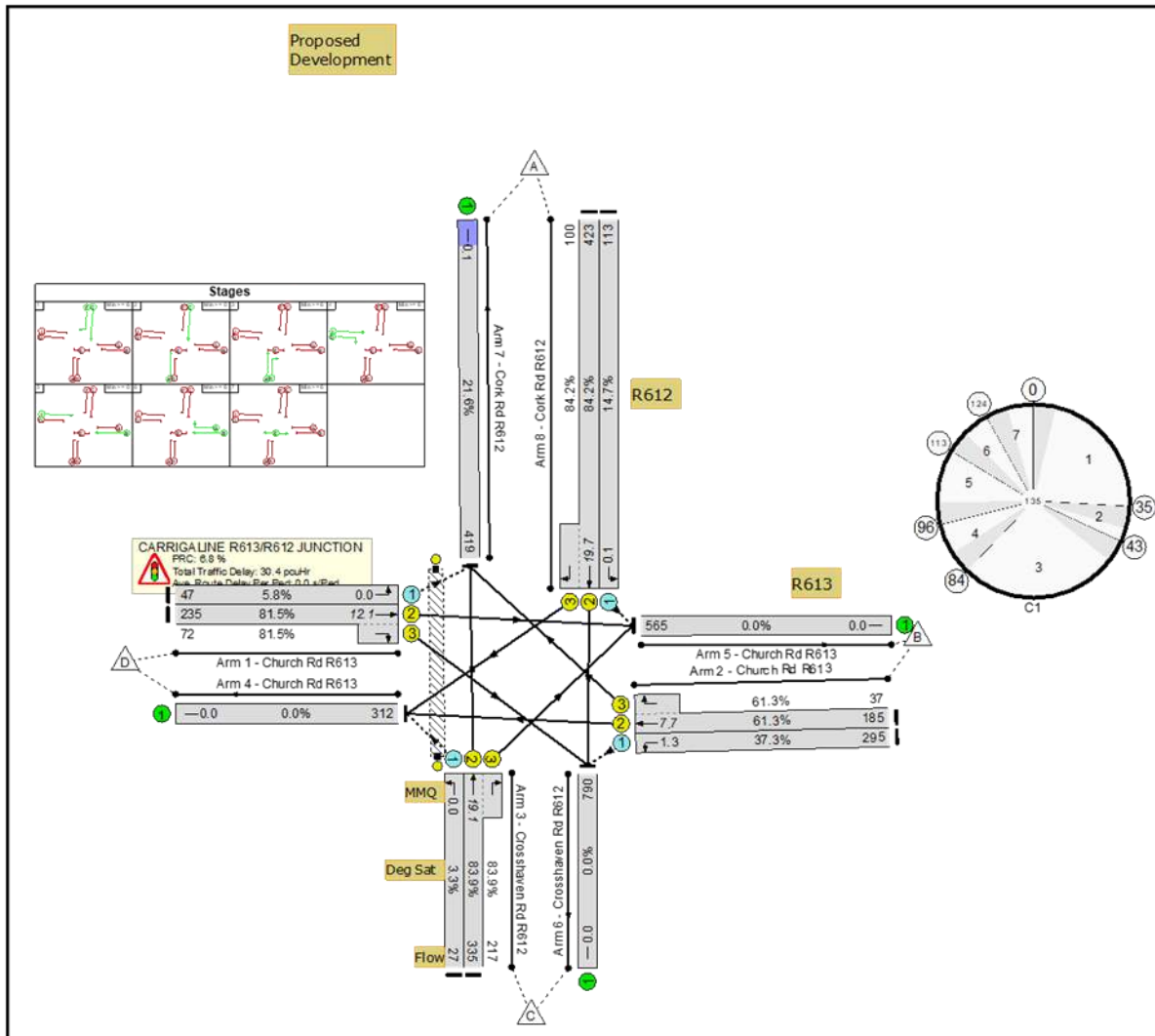


Figure 12-7: Scenario AM 2018. Junction of Church Road / Crosshaven Road.

The existing signalised junction is operating within capacity in the base year 2018 for the morning peak hour. The LinSig traffic analysis shows that the maximum degree of saturation occurs on Arm 8 Cork Road as can be seen in Figure 12-7. The degree of saturation is measured at 84.2% with a mean maximum car queue length of 19.7 vehicles for the morning peak hour 08:15-09:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

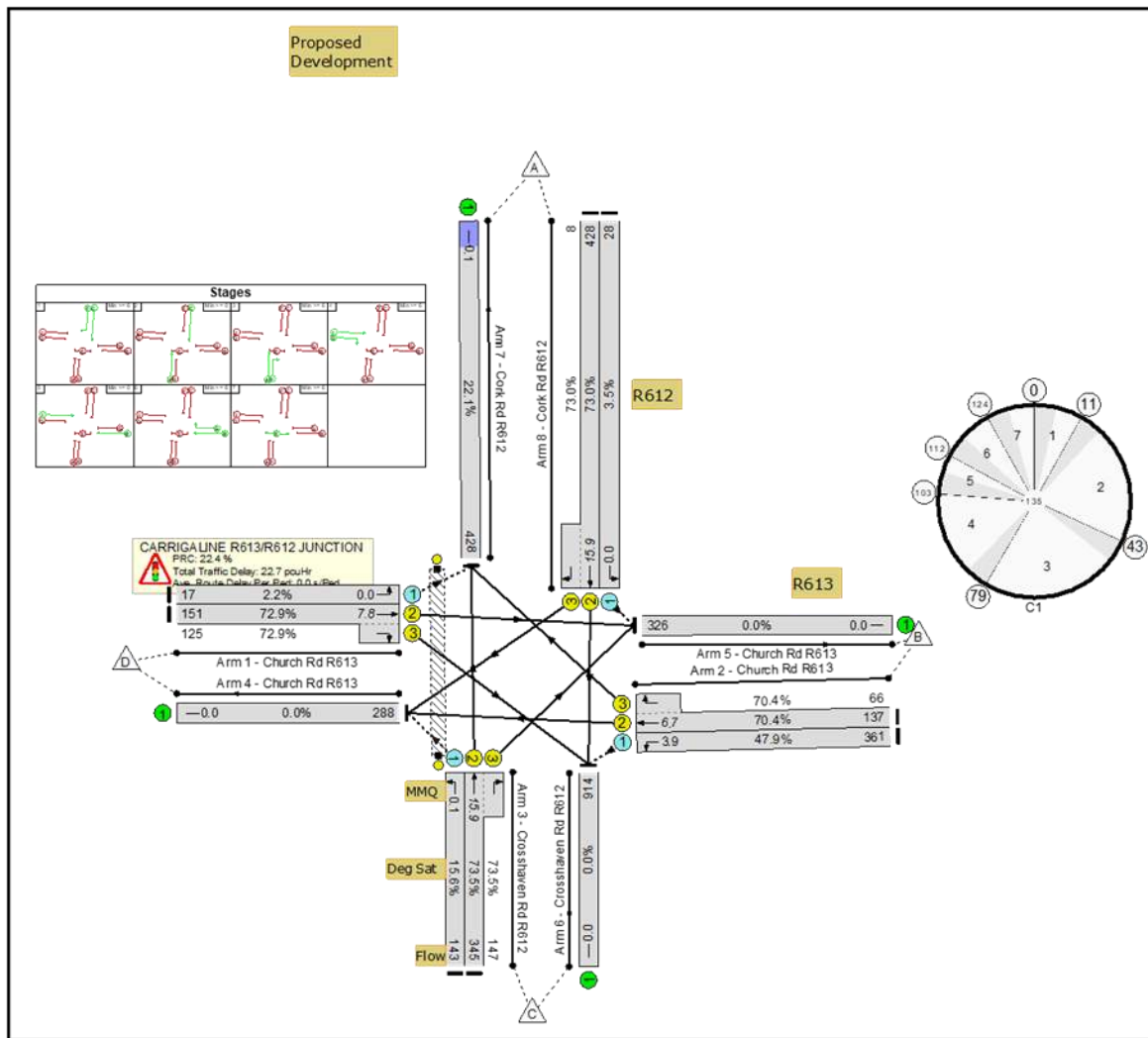


Figure 12-8: Scenario PM 2018. Junction of Church Road / Crosshaven Road.

The existing junction is operating within capacity in the base year 2018 for the evening peak hour. The LinSig traffic analysis shows that the maximum degree of saturation occurs on Arm 3 Crosshaven Road as can be seen in Figure 12-8. The degree of saturation is measured at 73.5% with a mean maximum car queue length of 15.9 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

12.1.4 Characteristics of the Proposed Development

The Proposed Development consists

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units;
- A 184 m² creche/childcare facility;

- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas;
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level; and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage

Trip generation will be calculated on the above Strategic Housing Development using the TRICS database.

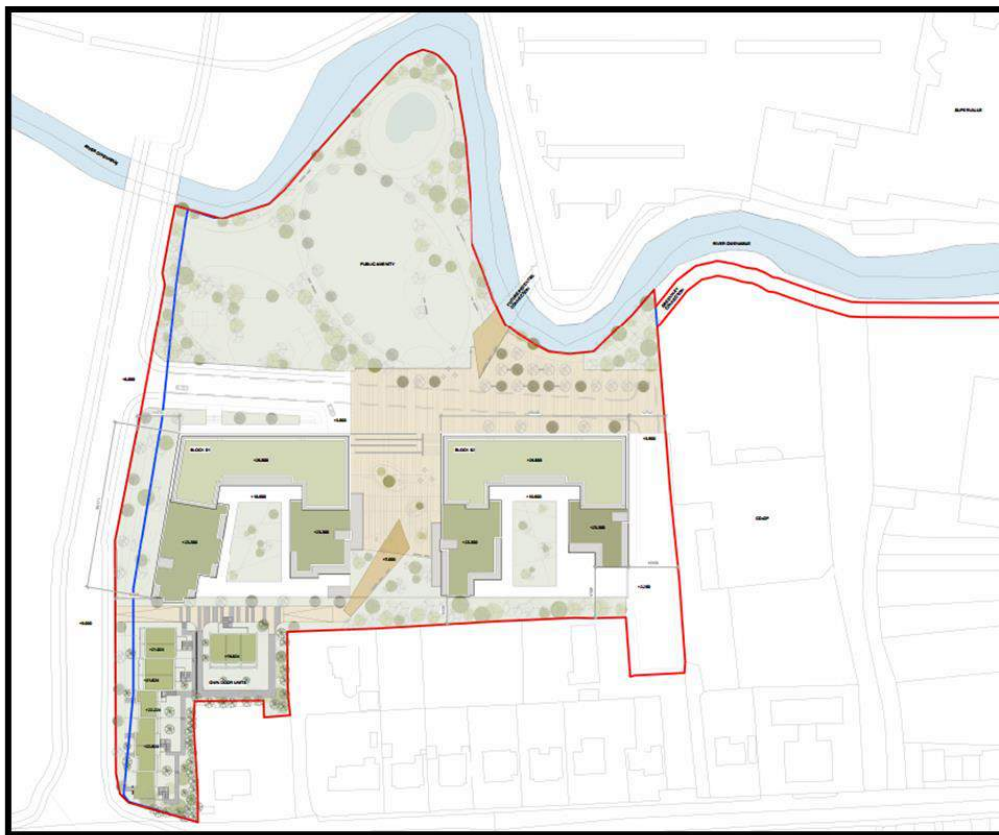


Figure 12-9: Proposed Development Layout.

12.1.4.1 Trip Generation

TII's 2014 publication "Traffic and Transport Assessment Guidelines" states that for new developments a traffic analysis should be undertaken during the busiest hours which have been identified from traffic counts as 08:15-09:15 and 17.00-18.00.

The TRICS database was used to calculate the trip generation for this development. TRICS is a well-established UK and Irish national database which holds in excess of 2,100 site locations and 4,700 survey counts with over 98 separate land use sub-categories. The TRICS program was used to estimate the number of car trips that would be generated by this development during the morning and evening peak hours. Table 12-1 shows the total number

of trips generated during the peak hours for the Proposed Development. The output sheets from TRICS can be seen in Appendix 12B of the Traffic and Transport Assessment (which can be found in Appendix G of this EIAR).

Table 12-1: Trip Generation from Proposed Development

Mixed Use Development, Carrigaline		AM ARRIVAL 08:15-09:15	AM DEPARTURES 08:15-09:15	PM ARRIVAL 17:15-18:15	PM DEPARTURES 17:15-18:15
202 Apartments	per unit	0.047	0.224	0.187	0.047
	No.	202	202	202	202
	Trips	9	45	38	9
22 Townhouses	per unit	0.15	0.37	0.41	0.26
	No.	22	22	22	22
	Trips	3	8	9	6
Food Retail Including 2No small retail units 3,158 sqm	per 100sqm	3.571	2.345	6.385	6.908
	No.	31.58	31.58	31.58	31.58
	Trips	113	74	202	218
Childcare 184 sqm	per 100sqm	2.000	1.778	1.000	3.900
	No.	1.84	1.84	1.84	1.84
	Trips	4	3	2	7
		AM ARRIVAL	AM DEPARTURES	PM ARRIVAL	PM DEPARTURES
TOTAL TRIPS PEAK HOURS		129	131	250	241

12.1.4.2 Modal Split

In order to predict the level of traffic that will be generated by the Proposed Development, the means of transport (modal split) and quantity of traffic generated (trip attraction) must be considered.

Given the location of the Proposed Development, the peak hour trips generated will primarily be by public transport and private car. In terms of modal split and national policies for the promotion of sustainable transport solutions, a reduction in car trips would be expected, with improvement in pedestrian / cycle facilities as well as improvement in public transport. In order to provide a robust traffic analysis, no reduction in car traffic volumes has been assumed in this report.

National policies, strategies, and guidelines for improvements to public transport systems and reductions in car usage are outlined in the Department of Transport Tourism and Sport's Planning Guidelines for Spatial Planning and National Roads 2012 and the Department of Transport, Tourism and Sport's Smarter Travel: A Sustainable Transport Future. In addition, the document a New Policy for Ireland 2009-2020 states that the key aims of any development plan must be to secure more sustainable residential development that reduces overall demand for transport by car and encourages modal shift towards sustainable travel modes (e.g., walking, cycling and public transport), whilst also ensuring the strategic traffic function of national roads is maintained."

The Proposed Development meets these requirements in terms of proximity to local services, convenience shopping within 1km and numerous amenities such as sports fields/clubs and public parks within 1.5km. Given the nature of the development a reduction in car trips would be expected over time as further improvements to public transport are developed.

12.1.4.3 Trip Distribution

The current distribution of traffic along the Cork Road, Main Street, Ballea Road, and Church Hill will be used to determine directional split to and from the Proposed Development for both morning and evening peak hours. The Carrigaline Western Relief Road is currently under construction. Once completed the distribution of traffic will change. The following assumptions have been made to the redistribution of traffic once the CWRR is completed.

It is assumed that 50% of Main Street traffic will divert to CWRR. It is also assumed that 50% of Ballea Road traffic will divert to the Internal Western Link Road. It is also assumed that 50% of traffic from Church Hill will divert and turn left, onto the CWRR.

12.1.4.4 Traffic Growth

In order to predict likely future traffic conditions so that the impact of this development proposal on the road and transport network can be predicted and assessed, traffic forecasting considers the possible traffic flows generated by a development proposal as well as the existing background network traffic.

The assessment years considered in this report are the Base Year (2018), which is the year the baseline traffic surveys were undertaken, the proposed Opening Year, which is the year of expected completion for the Proposed Development (2024) and the Design Years, taken as the opening year plus 5 years (2029) & the opening year plus 15 years (2039).

Transport Infrastructure Irelands publication “Project Appraisal Guidelines for National Roads Unit 5.3” 2019 was used to calculate growth factors for the background road network traffic. These Guidelines state that for the years 2016-2030 within Cork Metropolitan Area, a traffic growth rate of 1.53% per annum can be assumed. This changes to 0.72% beyond 2030. The original traffic counts from 2018 were factored up using these percentage increases. The effects of traffic growth on the existing network plus the additional traffic generated by the Proposed Development have been compiled to provide a robust set of data for the traffic analysis.

Table 12-2 shows the calculated growth factors based on a growth rate measured from the current year 2018.

Table 12-2: TII Predicted Traffic Growth Rates for County Cork.

Location		2018	2024	2029	2039
County Cork	Growth Rate From 2018	104.66%	107.89%	116.40%	125.89%

12.1.4.5 Assignment of Development Trips

The Proposed Development will generate trips as outlined in section 12.1.4.1 of this Chapter.. As outlined in section 12.1.4.2 the expected modal split has been assumed to remain as it is at present with no increase in modal shift towards more sustainable transport patterns. This is the worst-case scenario form a traffic analysis perspective.

A number of traffic model were produced for future traffic analysis. These models included a 5 No junction.

Linsig model including junctions J1,J2,J3,J4 & J5. A separate Linsig traffic model for Junction 7 and an Arcady traffic model for Junction 6 was also prepared.

Junction J1, J2, J3, J4 & J5 – Linsig Traffic Model

The list of traffic models built for the Proposed Development traffic assessment are:

Seven zones were used to construct the LinSig network labelled A to H. The development is represented by zone H.

Table 12-3: Traffic Assignment for AM Peak 2024

		Destination								
		A	B	C	D	E	F	G	H-Dev	Tot
Origin	A	0	453	0	0	108	108	108	40	817
	B	303	0	0	0	12	12	12	20	359
	C	11	22	0	22	22	22	22	10	129
	D	0	0	0	0	12	12	12	20	56
	E	216	0	43	0	0	259	0	10	528
	F	0	0	0	0	225	0	199	20	444
	G	0	76	0	76	19	151	0	10	332
	H-Dev	40	25	0	25	9	20	9	0	128
	Tot	570	575	43	122	407	583	361	130	2791

Table 12-4: Traffic Assignment for AM Peak 2029

		Destination								
		A	B	C	D	E	F	G	H-Dev	Tot
Origin	A	0	489	0	0	116	116	116	40	878
	B	327	0	0	0	13	13	13	20	385
	C	12	23	0	23	23	23	23	10	138
	D	0	0	0	0	13	13	13	20	58
	E	233	0	47	0	0	279	0	10	569
	F	0	0	0	0	243	0	214	20	477
	G	0	81	0	81	21	163	0	10	357
	H-Dev	40	25	0	25	9	20	9	0	128
	Tot	612	619	47	130	439	628	388	130	2991

Table 12-5: Traffic Assignment for AM Peak 2039

		Destination							H-Dev	Tot
		A	B	C	D	E	F	G		
Origin	A	0	529	0	0	126	126	126	40	946
	B	354	0	0	0	14	14	14	20	415
	C	13	25	0	25	25	25	25	10	148
	D	0	0	0	0	14	14	14	20	62
	E	252	0	50	0	0	302	0	10	614
	F	0	0	0	0	263	0	232	20	515
	G	0	88	0	88	23	176	0	10	385
	H-Dev	40	25	0	25	9	20	9	0	128
	Tot	658	667	50	138	474	677	419	130	3214

Table 12-6: Traffic Assignment for PM Peak 2024

		Destination							H-Dev	Tot
		A	B	C	D	E	F	G		
Origin	A	0	443	0	0	140	140	140	68	932
	B	297	0	0	0	16	16	16	48	393
	C	11	22	0	22	22	22	22	0	119
	D	0	0	0	0	16	16	16	58	107
	E	30	60	30	60	0	183	66	25	455
	F	0	0	11	11	439	0	303	25	789
	G	0	36	0	36	36	71	0	25	203
	H-Dev	84	5	0	80	24	24	24	0	241
	Tot	422	566	41	208	693	473	587	249	3239

Table 12-7: Traffic Assignment for PM Peak 2029

		Destination							H-Dev	Tot
		A	B	C	D	E	F	G		
Origin	A	0	478	0	0	151	151	151	68	1000
	B	320	0	0	0	17	17	17	48	420
	C	12	23	0	23	23	23	23	0	128
	D	0	0	0	0	17	17	17	58	110
	E	33	65	33	65	0	198	71	25	489
	F	0	0	12	12	474	0	327	25	849
	G	0	38	0	38	38	77	0	25	217
	H-Dev	84	5	0	80	24	24	24	0	241
	Tot	448	610	44	219	746	508	632	249	3456

Table 12-8: Traffic Assignment for PM Peak 2039

		Destination							H-Dev	Tot
		A	B	C	D	E	F	G		
Origin	A	0	517	0	0	164	164	164	68	1076
	B	346	0	0	0	19	19	19	48	451
	C	13	25	0	25	25	25	25	0	138
	D	0	0	0	0	19	19	19	58	115
	E	35	70	35	70	0	214	77	25	527
	F	0	0	13	13	512	0	354	25	916
	G	0	42	0	42	42	83	0	25	233
	H-Dev	84	5	0	80	24	24	24	0	241
	Tot	478	660	48	230	805	548	681	249	3698

Junction J7 – Linsig Traffic Model

The following are the traffic assignment matrices used for J7 – Church Road / R612 Crosshaven Road for the following design years,

- Base Year 2018
- Opening Year 2024
- Opening Year + 5 Year Forecast 2029
- Opening Year + 15 Year Forecast 2039

Table 12-9: Traffic Assignment for AM Peak 2018

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	113	423	100	636
	B	37	0	295	185	517
	C	335	217	0	27	579
	D	47	235	72	0	354
	Tot	419	565	790	312	2086

Table 12-10: Traffic Assignment for AM Peak 2024

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	122	456	108	686
	B	40	0	318	200	558
	C	361	234	0	29	625
	D	51	254	78	0	382
	Tot	452	610	852	337	2251

Table 12-11: Traffic Assignment for AM Peak 2029

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	132	492	116	740
	B	43	0	343	215	602
	C	390	253	0	31	674
	D	55	274	84	0	412
	Tot	488	658	920	363	2428

Table 12-12: Traffic Assignment for AM Peak 2039

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	142	533	126	801
	B	47	0	371	233	651
	C	422	273	0	34	729
	D	59	296	91	0	446
	Tot	527	711	995	393	2626

Table 12-13: Traffic Assignment for PM Peak 2018

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	28	428	8	464
	B	66	0	361	137	564
	C	345	147	0	143	635
	D	17	151	125	0	293
	Tot	428	326	914	288	1956

Table 12-14: Traffic Assignment for PM Peak 2024

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	30	462	9	501
	B	71	0	389	148	608
	C	372	159	0	154	685
	D	18	163	135	0	316
	Tot	462	352	986	311	2110

Table 12-15: Traffic Assignment for PM Peak 2029

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	33	498	9	540
	B	77	0	420	159	656
	C	402	171	0	166	739
	D	20	176	146	0	341
	Tot	498	379	1064	335	2277

Table 12-16: Traffic Assignment for PM Peak 2039

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	35	539	10	584
	B	83	0	454	172	710
	C	434	185	0	180	799
	D	21	190	157	0	369
	Tot	539	410	1151	363	2462

Junction J6 – Linsig Traffic Model

The following are the traffic assignment matrices used for J6 – Roundabout Cork Road R611 / Ballea Road R613 for the following design years,

- Base Year 2018
- Opening Year 2024
- Opening Year + 5 Year Forecast 2029
- Opening Year + 15 Year Forecast 2039

Table 12-17: Traffic Assignment for AM Peak 2018

		Exit Flow				
		A	B	C	D	Total
Entry Flow	A	0	128	299	131	558
	B	85	0	42	213	340
	C	386	167	0	76	629
	D	119	162	65	0	346
	Total	590	457	406	420	

Table 12-18: Traffic Assignment for AM Peak 2024

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	299	0	342	641
	B	92	0	0	308	399
	C	416	180	0	92	689
	D	145	104	0	0	250
	Tot	654	583	0	742	1979

Table 12-19: Traffic Assignment for AM Peak 2029

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	322	0	366	688
	B	99	0	0	331	430
	C	449	194	0	98	742
	D	156	111	0	0	267
	Tot	704	628	0	795	2127

Table 12-20: Traffic Assignment for AM Peak 2039

		Exit Flow				
		A	B	C	D	Tot
Entry Flow	A	0	349	0	392	741
	B	107	0	0	357	464
	C	486	210	0	106	802
	D	167	119	0	0	286
	Tot	760	678	0	855	2293

Table 12-21: Traffic Assignment for PM Peak 2018

		Entry Flow				
		A	B	C	D	Total
Exit Flow	A	0	82	390	159	631
	B	90	0	32	164	286
	C	364	100	0	90	554
	D	119	156	91	0	366
	Total	573	338	513	413	1837

Table 12-22: Traffic Assignment for PM Peak 2024

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	300	0	437	737
	B	97	0	0	226	324
	C	393	108	0	112	613
	D	184	99	0	0	284
	Tot	674	507	0	775	1957

Table 12-23: Traffic Assignment for PM Peak 2029

		Exit Flow				
		A	B	C	D	Tot
Entry Flow	A	0	324	0	467	790
	B	105	0	0	243	348
	C	424	116	0	120	660
	D	195	106	0	0	300
	Tot	723	546	0	830	2098

Table 12-24: Traffic Assignment for PM Peak 2039

		Destination Zone				
		A	B	C	D	Tot
Origin Zone	A	0	350	0	500	850
	B	113	0	0	262	375
	C	458	126	0	128	712
	D	206	113	0	0	319
	Tot	777	589	0	890	2257

12.1.5 Potential Impact of the Proposed Development

12.1.5.1 Linsig Analysis

The proposed junctions 1,2,3,4,5 & 7, were modelled using LinSig traffic modelling software. LinSig is a computer software program which provides an analysis including capacities, mean max queue lengths (pcu) and delays at uncontrolled and signalised junctions. Junction 1-5 were modelled as per layout Figure 12-10. Junction 7 was modelled in Linsig separately.

The output results sheets from LinSig consist of tables of demand flow, capacities, queues and delays for the morning and evening peak hour analysis, for each arm of the junction. These tables contain start and finish times for each arm, traffic demand, Degree of Saturated Flow (DOS %), start queue length and queuing delay.

The DOS provides the basis for judging the acceptability of junction design and the capacity of existing junctions. In general, a DOS of 90% or less for signalised and controlled junctions is considered acceptable during the peak periods. A DOS of this value would indicate that at peak times the junction is at 90% of its operational capacity and therefore has a practical reserve capacity of 10%. This reserve capacity of 10% is considered by traffic engineers to be the level of reserve capacity at a junction required to cater for periods of unusually high traffic flows such as bank holiday weekends, public entertainment, and sporting events etc.

The results from the LinSig analysis are shown in the pages which follow for the following traffic scenarios.

- Scenario 1 AM 2024 Design Year
- Scenario 2 AM 2029 Design Year
- Scenario 3 AM 2039 Design Year
- Scenario 4 PM 2024 Design Year
- Scenario 5 PM 2029 Design Year
- Scenario 6 PM 2039 Design Year

The full output from Linsig traffic analysis is available in Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

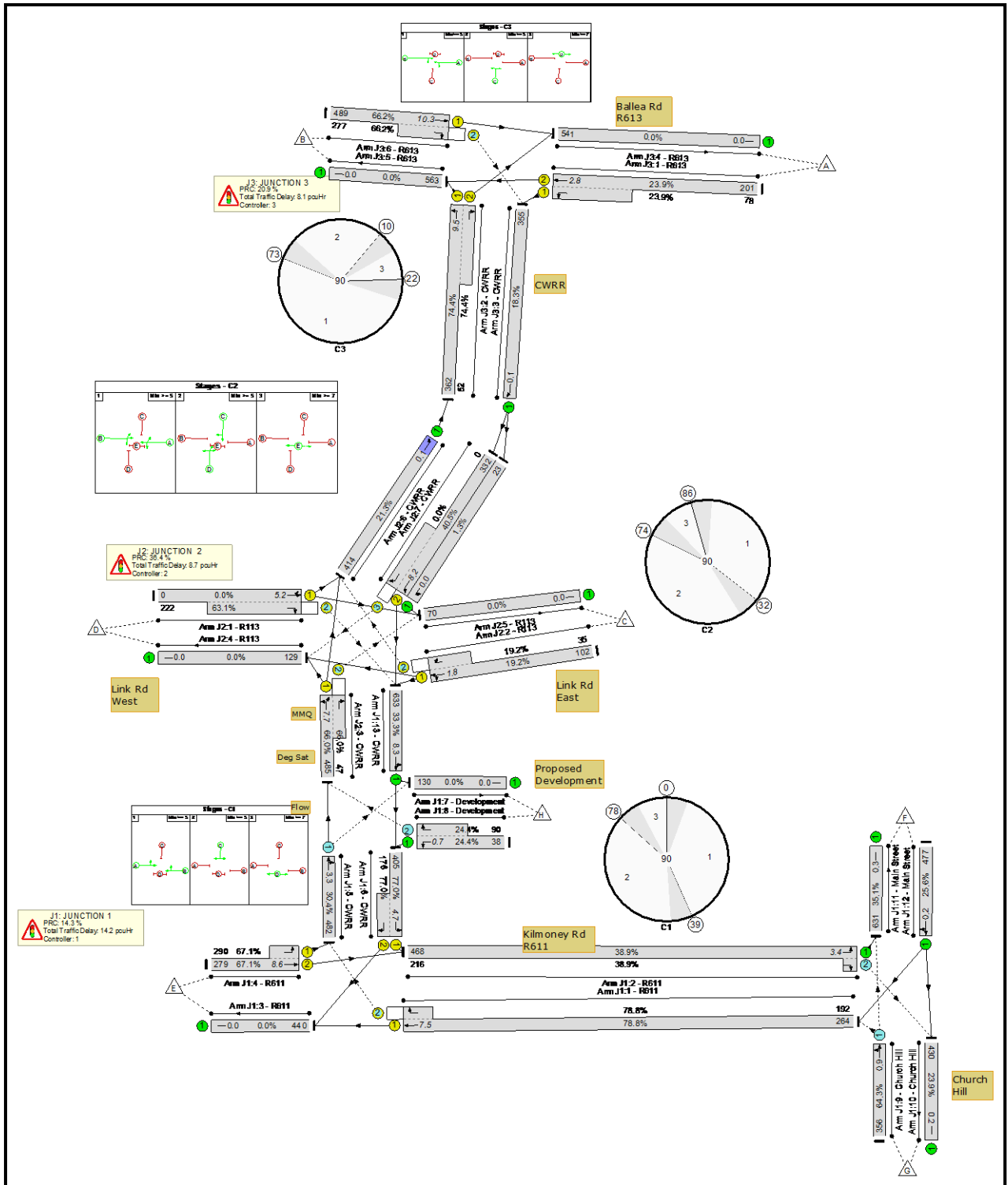


Figure 12-10: Linsig Model Junctions 1-5

Junction 1 – Main Street R611 / R611 Kilmoney Road

For the Design years 2024, 2029,2039 AM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on Church Hill in the design year 2039 as can be seen in Figure12-11. The degree of saturation is measured at 71.1% with a mean maximum car queue length of 1.9 vehicles for the morning peak hour 08:15-09:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

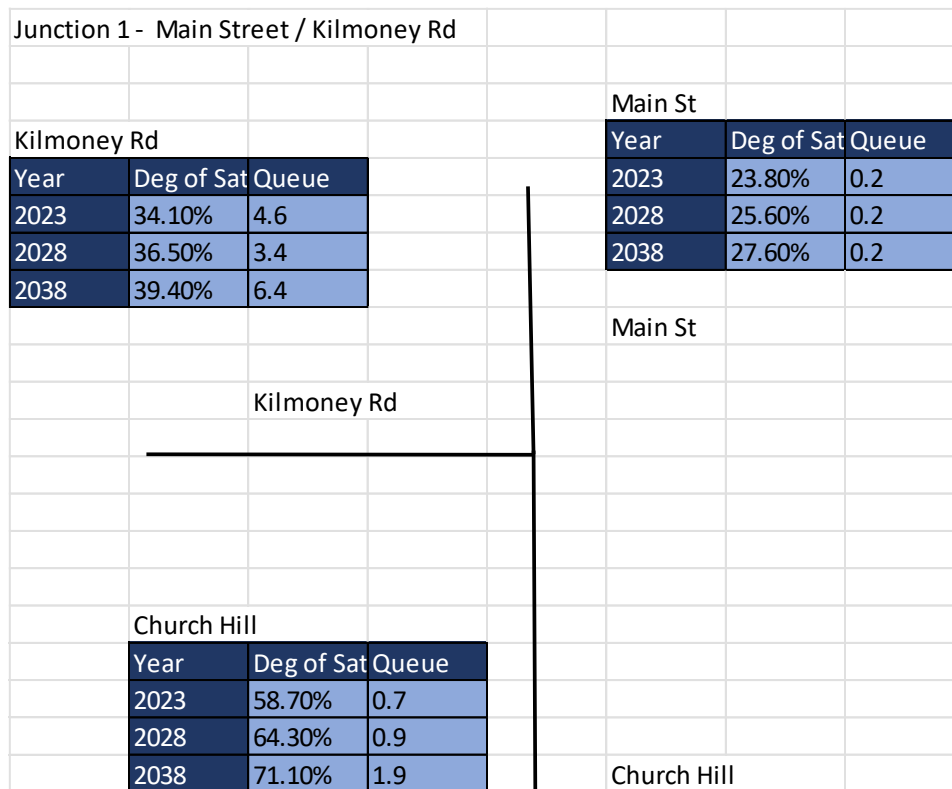


Figure 12-11: Linsig Analysis Summary AM 2024,2029 & 2039

For the Design years 2024, 2029,2039 PM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the Kilmoney in the design year 2039 as can be seen in Figure 12-12. The degree of saturation is measured at 63.9% with a mean maximum car queue length of 8.9 vehicles for the evening peak hour 17:15-18:15. A short right hand turn lane should be provided on Kilmoney Road. The junction could be signalised from 2029 onwards. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

Junction 3 - Western Relief Road / Proposed Development

For the Design years 2024, 2029,2039 AM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the CWRR in the design year 2039 as can be seen in Figure 12-15. The degree of saturation is measured at 33.0% with a mean maximum car queue length of 7.2 vehicles for the morning peak hour 08:15-09:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

Junction 3 - CWRR / Proposed Access					
CWRR					
Year	Deg of Sat	Queue			
2023	29.10%	0.2			
2028	30.90%	7.8			
2038	33.00%	0.2			
			Year	Deg of Sat	Queue
			2023	22.90%	0.1
			2028	23.70%	0.8
			2038	24.80%	0.2
			Proposed Development		
CWRR			CWRR		
Year	Deg of Sat	Queue			
2023	27.60%	0.2			
2028	30.30%	4.8			
2038	31.40%	0.2			

Figure 12-15: Linsig Analysis Summary AM 2024,2029 & 2039

For the Design years 2024, 2029,2039 PM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the development access in the design year 2039 as can be seen in Figure 12-16. The degree of saturation is measured at 50.2% with a mean maximum car queue length of 1.8 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

Junction 3 - CWRR / Proposed			Access		
CWRR			CWRR		
Year	Deg of Sat	Queue	Year	Deg of Sat	Queue
2023	40.30%	4.6	2023	46.00%	1.7
2028	42.50%	9.9	2028	47.80%	1.5
2038	45.40%	11	2038	50.20%	1.8
CWRR			Proposed Development		
CWRR			CWRR		
Year	Deg of Sat	Queue	Year	Deg of Sat	Queue
2023	27.90%	1.9			
2028	29.60%	0.2			
2038	31.50%	0.4			

Figure 12-16: Linsig Analysis Summary PM 2024,2029 & 2039

Junction 4 - Western Relief Road / Internal Link Road

For the Design years 2024, 2029,2039 AM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the CWRR in the design year 2029 as can be seen in Figure 12-17. The degree of saturation is measured at 52.4% with a mean maximum car queue length of 2.8 vehicles for the morning peak hour 08:15-09:15. For full Linsig results see Appendix 12C of the Chapter (which can be found in Appendix G of this EIAR).

Junction 4 - CWRR / Link Road								
						CWRR		
Link Road			CWRR			Year	Deg of Sat	Queue
Year	Deg of Sat	Queue				2023	33.00%	1.7
2023	36.40%	1.5				2028	43.20%	10.4
2028	22.90%	1.3				2038	36.70%	1.2
2038	37.00%	2.1						
Link Road			Link Road					
						Link Road		
						Year	Deg of Sat	Queue
						2023	46.10%	2.7
						2028	26.60%	2.2
						2038	43.40%	3.7
CWRR						CWRR		
Year	Deg of Sat	Queue						
2023	40.30%	5.7						
2028	52.40%	2.8						
2038	44.50%	8.4						

Figure 12-17: Linsig Analysis Summary AM 2024,2029 & 2039

For the Design years 2024, 2029,2039 PM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the Western Link Road in the design year 2039 as can be seen in Figure 12-18. The degree of saturation is measured at 58.1% with a mean maximum car queue length of 3.0 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

Link Road			CWRR		
Year	Deg of Sat	Queue	Year	Deg of Sat	Queue
2023	58.10%	3	2023	48.40%	3.5
2028	51.60%	3.6	2028	51.10%	8.7
2038	49.70%	3.7	2038	57.10%	10.6

Link Road			Link Road		
Year	Deg of Sat	Queue	Year	Deg of Sat	Queue
2023	38.50%	3.1	2023	33.40%	2.2
2028	40.40%	12	2028	29.10%	2.8
2038	44.20%	13.3	2038	28.60%	2.9

Figure 12-18: Linsig Analysis Summary PM 2024,2029 & 2039

Junction 5 - Western Relief Road / R613 Ballea Road

For the Design years 2024, 2029,2039 AM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the CWRR in the design year 2039 as can be seen in Figure12-19. The degree of saturation is measured at 75.3% with a mean maximum car queue length of 10.4 vehicles for the morning peak hour 08:15-09:15. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

Junction 5 - CWRR / Ballea Rd					
Ballea Rd			Ballea Rd		
Year	Deg of Sat	Queue	Year	Deg of Sat	Queue
2023	31.80%	4.2	2023	58.60%	7.2
2028	33.60%	4.4	2028	62.10%	7.9
2038	34.70%	6.0	2038	67.80%	10.6
			CWRR		
			Year	Deg of Sat	Queue
			2023	63.50%	5
			2028	70.20%	8.3
			2038	75.30%	10.4

Figure 12-19: Linsig Analysis Summary AM 2024,2029 & 2039

For the Design years 2024, 2029, 2039 PM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the Ballea Road in the design year 2039 as can be seen in Figure 12-20. The degree of saturation is measured at 64.8% with a mean maximum car queue length of 8.2 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

Junction 5 - CWRR / Ballea Rd					
Ballea Rd			Ballea Rd		
Year	Deg of Sat	Queue	Year	Deg of Sat	Queue
2023	29.50%	3.3	2023	57.90%	6.4
2028	37.50%	3.9	2028	60.70%	7.6
2038	48.90%	4.4	2038	64.80%	8.2
			CWRR		
			Year	Deg of Sat	Queue
			2023	47.60%	3.2
			2028	54.00%	4.4
			2038	62.70%	4.7

Figure 12-20: Linsig Analysis Summary PM 2024,2029 & 2039

Junction 7 – Church Road / R612 Crosshaven Road

For the Design years 2024, 2029,2039 AM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the Crosshaven Road R612 in the design year 2039 as can be seen in Figure 12-21. The degree of saturation is measured at 104.3% with a mean maximum car queue length of 50.6 vehicles for the morning peak hour 08:15-09:15. For full Linsig results see Appendix 12C of this Chapter (which can be found in Appendix G of this EIAR).

			Arm A		
			Cork Road R612		
Church Rd			Year	Deg of Sat	Queue
Year	Deg of Sat	Queue	2023	88.00%	24.4
2023	88.00%	15.6	2028	94.90%	30.1
2028	94.90%	19.5	2038	102.80%	45.8
2038	102.50%	28.8			
Church Rd			Church Rd		
Arm D			Arm B		
			Church Rd		
			Year	Deg of Sat	Queue
Crosshaven Road R612			2023	73.30%	10.1
Year	Deg of Sat	Queue	2028	79.20%	11.4
2023	89.30%	24.8	2038	85.90%	13.3
2028	96.60%	32.2			
2038	104.30%	50.6			
			Crosshaven Road R612		
			Arm C		

Figure 12-21: Linsig Analysis Summary AM 2024,2029 & 2039

For the Design years 2024, 2029,2039 PM scenarios, the LinSig traffic analysis shows that the maximum degree of saturation increases over time. The maximum degree of saturation occurs on the Cork Road in the design year 2039 as can be seen in Figure 12-22. The degree of saturation is measured at 92.6% with a mean maximum car queue length of 27.1 vehicles for the evening peak hour 17:15-18:15. For full Linsig results see Appendix C of this Chapter (which can be found in Appendix G of this EIAR).

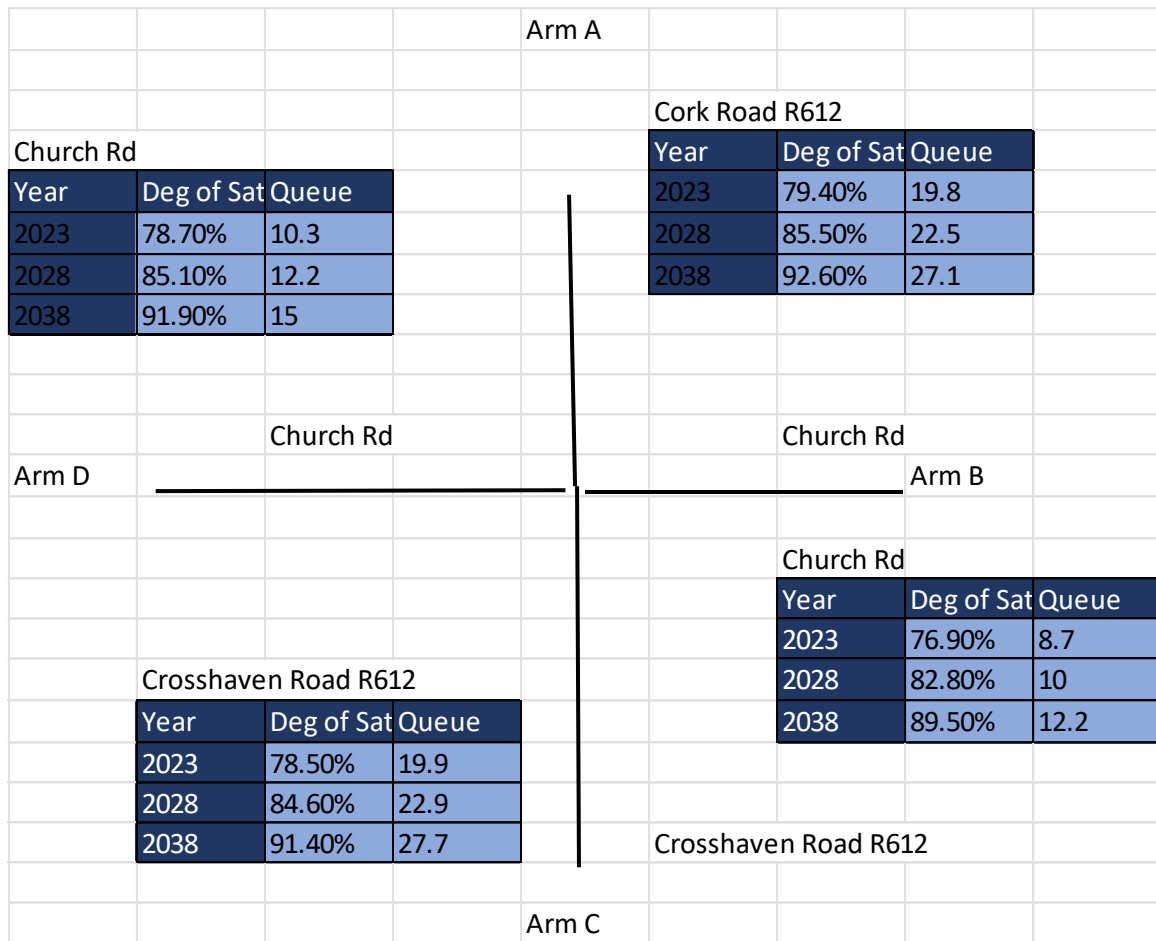


Figure 12-22: Linsig Analysis Summary PM 2024, 2029 & 2039

12.1.5.2 Arcady Roundabout Analysis

Junction 6 – Roundabout Cork Road R611 / Ballea Road R613

In order to assess the capacity of the roundabout junction, Arcady traffic analysis software by TRL was used. Arcady is a computer software program dealing with capacities, mean max queue lengths (pcu) and delays at roundabout junctions. The output result sheets from the software consist of tables of demand flow, capacities, queues and delays for the morning and evening peak hour analysis, for each arm of the junction. These tables contain start and finish times for each arm, traffic demand, Ratio of Flow to Capacity (RFC), start queue length and queuing delay. The RFC provides the basis for judging the acceptability of roundabout junction design and the capacity of existing junctions. Generally, an RFC of 85% or less for roundabout junctions is considered acceptable during the peak period for priority junctions. An RFC of this value would indicate that at peak times the junction is at 85% of its operational capacity and therefore has a practical reserve capacity of 15%. This reserve capacity of 15% is considered by traffic engineers to be the level of reserve capacity at a junction required to cater for periods of unusually high traffic flows, such as bank holiday weekends, public entertainment, and sporting events etc.

The existing roundabout junction is operating within capacity in the base year 2018 for the morning peak hour. The Arcady traffic analysis shows that the maximum degree of saturation increase over time. The maximum degree of saturation occurs on Arm C Main Street for the

design year 2039 as can be seen in Figure 12-23. The degree of saturation is measured at 70.80% with a mean maximum car queue length of 2.4 vehicles for the morning peak hour 08:15-09:15. For full Arcady results see Appendix 12D of this Chapter (which can be found in Appendix G of this EIAR).

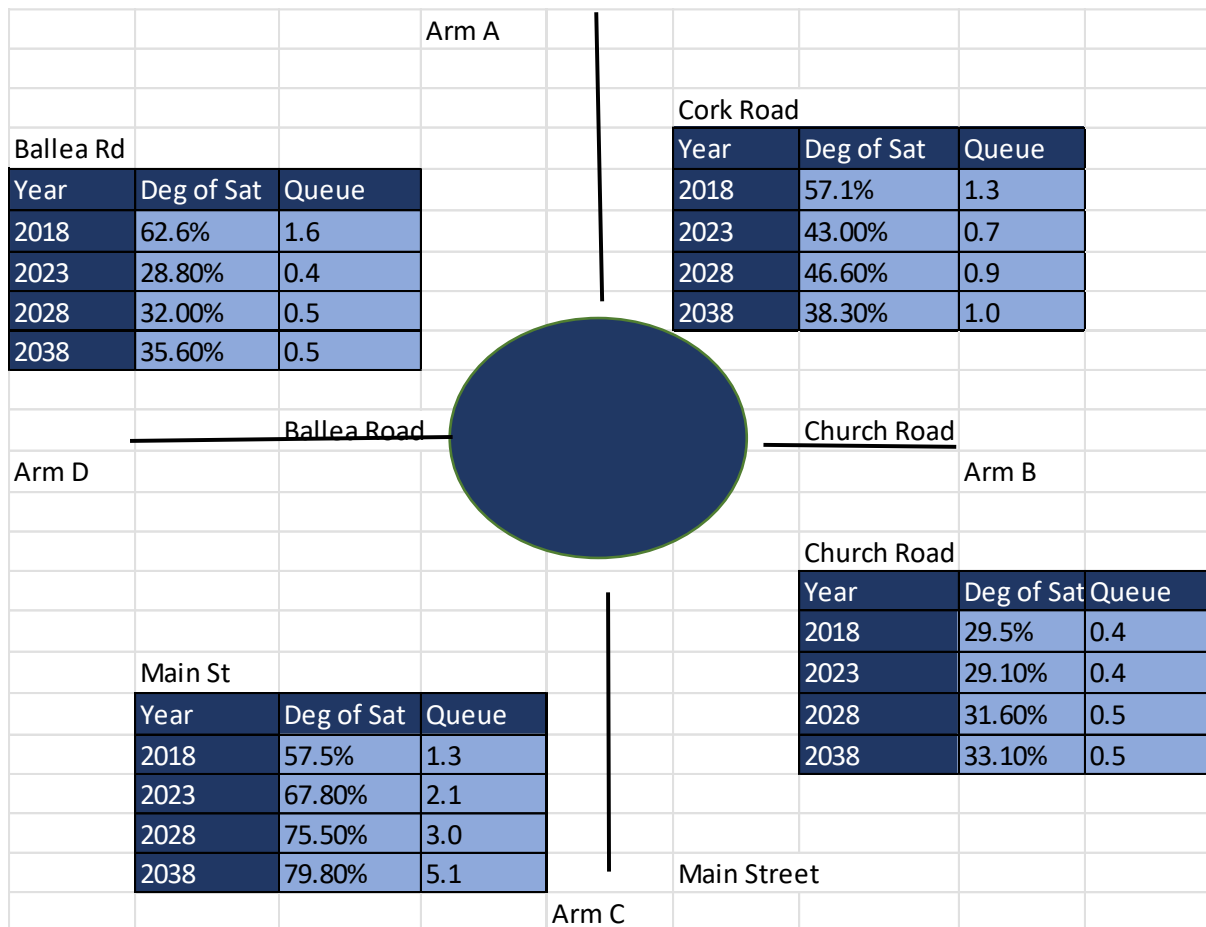


Figure 12-23: Arcady Analysis Summary AM 2024, 2029, 2039. Roundabout Junction of Ballea Road /

The Arcady traffic analysis shows that the maximum degree of saturation increases over time for the design years 2024, 2029 & 2039. The Arcady traffic analysis shows that the maximum degree of saturation occurs on Arm D Ballea Road as can be seen in Figure 12-24. The degree of saturation is measured at 79% with a mean maximum car queue length of 3.3 vehicles for the evening peak hour 17:15-18:15. For full Arcady results see Appendix 12D of the Traffic and Transport Chapter (which can be found in Appendix G of this EIAR).

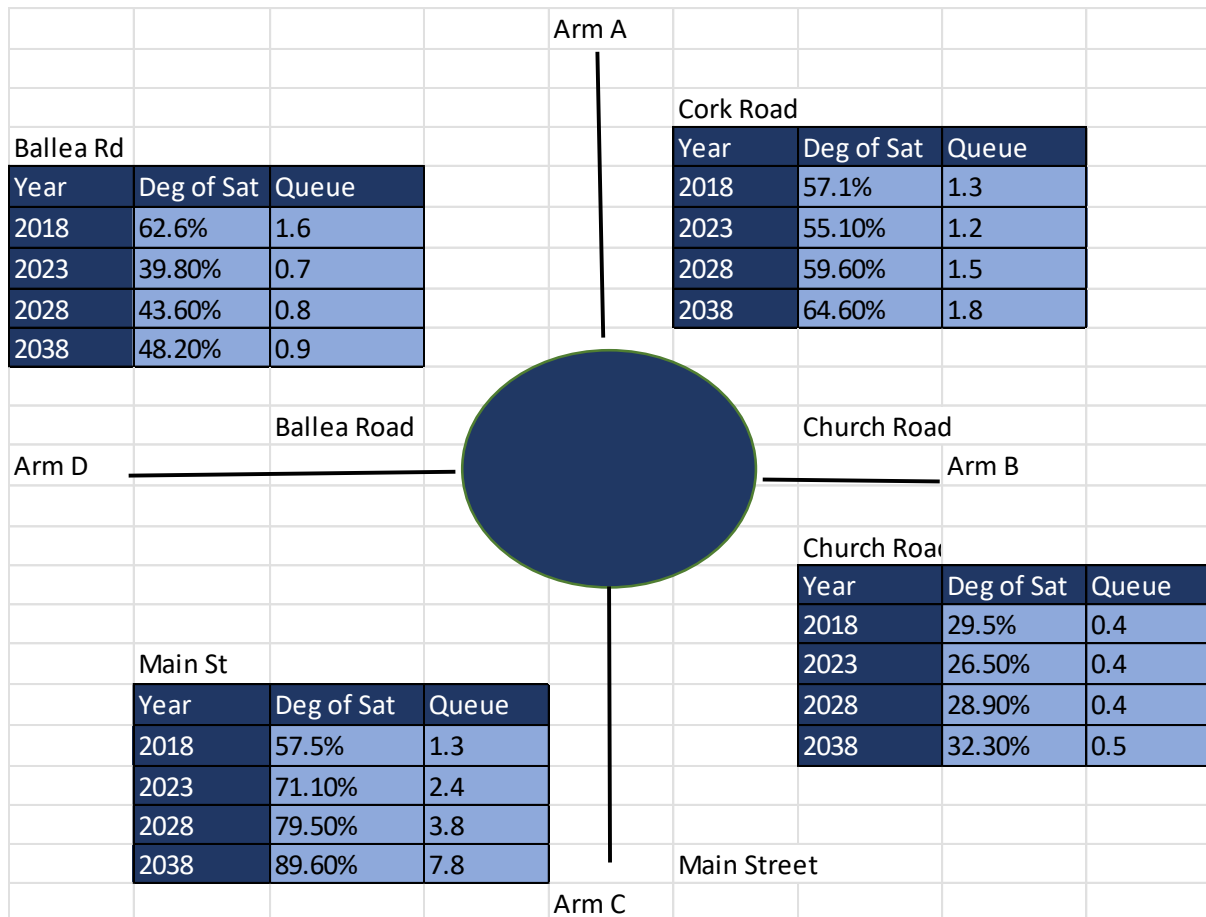


Figure 12-24: Arcady Analysis Summary PM 2024,2029,2039. Roundabout Junction of Ballea Road / Cork Road

12.1.5.3 Construction Phase

The standard working hours for all the construction activity will be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 13:00 Saturdays. Road construction traffic passing through Carrigaline will be instructed do so outside the morning and evening peak traffic times, where possible.

All site personnel will be required to wear project notification labelling on high visibility vests and head protection so that they can be easily identified by all workers on-site. It is expected that 50 workers will be working directly on the construction of the houses and the Link Road depending on activities.

Provision will be made for on-site parking. Worker’s parking along the CWRR and public roads will not be permitted by site management.

Some workers will car pool, so it is estimated that up to 25 cars / vans will access the site. These will generate additional traffic movements mainly at morning, lunch, and evening. This will not place an undue pressure on the local road system.

The construction stage traffic has been estimated based on the amount of material to be removed from the site, material imported to site, extent of the construction processes, plant deliveries and labour all with respect of the likely construction period.

It is proposed that all construction traffic accesses the site through a main access of the CWRR. This will accommodate all construction stage plant, material, and site offices. It will function as a site compound and storage area for earthworks and material during the construction stage.

Sightlines will be provided, as required for the public road design speed.

During the Construction Phase it is predicted that a low volume of rock and soil will be disposed of from site and fill materials imported. It is estimated that over the entire construction period that 2 HGVs and 25 Cars/LGVs are expected to travel to and from the site each working day.

<u>ROAD CONSTRUCTION TRAFFIC LEVEL</u>	Construction Traffic Peak Daily Traffic (Veh/Day)
HGVs:	2
<u>Construction Workers & LGVs</u>	<u>25</u>
Total:	27 (Veh/Day)

12.1.5.4 Operational Phase

The TRICS database was used to calculate the trip generation for this development. TRICS is a well-established UK and Irish national database which holds in excess of 2,100 site locations and 4,700 survey counts with over 98 separate land use sub-categories. The TRICS program was used to estimate the number of car trips that would be generated by this development during the morning and evening peak hours. Table 12-25 shows the total number of trips generated during the peak hours for the Proposed Development. The output sheets from TRICS can be seen in Appendix 12B of the Traffic and Transport Chapter (which can be found in Appendix G of this EIAR).

Table 12-25: Trip Generation from Proposed Development Operational Phase

Mixed Use Development, Carrigaline		AM ARRIVAL 08:15-09:15	AM DEPARTURES 08:15-09:15	PM ARRIVAL 17:15-18:15	PM DEPARTURES 17:15-18:15
202 Apartments	per unit	0.047	0.224	0.187	0.047
	No.	202	202	202	202
	Trips	9	45	38	9
22 Townhouses	per unit	0.15	0.37	0.41	0.26
	No.	22	22	22	22
	Trips	3	8	9	6
Food Retail Including 2No small retail units 3,158 sqm	per 100sqm	3.571	2.345	6.385	6.908
	No.	31.58	31.58	31.58	31.58
	Trips	113	74	202	218
Childcare 184 sqm	per 100sqm	2.000	1.778	1.000	3.900
	No.	1.84	1.84	1.84	1.84
	Trips	4	3	2	7
		AM ARRIVAL	AM DEPARTURES	PM ARRIVAL	PM DEPARTURES
TOTAL TRIPS PEAK HOURS		129	131	250	241

Cork County Council Development Plan 2022-2028 gives guidance on car parking standards for new developments. Table 12.6 of the Plan sets the car space allocation for various types of development including apartments. Table 12.26 shows a schedule of car parking spaces as set out by the Development Plan.

Table 12-26: schedule of car parking spaces as set out by the Development Plan.

Land Use Category	Cork County Development Plan 2022-2028 Car Parking Requirement	Total Spaces Per Unit	Total Units	Spaces required
Apartment 202No Townhouses 22No	1.25 spaces per Apartment	1.25	202	253
	2.0 spaces per Townhouse	2	22	44
Food Retail Including 2No small retail units 3,158sqm	1 space per 20sqm	1	158	158
Childcare 184 sqm 10 staff	1 space per 3 staff	1	3.33	3
	+ 1 space per 10 children	1	1	1
Total			386	459

The design and layout of the car park is mindful of ensuring that the space provides a safe and efficient environment and is convenient for all those who use it. It is intended that all parking for the development will be facilitated within the site, in the basement and a small number at surface level.

The total number of parking spaces provided will be 255 spaces for the proposed residential and commercial development including 245 internal and 10 external spaces. The parking provision in the development plan is considered to be a maximum and given the proximity of

the good Bus services as well as the proximity of the proposed Development to centre of Carrigaline this level of parking is considered to be adequate.

All car parking spaces are required to be a minimum 2.4m x 4.8m in size. According to the Development Plan 5% of car parking spaces provided will be suitable for use by disabled persons for non-residential developments. 10% of car parking spaces provided should be set aside for parent and child car parking in non-residential developments. One motorcycle space should be provided for every ten car parking spaces. 10% of car parking spaces provided should be set aside for battery powered vehicles with fast charging outlets.

This is equivalent to 13 disabled parking bays. Parking bay widths suitable for people with disabilities will be a minimum of 3.0 m wide and 4.9m in depth.

12.1.5.5 Potential Cumulative Impacts

A comprehensive list of proposed planning applications within the vicinity of the Proposed Development is presented in Table 12-27.

Table 12-27: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part Planning 8	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	<p>The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence.</p> <p>The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians, cyclists and vehicular traffic).</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
217464	Aldi Stores (Ireland) Ltd	<p>On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.</p>	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
214818	Ruden Homes Ltd	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.</p>
205230	Barry Collins (Supermarket) Ltd	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
196065	Athena Private Assets Ltd	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.”</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.</p>
194642	Piton Properties Ltd	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>“Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.”</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

12.1.5.6 “Do Nothing” Impact

The traffic model were also prepared for the Do-Nothing scenario. In general, if the Proposed Development were not to proceed the traffic capacity of the junction in close proximity to the Proposed Development would see an 7.7% increase in operation capacity in the design year 2039 for the morning peak hour. This increase would dissipate for the junctions further removed for the Proposed Development.

In general, if the Proposed Development were not to proceed the traffic capacity of the junction in close proximity to the Proposed Development would see an 21.3% increase in operation capacity in the design year 2039 for the evening peak hour. This increase would dissipate for the junctions further removed for the Proposed Development.

12.1.6 Avoidance, Remedial & Mitigation Measures

12.1.6.1 Construction Phase

During the construction phase the appointed Works Contractor on site will be responsible for the planning, design, implementation, maintenance and removal of traffic safety and management measures required in order to facilitate and complete the works. The closure of the any roads to traffic during the works period will not be permitted.

The Contractor should be aware that during working hours it is a specific requirement of the Contract that STOP/GO under the control of flagmen be employed for traffic management operations. Two-way traffic should be provided at all times with STOP/GO only permitted during peak hour traffic periods, between 07.00-09.00 in the AM peak traffic period and between 16:30-18:00 in the PM peak period.

The Contractor will notify all businesses within the extent of the Works of the start date and duration of the Works through a letter/email drop 2 weeks in advance of the start date. Further information leaflets will be issued at monthly intervals throughout the duration of the Works or as may be required to advise of any interference with access.

During the construction phase the appointed Works Contractor will comply at all times with the requirements of the Department of the Environment Chapter 8 -Traffic Signs Manual, Temporary Traffic Management Design Guidance, Temporary Traffic Management Operations Guidance, Temporary Traffic Measures and Signs for Roadworks and also the Guidance for the Control and Management of Traffic at Road Works (Second Edition, 2010) prepared by the Local Government Management Services Board and any additional requirements detailed in the Design Manual for Roads and Bridges.

The design and implementation of Traffic Safety and Management measures will be conducted by a Traffic Management Design Specialist appointed by the Contractor.

12.1.6.2 Operational Phase

During the operational phase of the project the Mobility Management Plan (MMP) for the project will evolve over time and depends upon ongoing implementation, management, and monitoring. Its successful implementation requires organisational support, an internal Mobility Manager and financial resourcing. To implement the MMP the following inputs will be required:

- Management Company support and commitment.
- A Mobility Management Plan manager as the plan coordinator.
- A steering group to oversee the plan.
- Working groups on various related issues.
- Consultations with development occupants and external organisations.

To secure effective results from any initial sustainable travel investment, it is imperative to obtain the agreement of all the stakeholders and the support of external partners, such as the Local Authority, public transport operators, etc.

Ideally, the Mobility Management Plan will be managed by a Mobility Management Plan manager or Mobility Management Plan coordinator with the clear mandate to implement and evolve the plan. The Mobility Management Plan manager will also be best suited to monitor the results of the plan. This role may for example be performed by a member of the development Management Company. Travel surveys of staff (and of visitors, if practicable) should be carried out in the early stages and repeated annually, to monitor the initial success of the Mobility Management Plan and to gain a better understanding of travel habits. These survey results can also serve as a sustainable travel performance benchmark to indicate how the Mobility Management Plan is performing in comparison to previous years and against the sustainable travel targets initially outlined in the plan.

12.1.6.3 “Worst Case” Scenario

The Proposed Development will generate trips as outlined in section 12.1.4.1 of this Chapter. As outlined in section 12.1.4.2 the expected modal split has been assumed to remain as it is at present with no increase in modal shift towards more sustainable transport patterns. This is the worst-case scenario from a traffic analysis perspective.

12.1.7 Residual Impacts

12.1.7.1 Car Parking

Cork County Council Development Plan 2022-2028 gives guidance on car parking standards for new developments. Table 12.6 of the Plan sets the car space allocation for various types of development including apartments.

Table 12.26 shows a schedule of car parking spaces as set out by the Cork County Development Plan.

The design and layout of the car park is mindful of ensuring that the space provides a safe and efficient environment and is convenient for all those who use it. It is intended that all parking for the development will be facilitated within the site, in the basement and a small number at surface level.

The total number of parking spaces provided will be 255 spaces for the proposed residential and commercial development including 245 internal and 10 external spaces. The parking provision in the development plan is considered to be a maximum and given the proximity of the good Bus services as well as the proximity of the proposed Development to centre of Carrigaline this level of parking is considered to be adequate.

All car parking spaces are required to be a minimum 2.4m x 4.8m in size. According to the Development Plan 5% of car parking spaces provided will be suitable for use by disabled persons for non-residential developments. 10% of car parking spaces provided should be set aside for parent and child car parking in non-residential developments. One motorcycle space should be provided for every ten car parking spaces. 10% of car parking spaces provided should be set aside for battery powered vehicles with fast charging outlets.

This is equivalent to 13 disabled parking bays. Parking bay widths suitable for people with disabilities will be a minimum of 3.0 m wide and 4.9m in depth.

12.1.8 Monitoring

12.1.8.1 Construction Phase

No specific monitoring of traffic is proposed during the construction phase.

12.1.8.2 Operational Phase

No specific monitoring of traffic is proposed during the operational phase.

12.1.9 Interactions

12.1.9.1 Population and Human Health

During the Construction Phase there will be an increase in traffic movements. It is estimated that over the entire construction period that 2 HGVs and 25 Cars/LGVs are expected to travel to and from the site each working day. Mitigation measures are outlined in Chapter 8 Air Quality and Chapter 12.1 Traffic to ensure there will be no significant impacts on Population and Human Health as a result of traffic.

12.1.9.2 Air Quality and Climate

There can be a significant interaction between air quality, climate and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect Air Quality and Climate have been deemed as insignificant. Therefore, the impact of the interaction between air quality and climate is insignificant.

12.1.9.3 Material Assets: Waste and Utilities

Collection of waste materials at the Proposed Development have the potential to impact upon traffic movements in the Carrigaline area during the Construction and Operational Phases. Potential impacts on traffic are addressed in Chapter 12, Section 12.1.

12.1.10 Difficulties Encountered

One issue that arose during the compiling of the traffic data was the issue of the Covid 19 restrictions on traffic movements. It was agreed following discussions with Cork County Council Transport Department, that historic counts from 2018 (i.e., pre pandemic) would be used. These counts were supplied by Cork County Council for traffic count undertaken on 1st May 2018.

Traffic counts were also undertaken by Traffinomics Ltd. on Thursday 16th September 2021 for the morning peak hours of 07:30 - 09:30 and the evening peak hours of 16:30-18:30.

Counts were undertaken at the junctions of Main Street R611 / Church Hill Junction and Ballee R613 / Nova Court Housing Development. These counts were only used for comparative purposes. Full traffic count data can be found in Appendix 12A of this Chapter (which can be found in Appendix G of this EIAR).

12.1.11 References

Cork County Council Development Plan 2022-2028 (Draft)

Cork County Council Development Plan 2014.

Transport Infrastructure Ireland (2014) Traffic and Transport Assessment Guidelines TII, Dublin

Institution of Highways & Transportation (1994) Guidelines for Traffic Impact Assessment IHT, London

Transport Infrastructure Ireland (revised 2015) Design Manual for Roads and Bridges TII, Dublin

TRICS – A Trip Generation Database for Development Control, JMP, London

Transport Infrastructure Ireland (November 2004) Draft Traffic and Transport Assessment Guidelines TII, Dublin

Transport Infrastructure Ireland Project Appraisal Guidelines TII, Dublin 2010

Department of Tourism Transport and Sport “Design Manual for Urban Roads and Streets” (DMURS - 2013) DTTaS, Dublin

National Transport Authority “National Cycle Manual” (NCM - 2011) NTA, Dublin

12.2 Waste and Utilities

12.2.1 Introduction

Material assets have been defined as ‘Resources that are valued and that are intrinsic to specific places, they may be either human or natural origin and the value may arise for either economic or cultural reasons’ (EPA 2002).

This definition was further expanded by the EPA in 2022 in ‘*Guidelines on the information to be contained in Environmental Impact Assessment Reports*’ which states:

“In Directive 2011/92/EU this factor (material assets) included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils.”

The scope and definition of Material Assets within the context of the EIA process has been defined by the EIA Directive as including Architectural and Archaeological Heritage or Cultural Heritage. These elements are assessed separately in Chapter 11 under Archaeology & Cultural Heritage.

This section of Chapter 12 of the Environmental Impact Assessment Report (EIAR) provides an assessment of the potential impacts of the Proposed Development on Material Assets or physical resources in the environment of human origin including built services and infrastructure comprising:

- Electricity,
- Telecommunications,
- Gas,
- Water Supply and Demand,
- Surface Water Drainage,
- Wastewater Management, and
- Waste Management

Natural resources (water, land, biodiversity, air etc) are addressed in their respective Chapters. The Building Life Cycle Report produced by Aramark, and included in this EIAR as Appendix H, provides details of the raw materials to be used as building materials for the Proposed Development.

This Chapter was prepared by Enviroguide Senior Environmental Consultant Nikita Coulter. Nikita Coulter has a B.Sc. in Zoology (Hons) from University College Dublin, an M.Sc in Biodiversity and Conservation and a Postgraduate Diploma in Environmental Engineering from Trinity College Dublin, and a NEBOSH accredited International Diploma in Environmental Risk Management. Nikita has 8 years professional experience as an Environmental Compliance Specialist.

12.2.2 Study Methodology

The methodology adopted for the assessment takes cognisance of the relevant guidelines the following:

- Environmental Protection Agency (EPA) (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR)
- Environmental Protection Agency (EPA) (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR) - DRAFT
- EPA (2003) Advice Notes on Current Practice in the preparation of Environmental Impact Statements.
- 41EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements.

The scope of work undertaken for the assessment included a desk-based study of material assets, namely built services, utilities and infrastructure associated with the existing site and the Proposed Development. All phases of the Proposed Development were considered in the assessment of potential impacts on material assets.

Information on built assets in the vicinity of the Site of the Proposed Development was assembled by the following means:

- A desktop review of ESB Networks Utility Maps, Irish Water Utility Plans, Gas Networks Ireland Service plans, EIR E-Maps, Engineering Services Report, Site Specific Flood Risk Analysis, Construction and Demolition Waste Management Plan, Operational Waste Management Plan and Building Life Cycle Report.

Assessment of the likely impact of features of the Proposed Development, including surface water runoff, foul water discharge and water usage was carried out in accordance with the following guidelines:

- IS EN752, "Drain and Sewer Systems Outside Buildings".

12.2.2.1 Prediction and Assessment of Impacts

Impacts were predicted and assessed based on the Impact Assessment guidance detailed in the EPA's 2022 document, *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* and by using the definitions detailed in Tables 12-1 to 12-5. Impacts will vary from negative to neutral or positive, and also will vary in significance on the receiving environment. The terminology and methodology used for assessing the impact significance and corresponding effects throughout this chapter are described in Table 12-28 to 12-32. Where significant potential impacts were identified, mitigation measures are proposed to minimise impacts.

Table 12-28: Terminology used to assess the quality potential impacts & effects

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment.
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment.

Source: EPA, 2017

Table 12-29: Terminology used to assess the significance of potential impacts & effects

Significance of Effects / Impacts	Definition
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	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 baseline 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 a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

Source: EPA, 2017

Table 12-30: Terminology used to assess the duration of potential impacts/effects

Duration of Effects / Impacts	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

Source: EPA, 2017

In line with the EPA Guidelines (EPA, 2017), the terms in Table 12-31 are defined when quantifying the extent and context of effects, and the terms in Table 12-32 are defined when quantifying the probability of effects.

Table 12-31: Definition of the Extent and Context of Effects

Quality	Definition
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?)

Source: EPA, 2017

Table 12-32: Definition of the Probability of Effects

Quality	Definition
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Source: EPA, 2017

Figure 12-25 (extracted from the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022) shows how the character of the predicted impact in relation to the sensitivity of the receiving environment can determine the significance of the impact.

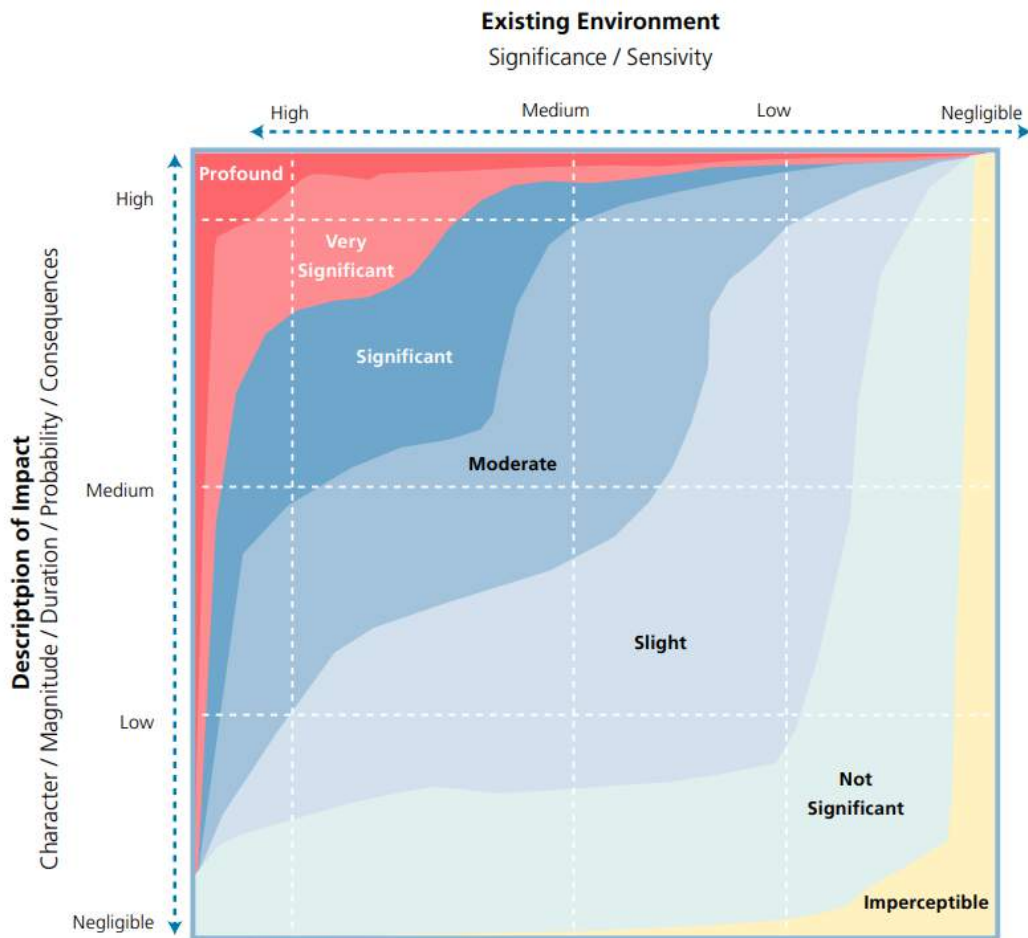


Figure 12-25 Chart showing typical classifications of the significance of impacts (EPA, 2022, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports)

12.2.3 The Existing and Receiving Environment (Baseline Situation)

12.2.3.1 Site Location

The Proposed Development is located in the townland of Kilmoney within the town of Carrigaline which is identified as a 'Metropolitan Town' in the Bandon Carrigaline Municipal District Local Area Plan 2017. The Proposed Development Site is situated to the west of the Carrigaline town centre and approximately 10km southeast of Cork City Centre. The site lies to the south of the N28 Cork to Ringaskiddy route. The total site area comprises 3.7 hectares and has a sloped topography. There is a net developable area of 1.9 hectares.

Figure 12-26 and Figure 12-27 detail the Site Location and the Site Layout respectively.

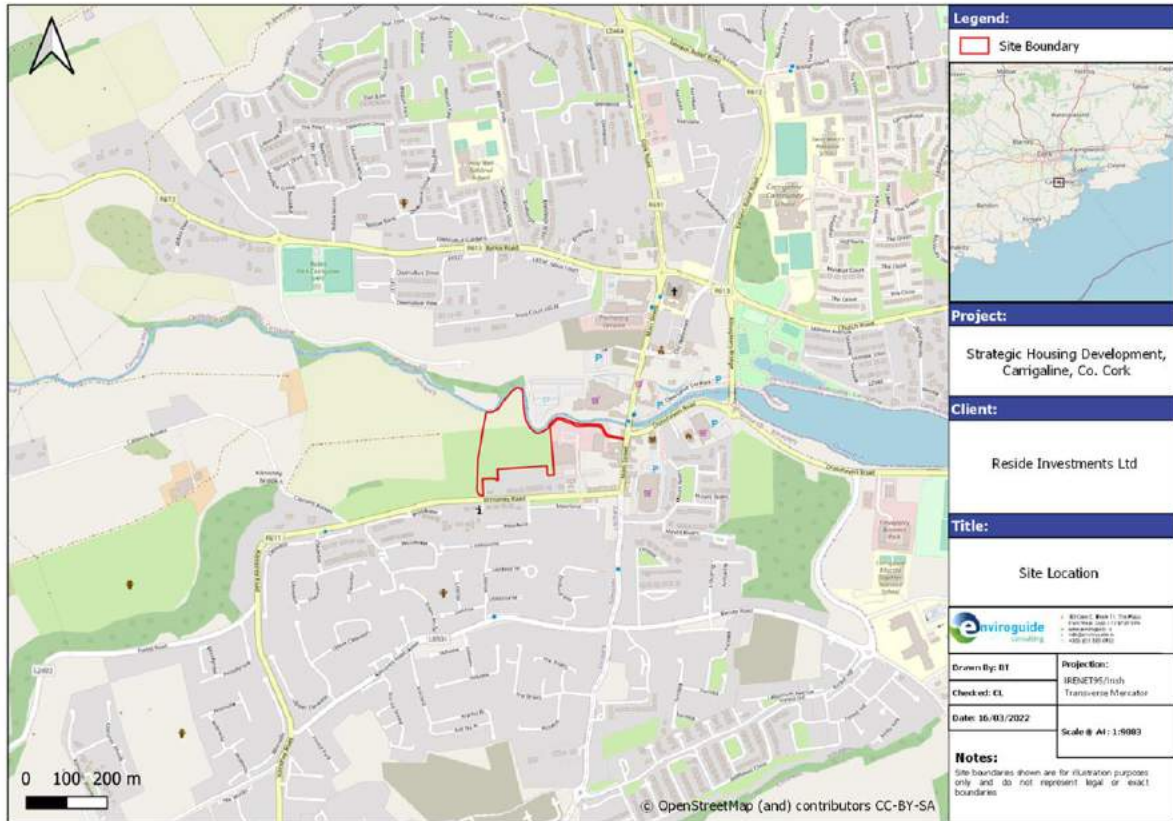


Figure 12-26: Site Location Map

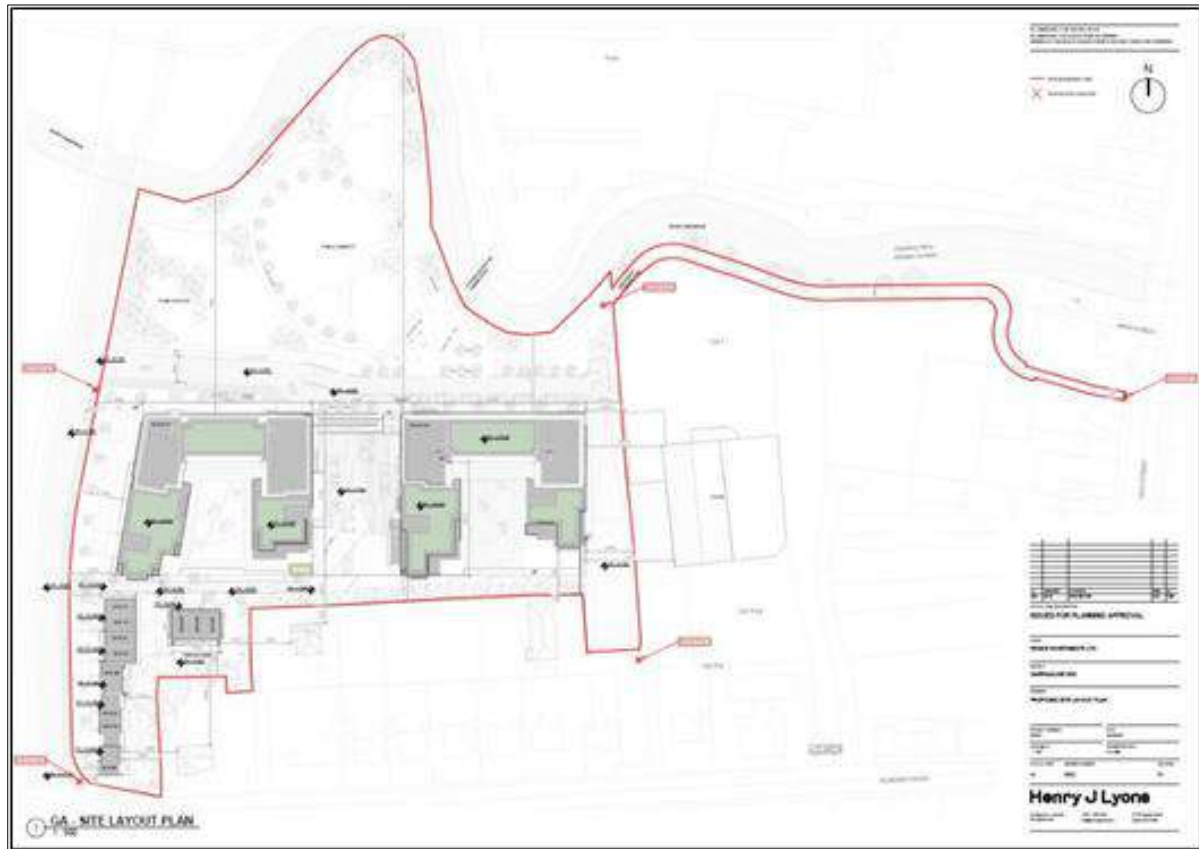


Figure 12-27: Site Layout Plan

12.2.3.2 Land Use History

Historical mapping and aerial photography available from the Ordnance Survey of Ireland website (OSI, 2022) were reviewed and key observations on-site and off-site are summarised in Table 12-33.

Table 12-33: Historical Land Use

Date	Information Source	Site Description
1837-1842	OSI map 6inch	<p>On-site: The Proposed Development Site is shown as open fields which are divided by field boundaries. The Owenboy River is mapped bounding the northern boundary of the Proposed Development Site and a local roadway is shown bounding the southern boundary and along the eastern site entrance.</p> <p>Off-site: The surrounding land-use is shown as open fields divided by field boundaries to the south, north and west of the Proposed Development Site. A number of residential buildings are mapped located immediately east of the Proposed Development Site.</p>
1888-1913	OSI map 25inch	<p>On-site: No significant change</p> <p>Off-site: Two quarries, which are mapped as “disused” are shown approximately 0.44km and 0.55km north of Proposed Development Site.</p>
1830-1930	OSI Cassini map 6inch	<p>On-site: No significant change</p> <p>Off-site: Lands located immediately south-east of the Proposed Development Site are mapped as occupied brick buildings.</p>
1995	OSI Aerial photography	<p>On-site: The site is shown as an agricultural field with no field boundaries.</p> <p>Off-site: Lands located north of the Owenboy River and to the east and south of the Proposed Development Site have been developed with mixed residential and commercial land use.</p>
2000	OSI Aerial photography	<p>On-site: No significant changes</p> <p>Off-site: No significant changes</p>
2005	OSI Aerial photography	<p>On-site: No significant changes</p> <p>Off-site: No significant changes</p>
2005-2013	OSI Aerial Photography	<p>On-site: No significant changes</p> <p>Off-site: No significant changes</p>
2021	Google Maps Photography	<p>On-site: No significant changes</p> <p>Off-site: No significant changes</p>

12.2.3.3 Immediate Surroundings

The site of the Proposed Development is situated towards the southwest of the designated Carrigaline Town Centre zone. The Site is bounded to the north by Owenabue River and mature trees and hedgerows, to the east by the Dairygold Co-op Superstore and associated car park, to the south by a number of detached bungalows with the Kilmoney Road beyond, and to the west by the Inner Western Relief Road (IWRR) (due to be complete in May 2022) and agricultural fields.

The site is within easy walking distance of a number of commercial and community facilities including local shops, churches and schools. Access to the Site is via the IWRR and the Kilmoney Road which runs to the south of the Site.

The IWRR has unlocked the development potential of the lands lying to the West of the main street in Carrigaline, which have remained largely underdeveloped while the town has expanded north toward Cork City and to the East towards the harbour. The IWRR defines the western edge of the town centre. Further to the west lies the flood plain for the Owenabue River and lands zoned for Open Space / Amenity (*Building Height Rationale, Henry J Lyons, 2022*).

12.2.3.4 Electricity Supply

12.2.3.4.1 Local Supply & Grid Connection

The electricity supply grid infrastructure on the island of Ireland is owned and maintained by ESB Networks and operated on a day-to-day basis by EirGrid. The grid today comprises of two types of networks, transmission lines which carry very large amounts of electricity long distances connecting power stations to local transformer stations and local distribution grids which carry electricity from the transformer stations into individual consumers' premises.

The closest 220 kV transmission system is situated, 2.3km northeast of the site of the Proposed Development at the Raffeen Electrical Substation, Raffeen Co. Cork. Carrigaline 38kV transformer substation is situated 1.85km northeast of the Site, and Kilmoney 38kV transformer substation is located 1.25km west of the Site.

12.2.3.4.2 Onsite Supply and Consumption

The site is currently greenfield and there is currently no onsite consumption or use of electricity.

12.2.3.5 Gas Supply

Gas Networks Ireland builds, develops and operates Ireland's gas infrastructure, maintaining over 14,521 km of gas pipelines and two sub-sea interconnectors. Gas Networks Ireland is responsible for connecting all new gas customers to the network, and for work on service pipes and meters at customers' premises, on behalf of all gas suppliers in Ireland.

The Gas Networks Ireland map indicates that connections to the natural gas network are available in the Kilmoney area.

The site is currently greenfield and there is currently no onsite consumption or use of natural gas.

12.2.3.6 Information and Communications Technology (ICT)

Eircom uses underground ducts and overhead poles for its services. Other operators in the market can have their fibre cable carried in Eircom's existing infrastructure to provide broadband for their customers.

National Broadband Ireland was set up by the Irish Government to facilitate the roll out of fibre broadband across Ireland. The Department of the Environment, Climate and Communications have developed an interactive map which details the progress of the rollout of the National

Broadband Plan. The High-Speed Broadband map identifies locations and premises as amber or blue and the map is updated on a quarterly basis. Amber areas depict target areas for the State intervention of the National Broadband Plan. Blue areas indicated that commercial operators have installed or are in the process of delivering high speed broadband services. The site of the Proposed Development is partially located within a blue area and high-speed broadband is available.

In terms of mobile telecommunication for transmission and reception, the closest mobile communications mast (Eir Mobile) is located at Owenabue Car Park, to the east of Cork Road (R611) approximately 300m east of the Site of the Proposed Development. A large mast hosting antennae for Three, Vodafone, Imagine and Eir is located 500m north-northeast of the Site behind the Intreo Office off the Ballea Road (R613).

The site is currently greenfield and IT infrastructure is not established or in place.

12.2.3.7 Water Supply and Demand

The site of the Proposed Development is greenfield and there is no water supply or demand at present. The site is currently not connected to a municipal water supply, but it is located in a well-serviced area.

12.2.3.8 Local Hydrology and Hydrogeology

The Proposed Development Site is located in the Lee, Cork Harbour and Youghal Bay catchment, the Owenabue [Cork]_ SC_010 sub-catchment and the Owenabue (Cork)_040 river sub-basin. The Owenabue River (EPA code: 19O01), is a 4th order river that runs along the northern boundary of the Proposed Development Site and flows east through the Owenabue estuary until it reaches the mouth of Cork harbour at Rams Head. Water quality monitoring stations (RS19O011000 and RS19O011400) located upstream of the Proposed Development report water quality as being "Moderate-Good" with a Q value score of 3-4 for the most recent monitoring timepoints in 2005 and 2020 respectively. The water quality of the Owenabue Estuary downstream of the Proposed Development was classed as "intermediate" during the latest reporting period 2018-2020.

The Site is located within the Ballinhassig East groundwater body (GWB) (IE_SW_G_004). The GWB covers the majority of the greater Cork City area reaching from Carrigaline in the south to Watergrasshill in the north and extents from Coolcower in the west to Youghal in the east. The main rivers flowing through the GWB are the Rivers Lee, Glashaboy, Owenabue, Bride and Glen. The GWB covers a total area of 1,209 km². The current WFD risk status for this GWB is reported as 'Good', and the groundwater 2013-2018 Risk Status was reported as At Risk (EPA, 2022). The site area is located on a bedrock aquifer that is Classed as Rkd: Locally Important Aquifer – Bedrock which is moderately productive only in local zones with groundwater vulnerability classed as either High or Moderate across the site.

12.2.3.9 On-site Surface Water Drainage

The site is currently greenfield and surface water infiltrates to ground at greenfield rates. An existing 225mm surface water drain runs north from Kilmoney road along the eastern site boundary and discharges into the Owenabue River and ultimately into Cork Harbour.

12.2.3.10 Wastewater Management

The Proposed Development Site is currently a greenfield site and there is currently no existing connection to a public sewer.

12.2.3.11 Waste Management

Cork County Council (CCC) is the local authority responsible for setting and administering waste management activities in the area of the Proposed Development. CCC's waste management activities are governed by the requirements set out in the Southern Region Waste Management Plan (SRWMP) 2015-2021. The Proposed Development Site is currently a greenfield site and has no waste management requirements.

12.2.4 Characteristics of the Proposed Development

12.2.4.1 Description of Development

The Proposed Development will consist of the following:

- The construction of 224 no. residential units consisting of 202 no. proposed apartments in 2 no. blocks, ranging in height from 6 to 7 storeys and 22 no. townhouse/duplex units
- A 184 m² creche/childcare facility
- The provision of landscaping and amenity areas to include 1 no. local play area, 1 no. kick about areas, an activity trail/greenway along the river, a gathering area/amphitheatre with tired seating areas, a civic space/promenade and 2 no. courtyard areas
- The provision of 3 no. retail units, residential amenity and management spaces at ground and first floor level, and
- All associated ancillary development including vehicular access on to the Kilmoney Road Lower, and a cycle/pedestrian connection on to the R611 (via an activity trail/greenway along the river), lighting, drainage, roads boundary treatments, ESB Substation, bicycle & car parking and bin storage.

12.2.4.2 Construction Phase

The duration of the Construction Phase of the Proposed Development will be approximately 18 months. The Construction Phase will include all necessary site clearance and preparation work, site development and construction activities. The location identified for the contractor's site compound is the area immediately northeast of the site. It is envisaged that this area will be utilised for site accommodation and car parking for construction staff. An area for site storage of materials and site laydown has been identified to the northwest of the site.

The Proposed Development will include the requirement for bulk excavation of soil and bedrock for the construction of the apartment blocks and the installation of subsurface drainage infrastructure including for a storm water attenuation tank and other infrastructure, foundations and ancillary works. Excavation of soil and subsoils will be required to an anticipated maximum depth up to 2.0mbGL in order to achieve the proposed levels for the underground utilities and the attenuation tank at the site of the Proposed Development.

12.2.4.3 Operational Phase

The Operational Phase of the Proposed Development will consist of the normal day-to-day operations necessary for the management of residential dwellings, childcare facilities and retail spaces, and the ongoing maintenance of the residential and commercial units and public and communal amenity space.

12.2.5 Potential Impact of the Proposed Development

This section assesses the impact of the Proposed Development on the Material Assets of the surrounding area.

12.2.5.1 Electricity Supply

12.2.5.1.1 Construction Phase

Construction related activities will require temporary connection to the local electrical supply network. The Main Contractor will apply for a power supply from ESB Networks to power both the compound and the construction site. The size of supply will be calculated to ensure it is sufficient to power both the site compounds and construction site activities.

Connecting a new multi-unit housing development to the electricity distribution system must be carried out in accordance with ESB Networks' specifications, and in particular with the guidance provided in the documents ESB Networks National Code of Practice for the Customer Interface Version 5 (2021) and ESB Networks Construction Standards for MV Substation Buildings (2019). The developer must undertake the preparatory work such as installation of ducting and provision of substation plinth or building. Once the preparation work has been completed to a satisfactory standard, ESB Networks will commence installation of the electricity cabling/lines and any other necessary equipment. A temporary suspension of the network locally to facilitate the connection works may be required during the construction Phase, and an additional temporary suspension will also occur when power is provided to the Site of the Proposed Development. These temporary suspensions will be controlled by ESB Networks as the statutory undertaker and in accordance with standard protocols.

The potential impact from the Construction Phase of the Proposed Development on the local electrical supply network is likely to be *negative, slight, and short-term*.

12.2.5.1.2 Operational Phase

Electricity will be required to provide public lighting, domestic lighting, power supply and heating for each individual unit for the Proposed Development. Electric car charging facilities will be provided in the car park in line with Government policy. The ESB Substation will be housed on the ground floor of the apartment block.

A Building Lifecycle Report (*Aramark, 2022*) has been prepared for the Operational Phase of the Proposed Development, which provides details on the mechanical and electrical services that will be installed at the Proposed Development. Air to Water Source Heat Pumps (AWSHP) will be installed in the residential dwellings and will be used for both domestic hot water and domestic heating. All public and amenity lighting will use low energy LED light fittings and be installed in line with Cork County Council specifications. LED light fittings with presence-

detection will also be used throughout circulation areas and will be locally controlled in apartments. Mechanical Extract Ventilation will be installed in order to continually ventilate wet, utility and kitchen areas.

The impact of the Operational Phase of the Proposed Development on the electricity supply network is likely to be to increase demand to the existing supply. The potential impact from the Operational Phase on the electricity supply network is likely to be *neutral, long term and not significant*.

12.2.5.2 Gas Supply

12.2.5.2.1 Construction Phase

There are no gas requirements during the Construction Phase and there will be no connections made to the natural gas network as part of the Proposed Development. As such, the potential impact from the Construction Phase on the gas supply network is likely to be permanently neutral and imperceptible.

12.2.5.2.2 Operational Phase

The Proposed Development will not be connected to the natural gas network. Heat Pumps powered by electricity will be used for space heating and domestic hot water during the Operational Phase. As such, the potential impact from the Operational Phase on the gas supply network is likely to be permanently neutral and imperceptible.

12.2.5.3 Information and Communications Technology (ICT)

12.2.5.3.1 Construction Phase

Connections may be required to the existing ICT network during the Construction Phase of the Proposed Development. New connections will be controlled by the network provider in accordance with standard protocols. Due to the temporary nature of the Construction Phase, the likely effect of the Construction Phase on the local telecoms network will be neutral, imperceptible, and temporary.

12.2.5.3.2 Operational Phase

Microwave transmission links for wireless communications can be obstructed by tall buildings. Cellular towers are typically between 20m-40m tall. As the height of the tallest building in the Proposed Development is approximately 27.2mOD, the likely effect of the height of the buildings on surrounding microwave links is neutral and imperceptible in the long term. The likely effect of the Operational Phase of the Proposed Development on the local telecommunications network is to be a marginal increase in demand. The Site of the Proposed Development is partially located within an area where high speed broadband is available and the closest mobile communications mast (Eir Mobile) is located at Owenabue Car Park, to the east of Cork Road (R611) approximately 300m east of the Site of the Proposed Development. A large mast hosting antennae for Tree, Vodafone, Imagine and Eir is located 500m north-northeast of the Site behind the Intreo Office off the Ballea Road (R613).

The likely effect of the Operational Phase on the local telecoms network will be neutral, and imperceptible in the long term.

12.2.5.4 Water Supply and Demand

It is noted that specific issues relating to Water associated with the Proposed Development are set out in Chapter 7 of this EIAR.

12.2.5.4.1 Construction Phase

Site offices and construction activities will create a demand for water supply to the site. A temporary connection is required to facilitate on-site works for all housing developments. Commencement of construction will therefore result in a net increase in the water demand for the Site of the Proposed Development.

The Proposed Development will be connected to the existing mains water supply subject to agreement from Irish Water who issued a Confirmation of Feasibility (CoF) for the connection on the 31st August 2021, reference number CDS21004834 (*refer to Appendix C of the Engineering Services Report, Horgan Lynch, 2021 which is included in Appendix I of this EIAR*). Within the CoF, Irish Water have confirmed that connection to the existing mains water supply network is feasible without any upgrades to the existing infrastructure. Connections will be made to the new 180mm diameter PE water main on Kilmoney Road on the southern side of the Proposed Development

New connection works may cause water supply disruptions during the Construction Phase. These disruptions will be controlled by Irish Water and Cork County Council in accordance with standard protocols. Due to the nature of the works during the Construction Phase, the likely effect will be *negative, not significant and temporary*.

12.2.5.4.2 Operational Phase

During the Operational Phase of the Proposed Development there will be a demand for water from the public water supply. The mains water supply is operated in accordance with relevant existing statutory consents. Water demand calculations carried out by Horgan Lynch Consulting Engineers (2021) as per Section 3.7.2 of the Irish Water Code of Practice for Water Infrastructure estimate that the Proposed Development will have a water usage demand of approximately 1.27 litres/sec during the Operational Phase. Irish Water have confirmed that, based on a desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, the proposed demand can be facilitated. Excess usage is the consumption of water services above the threshold amount stipulated in the Water Services Act (2017). Water use above the annual household allowance (213m³) is considered to be excessive use and Irish Water customers may be liable for charges on the amount above this level.

The likely effect of the increase in mains water demand will be *neutral, not significant, and long-term* on mains water supply.

12.2.5.5 Water Environment – Hydrology and Surface Water Drainage

It is noted that specific issues relating to Hydrology, Hydrogeology and Surface Water associated with the Proposed Development are set out in Chapter 7 of this EIAR.

12.2.5.5.1 Construction Phase

Surface water currently infiltrates the ground at the Site of the Proposed Development and any excess surface water discharges to the adjacent River Owenabue at greenfield rates. Due

to the proximity of the Site to the River Owenabue, there are several potential pathways for impacts to occur on the water environment during the Construction Phase of the Proposed Development. These include, but are not limited to, the following:

- Dewatering activities (if required) during construction may change the natural hydrological regime of the River Owenabue due to increases in surface and groundwater discharge rates.
- Potential for disrupting local drainage system due to diversions required to accommodate the works.
- Modifications to the hydraulic characteristics of the river through modifications to the channel dimensions during construction of outfalls and culverts, where required.
- Potential for temporary increase in hard standing areas and/or soil compaction during construction works which could result in temporary increased runoff rates.
- The stripping of topsoil and the dewatering of excavations and the storage of excavated material may cause silty water runoff containing high loads of suspended solids.
- Spillage or leakage of fuels/oils/chemicals/wastewater stored on site or from construction machinery may cause contamination of the River Owenabue.
- Increased sediment loading because of silty water runoff or dewatering activities, introducing a sediment plume, potentially leading to the smothering of bed substrate and changes to existing morphological features.

The potential impact from the construction phase on River Owenboy is likely to be *negative*, *short-term* and *moderate* in the absence of mitigation.

12.2.5.5.2 Operational Phase

The Surface Water Drainage Strategy (SWDS) for the Site of the Proposed Development has been prepared by Horgan Lynch Consultants (2022). All surface water generated by the Proposed Development will be collected via 150mm to 375mm uPVC pipes and will discharge via gravity to River Owenabue. Before discharging into the river, all surface water collected in the drainage system will pass through a Class 1 Kingspan Klargestar Bypass Separator - NSBE050, which will be located in the north-eastern portion of the Site adjacent to the River Owenabue, to capture hydrocarbons prior to discharge to the river.

The surface water drainage system will be attenuated, and the maximum permitted surface water outflow will be restricted to greenfield run-off rates, thereby managing any increase in runoff to the River Owenabue. Hydrobrake flow control will be placed on the outfall of Manhole SMH 05C, limiting flow to of 8.6l/s. The network will be designed to cater for 20% climate change and 1 in 100-year return period to ensure that flooding does not occur. The resulting design requires 600m³ of attenuated storage which will be located under the covered car park area which is located outside the flood plain. The Proposed Development will also incorporate green roofs, which slows down the flow of water from the roofs and therefore the time taken for the run-off from the roof into the storm network increases allowing the runoff from the paved areas at ground level to enter the system and discharge to the river. A head wall detail and non-return valve will be constructed as part of the outfall detail to the river. (*Engineering Services Report, Horgan Lynch, 2021*)

It is considered that the design of the Proposed Development including the implementation of green roofs, an underground attenuated storage tank, Hydrobrake flow control and an oil/water

separator are in line with the objectives of the Water Framework Directive (2000/60/EC) and the net runoff volume from the Site will therefore remain unchanged. Overall, the likely effect of the surface water drainage strategy for the Proposed Development will result in a *neutral, imperceptible, long-term* impact on receiving surface water quality.

12.2.5.6 Wastewater Management

12.2.5.6.1 Construction Phase

A temporary connection is required to facilitate on-site works for all housing developments. Commencement of construction will therefore result in a net increase in the foul water produced at the Site of the Proposed Development. The Main Contractor will carry out a site survey to identify the locations of the water and foul drainage connections to the Site. It will be the Main Contractor's responsibility to apply to Irish Water for connections to the water main and foul drain, ideally utilising existing connections to service the site toilets and canteen facilities during the Construction Phase.

Irish Water issued a Confirmation of Feasibility (CoF) for the Proposed Development on the 31st of August 2021, reference number CDS21004834 (*refer to Appendix C of the Engineering Services Report, Horgan Lynch, 2021 which is included in Appendix I of this EIAR*). The CoF notes that the feasibility of the wastewater connection is subject to the completion of the pumping station and rising main on the northern side of the development to be completed as part of the Carrigaline Inner Western Relief Road (Planning Permission Reference: Cork County Council 194642; permission was granted to Piton Properties Ltd on 27.07.2019). This infrastructure is not being provided by Irish Water so the programme for this project is not under the control of Irish Water. It will be required to get permission from the owner of these assets to connect. The developer must obtain and provide full details of new Pump Station at the connection application stage.

Foul water sewers will be constructed strictly in accordance with Irish Water requirements. No private drainage will be located within public areas. Drains will be laid to comply with the requirements of the latest Building Regulations, and in accordance with the recommendations contained in the Technical Guidance Document H.

Due to the temporary and phased nature of the Construction Phase the likely effect of the Proposed Development on the existing foul water network during this phase is considered to be *negative, slight and temporary*.

12.2.5.6.2 Operational Phase

The foul drainage from the Proposed Development will be collected by a gravity foul system, which will discharge directly to the proposed new pumping station on the Site of the Proposed Development. The network will consist of 150mm to 225mm diameter uPVC pipes laid to falls ranging from 1 in 60 to 1 in 100 collecting the foul waste from the residential and commercial units on the site (*Engineering Services Report, Horgan Lynch, 2021*). A pre-connection enquiry was submitted to Irish water on the 9th of July 2021, in which the above strategy for foul and water supply were proposed. This enquiry included details of the foul loadings from the Proposed Development to the proposed new pumping station.

The calculations for foul water flows at the Proposed Development are set out in the pre-connection enquiry application form (*Appendix C - Engineering Services Report, Horgan Lynch, 2021 which is included in Appendix I of this EIAR.*) in line with the Irish Water Code of Practice for Wastewater Infrastructure (2020). Domestic wastewater loads have been calculated based on a total of 690 persons occupying the residential portion of the Proposed Development, with a per capita wastewater flow of 150 litres per head per day; and 100 staff in the retail portion of the Proposed Development with a per capita wastewater flow of 60 litres per head per day. A peak flow multiplier of 1.25 was applied in the calculations. The resulting total average foul water flow from the Proposed Development is 1.27 l/s, with a peak flow of 1.5875 l/s.

Confirmation of Feasibility was received on the 31st of August 2021 (*Reference CDS21004834 – Appendix C - Engineering Services Report, Horgan Lynch, 2021 which is included in Appendix I of this EIAR*) Based upon the details provided with the pre-connection enquiry and on Irish Water's desk top analysis of the capacity currently available in the Irish Water networks, Irish Water advised that the proposed connection to the Irish Water networks can be facilitated at this moment in time.

Foul water from the Operational Phase of the Proposed Development will be discharged via a newly constructed onsite pumping station to an existing foul water sewer on Kilmoney road where it will flow to Cork Lower Harbour WwTP. The increase of a maximum load of 616 Population Equivalent (PE) at the facility as a result of the Proposed Development, assuming each PE unit was not previously supported by the WwTP, is considered to be an insignificant increase in terms of the overall scale of the facility. The maximum capacity of the Cork lower harbour WwTP is 65,000 PE. According to the most recent Annual Environmental Report (AER) for this WwTP, the remaining organic capacity (PE) at this plant is 34,203 people (*Appropriate Assessment Screening Report, Enviroguide Consulting, 2022*).

This increase in wastewater being discharged to the public sewer will have a neutral and imperceptible impact on the capacity of the Cork Lower Harbour WwTP in the long term.

12.2.5.7 Waste Management

12.2.5.7.1 Construction Phase

The main non-hazardous and hazardous waste streams that could be generated by construction activities at a typical site are shown in Table 12-34. The List of Waste (LoW) code (as effected from 1 June 2015) for each waste stream is also shown.

Table 12-34 Typical Waste Types Generated by Construction Activities and their Associated LoW Codes

Waste Material	LoW Code
Concrete	17 01 01
Bricks	17 01 02
Tiles and Ceramics	17 01 03
Mixture of concrete, bricks, tiles, and ceramics	17 01 07
Wood, Glass and Plastic	17 02 01, 17 02 02 and 17 02 03
Metals (including their alloys)	17 04 01, 17 04 02, 17 04 03, 17 04 04, 17 04 05, 17 04 06 and 17 04 07
Non-Hazardous Soil and Stone	17 05 04
Hazardous Soil and Stone	17 05 03*
Gypsum-based construction material	17 08 02
Bituminous mixtures	17 03 02
Paper and cardboard	20 01 01
Non-Hazardous Mixed C&D Wastes	17 09 04
Electrical and electronic components	20 01 35* and 20 01 36
Batteries and accumulators	20 01 33* and 20 01 34
Liquid fuels	13 07 01*, 13 07 02* and 13 07 03*
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13*, 20 01 19*, 20 01 27*, 20-01 28, 20 01 29* and 20 01 30
Insulation materials	17 06 04

Excavation of soil and subsoils will be required to an anticipated maximum depth of 2.0mbGL at the Proposed Development Site. It is anticipated that there will be no requirement for removal or excavation of bedrock during the Construction Phase of the Proposed Development based on the requirement to excavate to 2.0mbGL while bedrock was encountered at the Proposed Development Site at 7.5mbGL (*Site Investigations Ltd, 2007*).

As the ground level of the Site will be brought up to +4.000 OD, to bring floor levels above the flood level, it is anticipated that the soil generated during excavation will be reused (where deemed appropriate) for landscaping and fill, preventing the loss of soil from the Site. Any surplus soils generated at the Site will be removed offsite for reuse. The removal of surplus soil offsite will be undertaken in accordance with applicable statutory requirements. This may include, wherever suitable, removal as by-products that meet the legislative requirements of Article 27 of the European Communities (Waste Directive) Regulations, 2011 (S.I. No 126 of 2011). Material will only be moved under an Article 27 By-product notification when it can be robustly demonstrated that all tests for Article 27 By-product are met.

Table 12-35 shows the breakdown of Construction & Demolition (C&D) waste types produced on a typical construction site based on data from the EPA National Waste Statistics (*National Waste Statistics Summary Report for 2019, EPA, 2021*).

*Table 12-35 Quantities of C&D Materials Generated on a Typical Irish Construction Site
(Source: EPA, 2021)*

Waste Types	%
Mixed C&D waste	30
Segregated timber, glass, and plastic	2
Bituminous Mixtures	9
Metals	14
Segregated concrete, brick, tile, and gypsum	45
Total	100

C&D waste will be segregated on-site into labelled dedicated skips / receptacles. Where the on-site segregation of certain waste types is not practical, off-site segregation will be carried out at an authorised waste facility. Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, chemicals etc., if required.

Waste materials generated from site office(s) and canteen(s) will be segregated into general waste, biodegradable waste and dry recycling and will be stored in appropriate receptacles in a dedicated storage area on-site, where it is practical.

In the event of material being temporarily stockpiled on-site for reuse in the Proposed Development, or in the event of material excavated pending waste classification for removal off-site, the material will be temporarily stockpiled in a designated area on-site. Stockpiles of different waste material will be located, maintained, and separated by a sufficient distance to prevent any inadvertent mixing of excavated material. All stockpiles will be clearly identified (e.g., signage) and recorded on a site map.

Removal and recovery/recycling/disposal of all waste materials will be carried out in accordance with the Waste Management Act 1996 (as amended), S.I. No. 820/2007 - Waste Management (Collection Permit) Regulations 2007 (as amended) and S.I. No. 821/2007 - Waste Management (Facility Permit and Registration) Regulations 2007 (as amended). This includes the requirement for all waste contractors to have a Waste Collection Permit issued by the National Waste Collection Permit Office (NWCPO).

All waste will be documented prior to leaving the Site. Prior to any removal of waste from the Site, written confirmation should be obtained from the receiving waste facility, that acceptance of the waste will be in accordance with all waste management legislation and the conditions of the receiving waste facility's Local Authority Waste Certificate of Registration (COR), Waste Facility Permit, or EPA Licence. If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from the National Transfrontier Shipment of Waste Office (NTFSO) (as the relevant authority on behalf of all local authorities in Ireland). Full details of waste management procedures and proposed record keeping for the Construction Phase are provided in the CDWMP which has been prepared for the Proposed Development (Enviroguide Consulting, 2022)

The Construction Phase of the Proposed Development will result in an increase in demand for waste collections and waste treatment in the area. Due to the nature of this phase, the impact will be *temporary, negative* and *moderate* in the absence of mitigation.

12.2.5.7.2 Operational Phase

An Operational Waste Management Plan (OWMP) has been prepared for the Proposed Development by Enviroguide Consulting (2022). The refuse storage area for the apartments will be located on the ground floor within the carpark of the Proposed Development.

The predicted waste types that will be generated at the residential dwellings in the Proposed Development include the following:

- Mixed Municipal Waste (MSW) / General Waste
- Dry Mixed Recyclables (DMR) - includes cardboard, plastic packaging, aluminium cans, tins, paper, and Tetra Pak cartons
- Organic (food) waste, and
- Glass – bottles and jars.

In addition to the typical waste materials that will be generated on a daily basis, there will be some additional waste types generated in small quantities that will need to be managed separately including:

- Bulky wastes – including furniture, carpets, mattresses
- Waste electrical and electronic equipment (WEEE)
- Batteries
- Textiles – clothes or soft furnishings
- Light bulbs or fluorescent tubes
- Chemicals – old medicines, paints, detergents, and
- Waste oil.

The Commercial Units will generate similar waste types to domestic waste types:

- Dry mixed recyclables
- Mixed Municipal (non-recyclable)
- Organic (food) waste, and
- Glass

with some additional commercial “office” type wastes such as paper and printer ink, batteries, and waste electrical and electronic equipment (WEEE).

The List of Waste (LoW) code (previously referred to as European Waste Code or EWC) for typical waste materials expected to be generated during the operation of the Proposed Development are provided in Table 12-36.

Table 12-36 Expected Waste Types and List of Waste Codes

Waste Description	List of Waste Code
Mixed Municipal Waste	20 03 01
Mixed Dry Recyclables	20 03 01
Biodegradable Kitchen Waste	20 01 08
Glass	20 01 02
Bulky wastes	20 03 07
Waste electrical and electronic equipment*	20 01 35* 21 01 36
Batteries and accumulators*	20 01 33* 20 01 34
Textiles	20 01 11
Fluorescent tubes and other mercury containing waste*	20 01 21
Chemicals (solvents, pesticides, paints & adhesives, detergents, etc.) *	20 01 13/19/27-28/29-30
Plastic	20 01 39
Metals	20 01 40
Paper and Cardboard	20 01 01

**Individual waste type may contain hazardous materials*

The waste storage capacity requirements for the apartment and townhouse/ duplex buildings, has been calculated in the OWMP, based on the number of units and the number of bedrooms in each unit. With waste collections occurring on a weekly basis, it is anticipated that 24 no. 1,100L bins and 25 no. 240L bins (or equivalent) will be required in the waste storage areas – 9 no. 1,100L bins for mixed municipal waste, 15 no. 1,100L bins for dry mixed recyclables, 13 no. 240L bin for organic/food waste and 12 no. 240L bin for glass.

The OWMP notes that the total number of bins that will be provided is 29 no. 1,100L bins, which exceeds the required capacity for weekly collections. On this basis, the bin storage capacity comfortably allows for weekly collections and leaves adequate contingency to increase collection frequency should that be required during unusually high-volume periods such as Christmas. All collections must take place in compliance with conditions of the waste contractor's Waste Collection Permit for the region and in line with the Local Authority by-laws and the Waste Management (Waste Collection Permit) Regulations 2007 as amended. All residents are obliged by law to avail of the waste management service and must comply with local By-Laws and Statutory Instruments in relation to the presentation of waste for collection. Waste collections for a three-bin system service will be available from the time of first occupancy (i.e., even if all dwellings are not occupied).

Residents will be required to suitably store other waste materials that may be generated infrequently (such as bulky waste, textiles, printer toner/cartridges, WEEE, batteries and other

household hazardous wastes) within their own dwellings and dispose of them appropriately at bring centres or civic amenity facilities. Raffeen Civic Amenity Centre is located 4km northeast of the Site and bring banks are available in Collin’s SuperValu carpark, approx. 200m northeast of the Site and at the ESB E-Cars Charging Station approx. 500m northeast of the Site. All occupants will be supplied with information by the Management Company on the location of recycling facilities in the area.

By implementing the actions outlined in the OWMP, a high level of recycling, reuse and recovery will be achieved at the development in line with European targets. The source segregation of waste types as detailed in the OWMP will also help to achieve the targets set out in the Southern Region Waste Management Plan 2015-2021. Additionally, the design of the waste storage area will meet the requirements as detailed in the Department of Housing, Local Government and Heritage’s 2021 publication, Sustainable Urban Housing, Design Standards for New Apartments.

In the absence of mitigation, the potential impact from the Operational Phase on municipal waste disposal is likely to be long term, negative and moderate.

12.2.5.8 Potential Cumulative Impacts

The cumulative effects of Proposed Development on Material Assets have been assessed taking other planned, existing, and permitted developments in the surrounding area into account. All planning permission applications that have been granted and developed have been incorporated into the baseline assessment of this application.

A planning search revealed that there have been several recent (within the last five years) applications for developments in the vicinity of the Site of the Proposed Development, which have been granted permission as detailed in Table 12-37:

Table 12-37: Summary of Cumulative Impacts

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
Part 8 Planning	Cork County Council - Carrigaline Western Relief Road	Cork County Council proposes to design and construct new access points to zoned development land in conjunction with the delivery of the proposed Carrigaline Western Relief Road (CWRR) project. The CWRR commences on the R613 Ballea Road (at lands to the west of the existing Carrigaline Court Hotel), the new road initially heads south before re-directing to the west, crossing over the Owenboy River and continuing south to the R611, Kilmoney Road. The length of the CWRR measures approximately 750 metres.	The Western Relief Road is at the final stages of construction and is anticipated to be operational before construction works on this Proposed Development commence. The Western Relief Road will have a positive cumulative impact as it will provide additional road capacity and facilitate all road users (including pedestrians,

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
			cyclists and vehicular traffic).
217464	Aldi Stores (Ireland) Ltd	On 19/01/2022 a Planning Application was submitted to Cork County Council and is awaiting decision for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.	<p>Awaiting Decision 19th May 2022</p> <p>This application was subject to an Environmental Impact Assessment Screening, which has been assessed as part of this EIAR. The EIA Screening Report was found to conclude that is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 217464), alone or in combination with other projects. An Ecological Impact Assessment and a Natura Impact Statement have also been prepared and submitted for the proposed development which present mitigation measures to address and minimize potential effects of the development on European sites and ecological resources and receptors in the vicinity of the proposed development.</p>
214818	Ruden Homes Ltd	<p>A planning application for Extension of Duration was submitted to Cork County Council and granted permission on the 25th May 2021:</p> <p>A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref:</p>	<p>Extension of Duration Permission Granted 25th May 2021.</p> <p>This application has been assessed as part of this EIAR. The application for the Extension of Duration noted that there is no requirement for an environmental impact assessment or an appropriate</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
		06/11262- Extension of duration of permission granted under Planning Reference: 15/6753.	assessment for the development originally permitted under Planning Application Ref. 15/6753. As such there is no likelihood of significant effects on the environment as a result of the proposed development (Planning Ref. 214818), alone or in combination with other projects.
205230	Barry Collins (Supermarket) Ltd	<p>A planning application was granted conditional permission on the 21st July 2020 for the following:</p> <p>“Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.”</p>	<p>Conditional Permission Granted 11th August 2020</p> <p>This application has been assessed as part of this EIAR. The planning application document noted that, due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 205230), alone or in combination with other projects.</p>
196065	Athena Private Assets Ltd	<p>A planning application was granted conditional permission on the 28th February 2020 for the following:</p> <p>“Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping</p>	<p>Conditional Permission Granted 26th August 2020</p> <p>This application has been assessed as part of this EIAR. Due to the size and nature of the application, there was no requirement for an environmental impact assessment or an appropriate assessment for the</p>

Planning Ref No.	Applicant Name	Summary of Development	Cumulative Impact Assessment
		and boundary treatments, surface treatments and all ancillary site development works."	development. As such there is no likelihood of significant effects on the environment as a result of the permitted development (Planning Ref. 196065), alone or in combination with other projects.
194642	Piton Properties Ltd	<p>A planning application was granted conditional permission on the 22nd August 2019 for the following:</p> <p>"Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application."</p>	<p>Planning has been granted for the development of wastewater pumping station and ancillary structures. The development works have been completed and will be incorporated into the Proposed Development if granted.</p> <p>This development has been considered within the baseline assessment for the Proposed Development.</p> <p>Therefore, there are no potential cumulative impacts.</p>

Planning Application Reference: 217464 Cork County Council – Awaiting Decision

On 19/01/2022 a Planning Application was submitted to Cork County Council for the construction of a single storey discount food store (ALDI) (1,819sq/m gross floor area, 1,315 sq/m net floor area) including the sale of alcohol for consumption off the premises; loading bay; rooftop solar panels; external plant enclosure; bin store; trolley bay; signage; single storey café unit; single storey DRS unit; substation; plaza areas; sculpture; security barriers; 119 no. car parking spaces (including EV, disabled and parent and child spaces), of which 30 no. spaces will function as a public car park; new junction with the Carrigaline Western Relief Road (under construction) and internal access road; pedestrian and cycle connection to Main Street; and all associated boundary treatment, landscaping, drainage and site development works. A Natura Impact Statement will be submitted to the Planning Authority with the application. On a site at Carrigaline Town Centre, bound by Main Street and the Carrigaline Western Relief Road (under construction), Carrigaline West, Carrigaline, Co. Cork.

Planning Application Reference: 214818 Cork County Council – Extension of Duration Granted – 25.05.2021

A residential development consisting of 72 no. two-storey houses and all ancillary car parking, landscaping and site development works. The proposed site development works include the construction of a pumping station, underground tank, welfare kiosk/building, control kiosk/building and fencing. Access to the Proposed Development will be via Ballea Roundabout and the existing road permitted by Planning Ref: 06/11262 – Extension of duration of permission granted under Planning Reference: 15/6753.

Planning Application Reference:205230 Cork County Council – Conditional Permission – 21/07/2020

Permission for retention for the demolition of front walls of vacant properties at Main Street, Carrigaline and permission for retention and completion of the Eastern elevation (front on Main Street) of the following development (granted under Planning Ref 19/4698), construction of a new building for retail use which will be amalgamated into the existing newsagents and deli area of the adjoining retail building on the Northern side with associated seating area, signage and all associated site works.

Planning Application Reference:196065 Cork County Council – Conditional Permission – 28/02/2020.

Demolition of the existing derelict dwelling and the construction of 38 no. residential units comprising of 10 no. 1 bed apartments, 2 no. 2 bed apartments and 26 no. 3 bed duplex, terraced and semi-detached housing units in scheme. Vehicular and pedestrian access to the residential scheme is from Church Hill at the east of the site. The development also includes, associated car parking, drainage, landscaping and boundary treatments, surface treatments and all ancillary site development works.

Planning Application Reference:194642 Cork County Council – Conditional Permission – 22/08/2019

Construction of a wastewater pumping station and foul rising main including emergency storage tank, welfare kiosk, control kiosk, services, lighting and all ancillary site works. A Natura Impact Statement will be submitted to the Planning Authority with the application.

Planning Application Reference:194698 Cork County Council – Conditional Permission – 24/04/2019

The demolition of two vacant residential properties and construction of a new building for retail use which will be amalgamated into the existing Newsagents and Deli area of the adjoining retail building on the northern side with associated seating area, signage and all associated site works.

Planning Application Reference: 174176 Cork County Council – Granted Permission – 14.08.2017

Permission for the construction of 224 no. dwelling houses (54 no. dwellings will have an option for house type 2B-1 or 2B-2, with the remaining dwellings comprising house types 1A-

1 (2 no.), 1A-2 (1 no.), 1A-3 (2 no.), 1B-1 (39 no.), 1B-2 (1 no.), 1C-1 (12 no.), 1D-1 (8 no.), 2A-1 (1 no.) 2A-2 (3 no.), 2A-3 (1 no.), 2A-4 (3 no.), 2B-1 (1 no.), 2B-3 (1 no.) 2C-1 (36 no.), 2C-2 (12 no.), 2D-1 (16 no.), 2E-1 (18 no.) and 2F-1 (13 no.), the construction of a crèche and all associated ancillary development works including access (including the completion of the inner relief road connecting on to the L2495), bus stops, parking, footpaths, lighting, foul and surface/storm water drainage, landscaping and amenity areas.

This application was accompanied by a full Construction and Environmental Management Plan (McCutcheon Halley, 2016), and an Engineering Planning Report (Punch Consulting Engineers, 2016).

12.2.5.9 “Do Nothing” Impact

If the Proposed Development is not advanced, the site will remain as agricultural land,/ greenfield site. . A “Do-Nothing” scenario would result the lands remaining undeveloped, which would be an under-utilisation of zoned and serviceable lands from a sustainable planning and development perspective, particularly considering the location of the lands in relation to the Carrigaline IWRR and the town centre.

12.2.6 Avoidance, Remedial & Mitigation Measures

Specific avoidance, remedial and mitigation measures to be taken during the Construction and Operational Phase with respect to water supply, surface water drainage and foul water are detailed within Chapter 7, Water (Hydrology and Hydrogeology), of this EIAR. All works will be carried out in accordance with the Construction and Environmental Management Plan prepared for the Proposed Development and the Irish Water Code of Practice for Water Infrastructure (July 2020) and the Irish Water Code of Practice for Wastewater Infrastructure (July 2020). Laying of watermains/wastewater sewers and testing of pipelines and infrastructure will be in accordance with Irish Water standard details.

New connections for electricity and telecommunications will be coordinated with the relevant utility provider and Cork County Council and will be carried out and tested by approved contractors, as per standard protocols.

The CDWMP (Enviroguide Consulting, 2022) provides guidance to the Main Contractor on waste management during the Construction Phase. In the event that hazardous soil, or historically deposited waste is encountered during the site bulk excavation phase, the contractor will notify CCC and provide a Hazardous/Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s). According to the CDWMP, it is anticipated that there will be no asbestos containing materials (ACMs) generated during the Construction Phase of the Proposed Development. If ACMs are identified on site at a later stage, a full asbestos report will be carried out. Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACM's will only be removed from site by a suitably permitted/licenced waste contractor. in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.

An OWMP (*Enviroguide Consulting, 2022*) has been produced for the Proposed Development which outlines measures to be taken to achieve waste prevention, maximum recycling and

recovery of waste with a focus on diversion of waste from landfill wherever possible. Waste segregation will be implemented at the Proposed Development to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery. The Management Company will be responsible for the provision of a leaflet to all new tenants encouraging good waste segregation and pictorial information detailing the waste streams that can be placed in each bin. In addition to this, clauses that support waste segregation targets will be included in relevant legal documentation e.g., tenancy agreements where possible.

The OWMP also states that the facilities management company must employ suitably permitted or licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contractor handle, transport and reuse / recover / recycle / dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

12.2.6.1 'Worst-Case' Scenario

In the event that the Proposed Development was to proceed, a worst-case scenario in relation to built services & infrastructure (electricity, telecommunications, gas, water supply infrastructure, and sewerage), would be where the works involved during construction resulted in an extended power or telecommunications outage, or disruption to water supply or sewerage systems for existing properties in the area due to unforeseen delays on site.

A worst-case scenario in relation to waste would be where a previously unclassified hazardous waste stream arose on the site during excavations, which was not identified and segregated appropriately and resulted in the contamination of a non-hazardous waste stream, such as soil and stones, resulting in a large volume of hazardous waste that would require specialist removal and treatment. Additionally, the contaminated soil and stones would no longer be fit for use for fill and landscaping and would need to be replaced with imported materials.

However, taking account of the avoidance and mitigation measures, the worst-case scenarios are deemed to be an unlikely scenario.

12.2.7 Residual Impacts

Residual Impacts are defined as “effects that are predicted to remain after all assessments and mitigation measures”. They are the remaining ‘environmental costs’ of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts. Potential residual impacts from the Proposed Development were considered as part of this environmental assessment.

Provided the mitigation measures outlined in Section 12.2.6 and detailed in the CEMP (*Enviroguide Consulting, 2022*), the CDWMP (*Enviroguide Consulting, 2022*) and the OWMP (*Enviroguide Consulting, 2022*) are implemented, and a high rate of reuse, recycling and recovery is achieved, the likely effect of the Construction and Operational Phases on the environment will be neutral and imperceptible in the long term.

Having regard to the mitigation measures proposed within this and other chapters of the EIAR, no significant residual impacts are anticipated.

12.2.8 Monitoring

12.2.8.1 Construction Phase

The monitoring of C&D waste during the Construction Phase of the Proposed Development is recommended to ensure that impacts are not experienced beyond the Site boundary. The Main Contractor will be responsible for monitoring and record keeping in respect of waste leaving the facility and that these records will be maintained on site.

12.2.8.2 Operational Phase

The building management company, residents, tenants, retail units and creche operators will be required to maintain the bins and storage areas in good condition as required by the CCC Waste Bye-Laws. The waste strategy presented in the OWMP will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy. The areas will be fitted with CCTV for monitoring.

12.2.9 Interactions

Material assets, utilities and waste interact with other environmental receptors as follows:

- **Population and Human Health:** The improper removal, handling and storage of hazardous waste could negatively impact on the health of construction workers. Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health. Potential impacts on population and human health are addressed in Chapter 4.
- **Biodiversity:** The improper handling and storage of waste during the Construction and Operational Phases could negatively impact on biodiversity. Potential impacts on biodiversity are addressed in Chapter 5 (Biodiversity).
- **Land and Soil:** Improper handling and segregation of hazardous or contaminated wastes could lead to the contamination of soil and stones excavated from the site. Potential impacts on land and soils are addressed in Chapter 6.
- **Water (Hydrology & Hydrogeology):** Any connections to the public water network (water supply or foul sewer) during the Construction and Operational Phases will be under consent from Irish Water. Potential impacts on water are addressed in Chapter 7.
- **Traffic:** Waste collection activities at the Proposed Development have the potential to impact upon traffic movements in the Carrigaline area. Potential impacts on traffic are addressed in Chapter 12, Section 12.1.

12.2.10 Difficulties Encountered

No difficulties were encountered in the preparation of this Chapter.

12.2.11 References

Department of Housing, Local Government and Heritage (2021) Sustainable Urban Housing, Design Standards for New Apartments

Environmental Protection Agency (EPA) (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

Environmental Protection Agency (EPA) (2017) Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) – *DRAFT*

EPA (2003) Advice Notes on Current Practice in the preparation of Environmental Impact Statements.

EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements.

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

<https://myplan.ie/> Zoning and National Planning Applications Map Viewer. Consulted on 03.05.2022

<https://siteviewer.comreg.ie/#explore> (ComReg, 2021). Commission for Communications Regulation Mast Viewer. Consulted on 29.04.2022.

<https://www.gasnetworks.ie/corporate/company/our-network/pipeline-map/> (Gas Networks Ireland, 2021). Gas Networks Ireland Pipeline Viewer. Consulted on 28.04.2022.

<https://www.gasnetworks.ie/home/get-connected/connect-now/> Consulted on 28.04.2022.

<https://www.gov.ie/en/publication/5634d-national-broadband-plan-map/> Consulted on 29.04.2022.

Irish Water (2020) Code of Practice for Water Infrastructure – Connections and Developer Services (Revision 2)

Irish Water (2020) Code of Practice for Wastewater Infrastructure – Connections and Developer Services (Revision 2)

National Standards Authority of Ireland (NSAI), 2017. IS EN752, “Drain and Sewer Systems Outside Buildings – Sewer System Management”. NSAI, 1 Swift Square, Northwood, Santry, Dublin 9

Site Investigations Ltd., 2007. Site Investigation for a Road at Carrigaline, Co. Cork Factual Report (Contract No. 4404C)

13 RISK MANAGEMENT

13.1 Study Methodology

13.1.1 Scope and Context

The relevant legislation that applies to this Chapter is the Planning and Development Regulations 2001 – 2021, as amended, and in particular Schedule 6 – Information to be contained in EIAR. The following paragraph of Schedule 6, Paragraph 2(e)(i)(IV), specifically refers to "*a description of the likely significant effects on the environment of the proposed development resulting from ... the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*".

Paragraph 2(h) further expands with "*a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment 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, emergencies arising from such events.*"

Additionally, the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), which implement the Seveso III Directive (2012/18/EU), and which revoked the 2006 Major Accident Regulations also applies to this Chapter.

This Chapter was prepared by Enviroguide Senior Environmental Consultant Nikita Coulter. Nikita Coulter has a B.Sc. in Zoology (Hons) from University College Dublin, an M.Sc in Biodiversity and Conservation and a Postgraduate Diploma in Environmental Engineering from Trinity College Dublin, and a NEBOSH accredited International Diploma in Environmental Risk Management. Nikita has 8 years professional experience as an Environmental Compliance Specialist.

13.1.2 Guidelines and Reference Material

Cognisance has been taken of the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA May 2022). Although this document predates the 2018 legislation it follows the requirements laid out in the Directive 2014/52/EU.

Specifically, the EPA Guidelines state that the EIAR must take 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)... The potential for a project to cause risks to human health, cultural heritage or the environment due to its vulnerability to external accidents or disasters is considered where such risks are significant, e.g. the potential effects of floods on*

sites with sensitive plants. Where such risks are significant then the specific assessment of those risks in the form of a Seveso Assessment (where relevant) or Flood Risk Assessment may be required. The EIAR should refer to those separate assessments while avoiding duplication of their contents.”

Reference has also been made to the Department of the Environment, Heritage & Local Government (DoEHLG) Publication ‘Guide to Risk Assessment in Major Emergency Management 2010’ and the Office of Emergency Planning, Department of Defence (DOD) Publication ‘A National Risk Assessment for Ireland 2020’. A consolidated list of national hazards for Ireland identified in the DOD document are identified in Table 13-1.

Table 13-1: Consolidated List of National Hazards (Source: A National Risk Assessment for Ireland (2020) Department of Defence)

<p>Hazard: Civil</p> <ul style="list-style-type: none"> • Large Crowd Event • Pandemic • Water Supply Distribution and Contamination • Food Chain Contamination • Animal Disease • Terrorist Incident 	<p>Hazard: Natural</p> <ul style="list-style-type: none"> • Storm • Snow and Ice (Including prolonged low temperature) • Flooding (Including pluvial, fluvial and coastal)
<p>Hazard: Transportation</p> <ul style="list-style-type: none"> • Maritime Incident • Air Incident • Transport Hub (Includes Airports, Ports and Rail Stations) 	<p>Hazard: Technological</p> <ul style="list-style-type: none"> • Structural Collapse (Including Dam, Tunnel, Bridge and Building) • Nuclear Incident (Abroad) • Cyber Incident • Disruption of Energy Supply (Including oil, gas, electricity and communications)

13.1.3 Risk Assessment Methodology

The risk assessment methodology has been supported by general risk assessment methods. Hazard analysis and risk assessment are accepted internationally as essential steps in the process of identifying the challenges that may have to be addressed by society, particularly in the context of emergency management. Mitigation as a risk treatment process involves reducing or eliminating the likelihood and/or the impact of an identified hazard (DoEHLG, 2010).

Table 13-2 Classification of National Likelihood Criteria (Source: A National Risk Assessment for Ireland (2020) Department of Defence)

National Likelihood Criteria		
Rating	Classification	Average Recurrence Interval

1	Extremely Unlikely	100 or more years between occurrences
2	Very Unlikely	51-100 year between occurrences
3	Unlikely	11-50 years between occurrences
4	Likely	1-10 years between occurrences
5	Very Likely	Ongoing/Less than 1 year between occurrences

13.2 Predicted Impacts

The EIAR Chapters within this report identify that the Proposed Development has been designed in accordance with best practice and that the Proposed Development can be safely undertaken without risk to health.

In order to understand the potential consequences and predicted impacts of any major accident or disaster due to the Proposed Development and the vulnerability of the project a desk study was undertaken. The assessment reviewed:

- The vulnerability of the project to major accidents or disasters.
- The potential for the project to cause risks to human health, cultural heritage and the environment, as a result of that identified vulnerability.

A methodology has been used including the following phases:

Phase 1 Assessment:

The DOD Consolidated List of National Hazards was used to identify a preliminary list of potential major accident and disasters. Receptors covered by legislation were not included within the assessment e.g. construction workers.

Phase 2 Screening:

The list was screened and major events such as volcanoes were not included given the unlikely event of one occurring. Elements already addressed as a key part of the design e.g. risks of building collapse, are not repeated.

Phase 3: Mitigation and Evaluation

In the event that mitigation measures included did not mitigate against the risk, then, the potential impacts on receptors are identified in the relevant Chapter. Table 13-3 lists the major accidents and/or disasters reviewed.

Table 13-3: Major Accidents and/or Disasters Reviewed

Major Accident or Disaster	Relevant for this Proposed Development? (Y/N)	Why relevant?	Potential Receptor	Covered within EIAR?
Civil				
Large Crowd Event (An event with over 5,000 people)	N	Not considered vulnerable due to the nature of the Proposed Development, i.e., predominantly residential development with a creche.	N/A	N/A
Pandemic	Y	<p>COVID-19 is an illness that can affect your lungs and airways. It is caused by a virus called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). SARS-CoV-2 is spread in sneeze or cough droplets. The Proposed Development poses no additional COVID-19 risk.</p> <p>It is anticipated that there will be approximately 50 workers directly employed during the Construction Phase of the project. During the Construction Phase of this Proposed Development HSE guidelines will be adhered to as relevant.</p> <p>All workers directly and indirectly employed during the Operational Phase of the Proposed Development will comply with the relevant Government protocols that will be in place at that point in time in relation to COVID-19.</p>	Local businesses, construction workers	Chapter 4 (Population and Human Health) of this report addresses COVID-19.

Water Contamination	Supply	Y	Waterborne diseases can be caused by consuming contaminated drinking water. No public health issues have been identified for the Construction Phase or Operational Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers associated with the dewatering works. The existing water supply for the Proposed Development will be via connection to the public supply.	Local water users	Chapter 7 (Water (Hydrology and Hydrogeology)) of this report identifies the control measure required to avoid contamination of water supplies during construction works.
Food Contamination	Chain	Y	Potentially relevant to the Proposed Development in the Operational Phase. The creche units will be required to register with the HSE and would need to adhere to food safety legislation and traceability requirements.	Consumers/Producers	N/A
Animal Disease		N	Not relevant to the Proposed Development	N/A	N/A
Terrorist Incident		N	Not considered vulnerable due to the nature of the Proposed Development, i.e., residential/commercial development.	N/A	N/A
<u>Transportation</u>					
Maritime Incident		N	Not considered vulnerable. The closest maritime port is the Port of Cork, Ringaskiddy Deep Water Port, which is approx. 5km northeast of the site of the Proposed Development.	N/A	N/A
Air Incident		N	Not considered vulnerable. The closest commercial airport is Cork Airport, which is approximately 6.45km northwest of the Site of the Proposed Development. The closest Public Safety Zone (PSZ) associated with the runways at Cork Airport is located approximately 5km west of the Site of the Proposed Development. The closest domestic airport is Bantry Aerodrome, which is located approximately 76km west of the Site of the Proposed Development.	N/A	Section 13.3.4 of this Chapter (Risk Management) assess the vulnerability of the Proposed Development to air incidents.
Transport Hub (Includes Airports, Ports and Rail Stations)		N	Not considered vulnerable as the Site of the Proposed Development is not defined as a Transport Hub.	N/A	N/A

		<p>The closest railway station is at Rushbrooke, Cobh, Co. Cork, which is approximately 6.45km northeast of the Site of the Proposed Development.</p> <p><i>For airports and ports see above.</i></p>		
Natural				
Cultural, Archaeological and Architectural Heritage	Y	<p>A review of aerial and satellite imagery detailing the Proposed Development Site revealed the potential presence of a circa 8m diameter subcircular feature within the subject lands. This feature could potentially represent an unrecorded barrow type archaeological site.</p>	Archaeological cultural heritage and	Chapter 10 (Archaeology and Cultural Heritage) of this EIA assessed the impact of the Proposed Development on the Archaeological and Cultural Heritage and details the mitigation and monitoring measures to be undertaken.
Landslides / Sinkholes	N	<p>Not considered vulnerable.</p> <p>The GSI database indicates that the Site is located within an area of 'Low' susceptibility to landslides (GSI, 2022).</p> <p>The Site is not located within an area associated with karst geology and therefore there are no identified geological hazards associated with karst features such as sinkholes.</p>	N/A	Chapter 6 (Land and Soils) of this EIA assessed the vulnerability of the Proposed Development to ground movements.
Earthquakes	N	<p>Not considered vulnerable.</p> <p>The Irish National Seismic Network (INSN) has no recorded earthquake activities within a 2km radius of the Proposed Development and the closest recorded seismic activity recorded is 154km north-east of the Proposed Development Site at Ferns in Co. Wexford which is recorded as being associated with quarry blast activity (INSN, 2022).</p>	N/A	Chapter 6 (Land and Soils) of this EIA assessed the vulnerability of the Proposed Development to ground movements.
Floods/Storm surge/tidal flooding	Y	<p>The Site of the Proposed Development is vulnerable to flooding from fluvial and tidal sources. A Site-Specific Flood Risk Assessment (Arup, 2022) has been conducted for the Site of the Proposed Development. Flood compensation is proposed to ensure no negative flood impact to other sites</p>	Development	Chapter 7 (Hydrology) of this EIA identifies the vulnerability of the project to flooding. The Site-Specific Flood Risk Assessment details how the risks relating to flooding can be managed and mitigated to acceptable levels.

Severe weather such as Tornados, Heatwaves, Blizzards and Droughts	N	Not considered vulnerable. In the event of severe weather events, the national meteorological service, Met Éireann, provides advance notice of severe weather, usually several days in advance. When appropriate, colour-coded weather warnings are issued. The Office of Emergency Planning works with the government departments and other key public authorities in order to ensure the best possible use of resources and compatibility across different emergency planning requirements.	N/A	N/A
Air Quality events	N	Vehicular emissions Dust emissions	Residents/ workers	Chapter 8 (Air Quality) of this EIA identifies the impact of the construction and operation of the development on ambient air quality.
Wildfires	N	Not considered vulnerable due to the location of the Site of the Proposed Development.	N/A	N/A
Dam, Bridge or Tunnel Failure	N	Not considered vulnerable as no dams, bridges or tunnels are proposed as part of the development.	N/A	N/A
Flood defence failure	Y	The Site of the Proposed Development is vulnerable to flooding from fluvial and tidal sources. Flood compensation is proposed to ensure no negative flood impact to other sites.	Local residents and businesses	Chapter 7 (Hydrology) of this EIA identifies the vulnerability of the project to flooding. The Site-Specific Flood Risk Assessment details how the risks relating to flooding can be managed and mitigated to acceptable levels.
Fire	Y	There is a risk of fire which might lead to loss of life and environmental pollution. The buildings have been designed in accordance with all relevant building and fire safety standards. Fire safety infrastructure will be installed at the Site. A fire evacuation strategy will be put in place in advance of dwelling occupancy.	Residents / Employees / Members of the Public	Section 13.3.3 of this Chapter deals with Fire Safety and Emergency Response.
Invasive species	Y	There is a risk that invasive alien plant species (IAPS) within the Site (Buddleia, Sycamore, Turkey Oak and Himalayan Honeysuckle) could spread outside the Site as a result of soil disturbance and clearance activities at the Site. IAPS will be managed as described in the Biodiversity Chapter of this EIA. There is also a risk of introducing invasive species to the Proposed Development during landscaping and maintenance activities.	Native species / local biodiversity	Chapter 5 (Biodiversity) of this EIA details the preventative measures to be taken with regards to invasive species.

Technological					
Structural (Building)	Collapse	N	This has been taken into consideration in the building design. All buildings have been designed to modern standards. No further assessment is required.	N/A	N/A
Nuclear incident		N	Not considered vulnerable. There are no nuclear power stations close to the Proposed Development.	N/A	N/A
Cyber incident		N	Not considered vulnerable. This is a predominantly residential development; however, the retail/commercial units may opt to have cyber protection in place when operational. This will be at the discretion of the unit operators.	N/A	N/A
Disruption to energy supply (oil, gas, electricity)		N	Not considered vulnerable. ESB Networks maintain the electricity network in Ireland. Gas Networks Ireland maintain the natural gas network in Ireland.	N/A	Chapter 12 (Material Assets) of this EIAR contains information on the energy systems to be utilised during the Construction and Operational Phases of the Proposed Development
Utilities (communications)	failure	N	Not considered vulnerable. In Ireland, the fixed-line communications market is dominated by Eir; while Eir, Three, and Vodafone own Ireland's mobile telecommunications infrastructure.	N/A	Chapter 12 (Material Assets) of this EIAR contains information on communications systems.
Utilities (water supply)	failure (water supply)	N	Not considered vulnerable. A pre-connection enquiry was submitted to Irish Water in relation to a Water & Wastewater connection for the Proposed Development and Irish Water have advised the proposed connection to the Irish Water networks can be facilitated at this moment in time.	N/A	Chapter 7 (Water) and Chapter 12 (Material Assets) of this EIAR contain information on water supply
Utilities (wastewater, sewage)	failure	N	Not considered vulnerable. A pre-connection enquiry was submitted to Irish Water in relation to a Water & Wastewater connection for the Proposed Development and Irish Water have advised the proposed connection to the Irish Water networks can be facilitated at this moment in time.	N/A	Chapter 7 (Water) and Chapter 12 (Material Assets) of this EIAR contain information on wastewater and sewage removal and treatment
Utilities (solid waste)	failure (solid waste)	N	Not considered vulnerable. A Construction, Demolition and Waste Management Plan has	N/A	Chapter 12 (Material Assets) of this EIAR contains information on solid waste

		been prepared for the Construction Phase of the Proposed Development and an Operational Waste Management Plan has been prepared for the Operational Phase of the Proposed Development. The implementation of the waste management plans will mitigate risks from solid waste.		removal and treatment
Industrial accidents (defence, energy, oil and gas refinery, food industry, chemical industry, manufacturing, quarrying, mining)	N	Not considered vulnerable. There are no Upper Tier Seveso sites adjacent to the Site of the Proposed Development. The nearest Upper Tier Seveso Site is located approximately 3.8km northeast from the Proposed Development at Novartis Ringaskiddy Ltd.	N/A	N/A

13.3 Management Plans

13.3.1 Archaeological Management Plan

A programme of geophysical surveys will be undertaken across the undisturbed portions of the Proposed Development Site prior to the commencement of construction works. This will be followed by a programme of linear archaeological test trenching which will include targeted investigations of any geophysical anomalies that are of archaeological potential. These investigations will be carried out under licences issued by the National Monuments Service. There are a number of obligatory processes to be undertaken as part of archaeological licence applications for site investigation works and these will allow for monitoring of the successful implementation of the pre-construction archaeological mitigation measures. Method statements detailing the proposed strategy for site investigations will be submitted for approval to the National Monuments Service as part of the licence application process (Refer to Chapter 11 of this EIA for further details).

13.3.2 Flood Emergency Plan

The Management Company for the Proposed Development will develop a Flood Emergency Plan (FEP) in accordance with the OPW Planning Guidelines which will be updated annually to take account of the latest knowledge on flooding, the latest situation on flood protection for Carrigaline and the latest Cork City Emergency Plan. The FEP will be informed by the Emergency Response Plans of Cork County Council. The FEP will detail triggers for activation, including receipt of a timely flood warning, a staged response and to set out the management and operational roles and responsibilities. The FEP will set out arrangements for access and egress, both for pedestrians, vehicles and emergency services (*Site Specific Flood Risk Assessment, Arup, 2022*).

13.3.3 Fire Safety and Emergency Response Plan

The design criteria of the buildings are in accordance with all relevant building and fire safety standards. A Building Lifecycle Report (Aramark, 2022) has been prepared for the Proposed Development which reviews the outline specification of materials and infrastructure to be utilised for the Proposed Development. Protective Services that will be installed in the Proposed Development are listed within report and include:

- Fire alarms
- Fire extinguishers
- Apartment sprinkler system (where applicable by fire cert)
- Dry risers, and
- Firefighting lobby ventilation.

Fire alarms, fire extinguishers and fire blankets will be installed in all internal areas. All fire alarms will be in accordance with the current IS3218:2013 + A1 2019 and the Fire Certificate, and all fire extinguishers will meet the requirements of I.S 291:2015 – Selection, Commissioning, Installation, Inspection and Maintenance of Portable Fire Extinguishers. A sprinkler system will be installed in the apartments in accordance with BS 9251:2005 – Sprinkler Systems for Residential and Domestic Occupancies – Code of Practice. Dry Risers

are a system of empty pipes and valves that can be connected externally to a pressured water source by emergency services and firefighters in the event of a fire. They will be installed in the common area cores of the apartment blocks. The Dry Risers will be installed in accordance with BS 5041 – Fire Hydrant Systems Equipment & BS 9999 – Effective Fire Safety in the Design, Management and Use of Buildings. Fire-fighting ventilation consisting of smoke extract/exhaust systems will be installed in the common area lobbies to the fire consultants design and specification.

A fire evacuation strategy will be put in place in advance of dwelling occupancy. Appropriate means of escape in case of fire involving multiple escape stairs, ventilated corridors and sprinkler systems have been designed into each of the apartment blocks, the creche and the retail units. Fire safety checks and fire drills will be employed by the Management Company once the Proposed Development is operational. Access routes serving the Proposed Development have been designed to provide adequate space for the Fire Brigade.

13.3.4 Public Safety Zones

Public Safety Zones (PSZs) are mapped out around airport runways to protect the public on the ground from possible aircraft crashes in populated area. PSZs are used to prevent inappropriate use of land where the risk to the public is greatest, e.g., by limiting the type and allowable height of buildings and structures within the zones.

Two individual risk factors relating to chance of death by aircraft crash have been assessed in determining appropriate Public Safety Zones (PSZs) at Cork Airport. The inner PSZ risk value is 1 in 100,000 per year and the outer PSZ risk value is 1 in 1,000,000 per year, for each runway.

The Site of the Proposed Development is located approximately 6.45km to the southeast of Cork Airport. There are no PSZs directly over the Site of the Proposed Development at Kilmoney, Carrigaline. The nearest PSZ is an outer PSZ which is located approximately 5km to the west of the Site of the Proposed Development. The PSZs at Cork Airport and the location of the Site of the Proposed Development are shown in Figure 13-1.

Based on the PSZs, an aircraft strike disaster is not considered relevant to this Proposed Development.

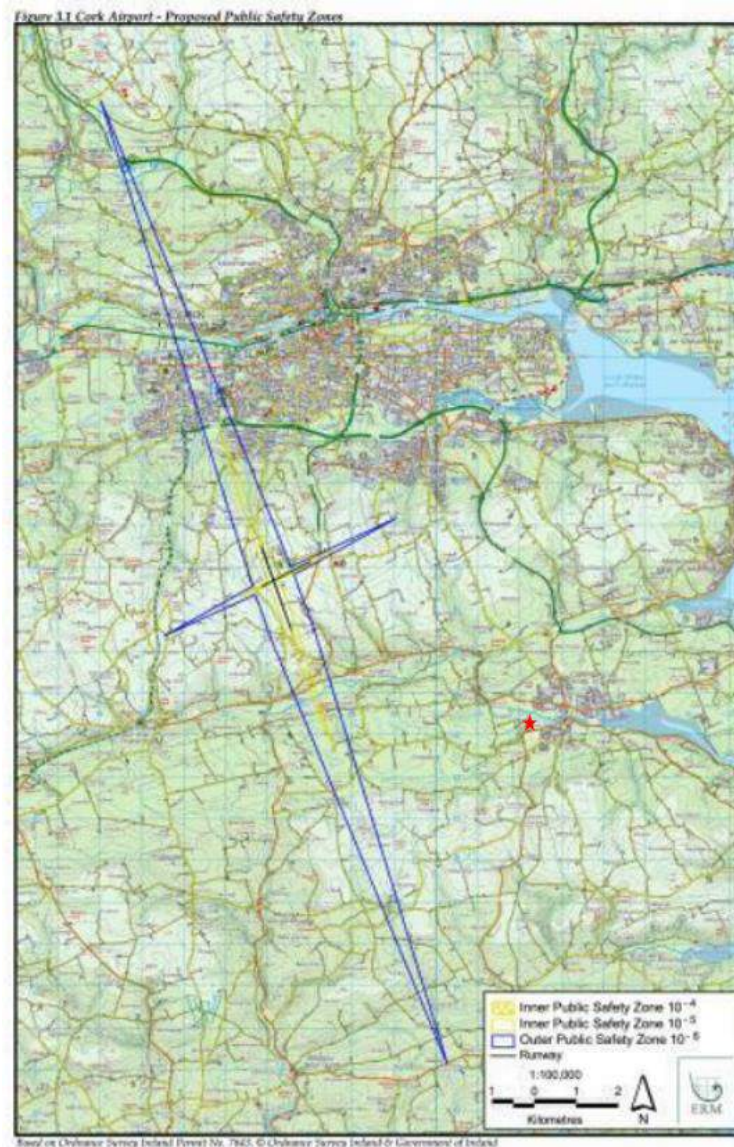


Figure 13-1: Cork Airport Proposed Public Safety Zones – the Site of the Proposed Development is represented by a red star and the blue line demarcates the Outer Public Safety Zone

13.4 Cumulative Impacts

The cumulative effects of Proposed Development on Major Accidents and Disasters have been assessed taking other planned, existing and permitted developments in the surrounding area into account. All planning permission applications that have been granted and developed have been incorporated into the baseline assessment of this application.

As noted in Table 13-3, the Site of the Proposed Development is not an industrial site, and is not regulated, connected to or close to any site regulated under the COMAH Regulations. Additionally, there are no developments under construction or proposed in the vicinity of the Site of the Proposed Development which will be regulated under the COMAH Regulations, and so there is no potential for cumulative impacts relating to major accidents involving dangerous substances.

All cumulative impacts have been detailed in the relevant technical Chapters and are summarised in Chapter 15.

13.5 Residual Impacts

Through the implementation of mitigation measures detailed in the relevant technical Chapters of this EIAR, there are no identified incidents or examples of major accidents and or natural disasters that present a sufficient combination of risk and consequence that would lead to significant residual impacts or environmental effects as a result of the Proposed Development, alone or in combination with other projects.

The residual impacts will be negligible once all control, mitigation and monitoring measures have been implemented.

13.6 Monitoring

All monitoring proposals for the risks identified in Table 13-3 have been detailed in the relevant technical chapters as listed in Table 13-3 and are included in Chapter 15 Mitigation Measures and Monitoring.

13.7 Difficulties Encountered

No difficulties were encountered in completing this Risk Chapter.

13.8 References

- Chapter 4-12 of Volume 2 of this EIAR
- Environmental Resources Management Ireland Ltd (2005) Public Safety Zones Report
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft).
- Garda Mapping Section – Seveso Sites Ireland WebMap [Viewed Online 03.05.2022] <https://www.arcgis.com/home/item.html?id=a01b5a0a6ff24f10adff30beaa3b6fd0>
- Office of Emergency Planning (2020) 'A National Risk Assessment for Ireland 2020' Department of Defence Publication
- Statutory Instrument (SI). No. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018

14 INTERACTIONS

14.2 Introduction

As a requirement of Planning Regulations and the Environmental Protection Agency's 'Guidelines on information to be contained in Environmental Impact Assessment Reports' (2022), interrelationships between various environmental aspects must be considered when assessing the impact of the Proposed Development, as well as individual significant impacts. The significant impacts of the Proposed Development and the proposed mitigation measures have been detailed in the relevant chapters of this report. However, as with all developments that pose potential environmental impacts, there also exists potential for interactions/interrelationships between the impacts of different environmental aspects. The results may exacerbate or ameliorate the magnitude of impacts. This chapter of the EIAR addresses the interactions between the various environmental factors of the Proposed Development.

The following Section is directed by Article 3 section 1(e) of the EIA Directive. The EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (May 2022) and Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015) were also considered.

Article 3 of the Directive states:

1. The environmental impact assessment will 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)

14.3 Study Methodology

The interactions between impacts on different environmental factors have been addressed throughout this EIAR. Close co-ordination and management with the EIAR team was carried out to ensure that all likely relevant interactions were addressed at the scoping stage of the EIAR and interactions have been adequately assessed.

Following an assessment of the EIAR, a matrix was produced to display where interactions between impacts on different factors have been addressed. This has been carried out by use of chapter headings included in the EIAR and details of any interaction during all phases of the Proposed Development.

14.4 Interactions

The following matrix has been produced to show where potential significant interactions between effects on different factors have been addressed, see Table 14-1.

As this EIAR has been prepared by a number of specialist consultants, an important aspect of the EIA process was to ensure that interactions between the various disciplines have been taken into consideration. The principal interactions requiring information exchange between the environmental specialists and the design team are summarised in Table 14-2 to Table 14-10.

Table 14-1: Interactions between Factors

Interaction	4. Population and Human Health	5. Biodiversity	6. Land and Soils	7. Hydrology and Hydrogeology	8. Air Quality & Climate	9. Noise & Vibration	10. Landscape & Visual Amenity	11. Archaeology, Architecture & Cultural Heritage	12. Material Assets – Waste & Utilities	12. Material Assets – Traffic
Population and Human Health	N/A	Interaction	No Interaction	No Interaction	No Interaction	No Interaction	No Interaction	Interaction	No Interaction	No Interaction
Biodiversity	Interaction	N/A	No Interaction	No Interaction	Interaction	No Interaction	Interaction	Interaction	Interaction	Interaction
Land and Soils	No Interaction	No Interaction	N/A	No Interaction	Interaction	Interaction	No Interaction	No Interaction	No Interaction	Interaction
Hydrology and Hydrogeology	No Interaction	No Interaction	No Interaction	N/A	Interaction	Interaction	Interaction	Interaction	Interaction	Interaction
Air Quality and Climate	No Interaction	Interaction	Interaction	Interaction	N/A	Interaction	Interaction	Interaction	Interaction	No Interaction
Noise & Vibration	No Interaction	No Interaction	Interaction	Interaction	Interaction	N/A	Interaction	Interaction	Interaction	No Interaction
Landscape & Visual Amenity	No Interaction	Interaction	No Interaction	Interaction	Interaction	Interaction	N/A	No Interaction	Interaction	Interaction
Archaeology, Architectural and Cultural Heritage	Interaction	Interaction	No Interaction	Interaction	Interaction	Interaction	No Interaction	N/A	Interaction	Interaction
Material Assets – Waste & Utilities	No Interaction	Interaction	No Interaction	Interaction	Interaction	Interaction	Interaction	Interaction	N/A	No Interaction
Material Assets – Traffic	No Interaction	Interaction	Interaction	Interaction	No Interaction	No Interaction	Interaction	Interaction	Interaction	N/A

No Interaction	
Interaction	
N/A	

Table 14-2 Population and Human Health

Population and Human Health	
Summary	
<p>Chapter 4 of this EIAR, <i>Population and Human Health</i>, details the direct and indirect effects of the Proposed Development on Population and Human Health; and sets out any required mitigation measures where appropriate.</p> <p>During the construction phase noise, dust, traffic and land and soil will be the key environmental factors that will have an impact on population and human health. During the operational phase noise, air, traffic and landscape and visual will be the key environmental factors that will have an impact on population and human health.</p>	
Interactions	
Land and Soil	<p>During construction works offsite removal of surplus soil will be required. The necessary mitigation measures will be implemented to address any nuisance issues associated with dust dispersion during this time. No public health issues associated with the land, soil, geology conditions at the Site have been identified for the Construction Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers.</p>
Hydrology and Hydrogeology	<p>No public health issues associated with the water (hydrology and hydrogeology) conditions at the Proposed Development Site have been identified for the Construction Phase or Operational Phase of the Proposed Development.</p> <p>Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.</p>
Air Quality & Climate	<p>Interactions between Air Quality and Population and Human Health have been considered as the Construction Phase has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic-related pollutants have been assessed and determined as imperceptible, therefore air quality impacts from the Proposed Development are not expected to have a significant impact on population and human health.</p>
Noise and Vibration	<p>The impact assessment of noise and vibration has concluded that additional noise associated with the operation of on-site machinery will be intermittent and will not create any major negative impacts beyond the Site boundary.</p>

	Mitigation and monitoring measures will be incorporated to further reduce the potential for noise generation from the Proposed Development.
Landscape and Visual	During the Construction Phase there will be visual changes associated with removal of trees and hedgerows and emerging plant and machinery. During the Operational Phase there will be permanent visual changes to the landscape which may impact residential dwellings surrounding the Proposed Development. A full impact assessment has been carried out in Chapter 10 Landscape and Visual to quantify this impact.
Material Assets: Waste and Utilities	The improper removal, handling and storage of hazardous waste could negatively impact on the health of construction workers. Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health.
Material Assets: Traffic	There can be a significant interaction between population and human health and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect Air Quality and thus Population and Human Health have been deemed as insignificant.
Conclusions	
<p>The Proposed Development is considered to have a slight positive impact during both the Construction and Operational Phase of the development, both directly and indirectly, to the local economy and employment. Adverse impacts on Population and Human Health are not expected to occur and any potential interactions with impacts of other environmental aspects, as outlined in this EIAR, are insignificant.</p>	

Table 14-3: Biodiversity

Biodiversity	
Summary	
<p>Chapter 5 of this EIAR, <i>Biodiversity</i>, details the direct and indirect effects of the Proposed Development on the local flora and fauna; and sets out any required mitigation measures where appropriate.</p> <p>The potential impacts of the Proposed Development on the identified Key Ecological Resources (KERs) associated with the Site of the Proposed Development are assessed including both habitats and species / species groups.</p>	
Interactions	
Land and Soil	<p>An assessment of the potential impact of the Proposed Development on the existing land, soils and geological environment, with emphasis on the extraction and infilling of material; and the potential accidental release of contaminated materials to ground during Operational Phase of the Proposed Development, is included in Chapter 6 Land, Soil and Geology. Measures for the mitigation of these impacts are also set out in Chapter 6.</p>
Hydrology	<p>An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is included in Chapter 7 of this EIAR. Procedures for dealing with silt laden runoff at the Site; potential spills/leakages of fuels/contaminants; and the protection of nearby watercourses are outlined in Chapter 7.</p>
Noise and Vibration	<p>An assessment of the potential impact of the Proposed Development in the form of excess noise and vibrations associated with the proposed works are laid out in Chapter 9 - Noise and Vibration. These impacts are relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Biodiversity Chapter.</p>
Conclusions	
<p>A suite of mitigation measures have been outlined and provided all these mitigation measures are implemented in full, and remain effective throughout the lifetime of the Proposed Development, no significant negative impacts on the local ecology or on any designated nature conservation sites are expected from the Proposed Development.</p>	

Table 14-4: Land and Soils

Land and Soil	
Summary	
<p>Chapter 6 of this EIAR, <i>Land and Soil</i>, details the direct and indirect effects of the Proposed Development on the local land, soils, and geology; and sets out any required mitigation measures where appropriate. The potential impacts on Land and Soil have been identified as follows;</p> <ul style="list-style-type: none"> • Land Take and Land Use • Excavation and Removal of Soil and Bedrock • Importation of Aggregates • Geological Hazards • Soil Structure • Soil Quality and Contamination • Human Health 	
Interactions	
Population and Human Health	<p>No public health issues associated with the land, soil, geology conditions at the Site have been identified for the Construction Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers. The necessary measures will also be implemented to address any nuisance issues associated with dust dispersion during construction works including the offsite removal of surplus soil.</p> <p>The impacts of the Proposed Development to Population & Human Health are included in Chapter 4 of this EIAR.</p>
Biodiversity	<p>An assessment of the potential impacts of the Proposed Development on the Biodiversity of the Proposed Development Site, with emphasis on habitats, flora and fauna which may be impacted a result of the Proposed Development are included in Chapter 5 of this EIAR. It also provides an assessment of the impacts of the Proposed Development on habitats and species, particularly those protected by national and international legislation or considered to be of particular conservation importance and proposes measures for the mitigation of these impacts.</p>
Hydrology and Hydrogeology	<p>An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is included in Chapter 7 of this EIAR. Procedures for protection of receiving water environment are set out in Chapter 7 of this EIAR.</p>

Landscape and Visual	During the construction phase the site landscape will undergo a change from agricultural land to a residential development with extensive landscaping. An assessment of the potential impact of the Proposed Development on the receiving landscape is included in Chapter 10 of this EIAR.
Archaeology and Cultural Heritage	While there was no definitive evidence identified for the presence of unrecorded archaeological sites or features within the Proposed Development Site, the Archaeological Impact Assessment (John Cronin & Associates Ltd., 2022) identifies that the undisturbed portions of the subject site possess a moderate to high archaeological potential. An assessment of the potential impact of the Proposed Development on archaeology is included in Chapter 11 of this EIAR.
Material Assets	An assessment of the potential impact of the Proposed Development on the material assets including built services, infrastructure, traffic, and waste management is included in Chapter 12 of this EIAR.
Conclusions	
<p>The facility design has incorporated many features which will limit the exposure of soil and groundwater to contamination. The mitigation measures outlined in the CEMP and the respective Chapters outlined above, will ensure that there will be no significant adverse impacts on the receiving land, soil and geology associated with the Construction Phase and the Operational Phase of the Proposed Development.</p>	

Table 14-5: Hydrology and Hydrogeology

Hydrology and Hydrogeology	
Summary	
<p>Chapter 7 of this EIAR, <i>Hydrology and Hydrogeology</i>, provides an assessment of the potential impacts of the Proposed Development on hydrology, water and hydrogeology and sets out any required mitigation measures where appropriate.</p> <p>The main activities predicted to have an impact relating to Hydrology are;</p> <ul style="list-style-type: none"> • Modifications to the hydraulic characteristics and natural hydrological regime of the river • Contamination of the river as result of silty water runoff, anthropogenic substances, and increased sediment loading • Accidental spillage of oil and chemicals • Increased impermeable surface area potentially increasing surface water runoff and flooding downstream • Contamination risks arising from the Proposed Development discharges, leaking pipes (sewer), contaminated water, etc. <p>The main activities predicted to have an impact relating to Hydrogeology are;</p> <ul style="list-style-type: none"> • Effects of dewatering; • Pollution from construction activities; • Loading bay and flood alleviation storage crates impacting groundwater levels or recharge 	
Interactions - Hydrology	
Population and Human Health	<p>No public health issues associated with the water (hydrology and hydrogeology) conditions at the Proposed Development Site have been identified for the Construction Phase or Operational Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.</p> <p>It is noted that specific issues relating to Public Health associated with the Proposed Development are set out in Chapter 4 of this EIAR.</p>
Land and Soils	<p>An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is included in Chapter 7 of this EIAR. Procedures for protection of receiving water environment are set out in Chapter 7 of this EIAR.</p>
Biodiversity	<p>Removal of soil/subsoils can increase sediment discharge to the Owenboy River and groundwater vulnerability. A number of mitigation measures have been detailed in the CEMP and NIS (Enviroguide Consulting, 2022) and Chapter 5 Biodiversity of this EIAR to ensure there will be no significant impacts in relation to Hydrology and Biodiversity.</p>

Conclusions

Overall, there will be no significant adverse impacts as a result of the Proposed Development on the receiving groundwater and surface water environment. The mitigation measures that will be applied as per the CEMP and Chapter 7 Hydrology and Hydrogeology will ensure that the Proposed Development will not give rise to any likely significant impacts.

Table 14-6: Air Quality & Climate

Air Quality & Climate	
Summary	
<p>Chapter 8 of this EIAR (Section 8.1 Air Quality and Climate and Section 8.2 Microclimate), provides an assessment of the potential impacts of the Proposed Development on ambient air quality and climate, and sets out appropriate mitigation measures where necessary.</p> <p>The main air quality impacts that may arise during construction activities are:</p> <ul style="list-style-type: none"> • Dust deposition; • Elevated particulate matter concentrations (PM₁₀ and PM_{2.5}) as a result of dust generating activities on Site; and • An increase in concentrations of airborne particles, volatile organic compounds, nitrogen oxides, and sulphur oxides due to exhaust emissions from diesel powered vehicles and equipment on Site (non-road mobile machinery) and vehicles accessing the Site. 	
Interactions – Air Quality & Climate	
Population and Human Health	<p>Interactions between Air Quality and Population and Human Health have been considered as the Operational Phase has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic-related pollutants have been assessed and determined as having an overall insignificant impact, therefore air quality impacts from the Proposed Development are not expected to have a significant impact on population and human health.</p>
Material Traffic Assets:	<p>There can be a significant interaction between air quality, climate, and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect Air Quality and Climate have been deemed as insignificant. Therefore, the impact of the interaction between air quality and climate is insignificant.</p>
Conclusions	
<p>Appropriate mitigation measures have been recommended and will be implemented at the Site to minimise the risk of dust emissions arising during the Construction Phase. These mitigation measures</p>	

have been outlined in the Construction Environmental Management Plan (CEMP) (Enviroguide Consulting 2022) for the Site, and provided such measures are adhered to, it is not considered that significant air quality impacts will occur.

Table 14-7: Noise and Vibration

Noise and Vibration	
Summary	
<p>Chapter 9 of this EIA, <i>Noise and Vibration</i>, provides a description and assessment of the likely impact of the proposed activities from noise, and sets out appropriate mitigation measures where necessary.</p> <p>The noise and vibration generating activities associated with the Site are as follows:</p> <ul style="list-style-type: none"> • Site clearance; • Building construction works; and • Trucks and vehicles entering and exiting the Site. 	
Interactions	
Population and Human Health	<p>The impact assessment of noise and vibration has concluded that additional noise associated with the operation of on-site machinery will be intermittent and will not create any major negative impacts beyond the Site boundary. Mitigation and monitoring measures will be incorporated to further reduce the potential for noise generation from the Proposed Development. It is noted that specific issues relating to Population and Human Health associated with the Proposed Development are set out in Chapter 4 of this EIA.</p>
Biodiversity	<p>Interactions between noise and vibration and biodiversity have been considered as the Proposed Development has the potential to cause short-term impacts on biodiversity as a result of noise and vibration in the absence of mitigation measures. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are neutral and biodiversity will not be affected. An assessment of the potential impact of the Proposed Development on biodiversity is included in Chapter 5 of this EIA.</p>
Material Traffic Assets:	<p>The Proposed Development will have no significant impact on overall traffic volumes and therefore traffic will not result in any significant increases of noise at sensitive receptors.</p>
Conclusions	
<p>No traffic routes are predicted to experience increases of more than 25% in total traffic flows as a result of the Proposed Development. The impact of noise from operational traffic will be negligible and will not have a negative impact. During Construction, predicted noise levels at the closest</p>	

residential noise sensitive locations are expected to be lower than set out in BS 5228-1 and the inverse square law. Therefore it is not envisaged for any excessively noisy activities to be carried out over extended periods of time during the construction stage. Mitigation measures as detailed in Section 9.6 of this EIAR, will be implemented to reduce any potential impacts.

Table 14-8: Landscape and Visual

Landscape and Visual	
Summary	
<p>Chapter 10 of the EIAR, <i>Landscape and Visual</i>, provides a description and assessment of the likely impact of the Proposed Development on the landscape and visual amenities of the area.</p> <p>The subject site will be transformed from its greenfield condition to a mixed residential development, retail outlet and town park. Based on this transformation, the Proposed Development has the potential to impact both sensitive visual receptors such as residents and other visual receptors in the vicinity of the Proposed Development Site.</p>	
Interactions	
Population and Human Health	<p>During the Construction Phase there will be visual changes associated with removal of trees and hedgerows and emerging plant and machinery. During the Operational Phase there will be permanent visual changes to the landscape which may impact residential dwellings surrounding the Proposed Development.</p>
Land and Soil	<p>During the construction phase the site landscape will undergo a change from agricultural land to a mixed residential development with extensive landscaping. Excavation of soil and subsoils will be required to an anticipated maximum depth of 2.0mbGL at the Proposed Development Site. The removal of surplus soil offsite will be undertaken in accordance with applicable statutory requirements.</p>
Archaeology and Cultural Heritage	<p>As there are no known archaeological or architectural remains found during the desk top survey or field survey is not predicted that any changes in landscape or visual impact will affect in any way the archaeology of the area.</p>
Conclusions	
<p>The subject site will be transformed from its greenfield condition to a residential neighbourhood, retail outlet and town park. The landscape effect is considered to be significant, on the landscape of the site and its immediate vicinity. The magnitude of change as a result of the Proposed Development is considered Medium. The development will provide a distinctive intervention at the edge of the town and define a new sense of place in the context of the town and its amenities and pedestrian/cyclist connectivity. These attributes are beneficial aspects of effect on the suburban landscape.</p>	

Table 14-9: Archaeology and Cultural Heritage

Archaeology and Cultural Heritage	
Summary	
Chapter 11 of the EIAR, <i>Archaeology and Cultural Heritage</i> , provides information on the known architectural, archaeological and cultural heritage sites in the study area.	
Interactions	
Land and Soil	Excavation of soil and subsoils will be required to an anticipated maximum depth of 2.0mbGL at the Proposed Development Site. While there was no definitive evidence identified for the presence of unrecorded archaeological sites or features within the Proposed Development Site, the Archaeological Impact Assessment (John Cronin & Associates Ltd., 2022) identifies that the undisturbed portions of the subject site possess a moderate to high archaeological potential.
Landscape and Visual	As there are no known archaeological or architectural remains found during the desk top survey or field survey is not predicted that any changes in landscape or visual impact will affect in any way the archaeology of the area.
Conclusions	
Subject to implementation of all mitigation measures detailed in Chapter 11 of this EIAR, there will be no negative impacts upon the archaeological or cultural heritage resource.	

Table 14-10: Material Assets - Traffic, Waste and Utilities

Material Assets, Traffic, Waste and Utilities	
Summary	
Chapter 12 of the EIAR, <i>Material Assets</i> , provides an assessment of the potential impacts of the Proposed Development on Material Assets including traffic, built services and infrastructure.	
Interactions - Traffic	
Population and Human Health	During the Construction Phase there will be an increase in traffic movements. It is estimated that over the entire construction period that 2 HGVs and 25 Cars/LGVs are expected to travel to and from the site each working day. Mitigation measures are outlined in Chapter 8 Air Quality and Chapter 12.1 Traffic to ensure there will be no significant impacts on Population and Human Health as a result of traffic.
Air Quality and Climate	There can be a significant interaction between air quality, climate and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect Air Quality and Climate have been deemed as insignificant. Therefore, the impact of the interaction between air quality and climate is insignificant.
Material Assets: Waste and Utilities	Collection of waste materials at the Proposed Development have the potential to impact upon traffic movements in the Carrigaline area during the Construction and Operational Phases. Potential impacts on traffic are addressed in Chapter 12, Section 12.1.
Interactions - Waste and Utilities	
Population and Human Health	The improper removal, handling and storage of hazardous waste could negatively impact on the health of construction workers. Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health. Potential impacts on population and human health are addressed in Chapter 4.
Biodiversity	The improper handling and storage of waste during the Construction and Operational Phases could negatively impact on biodiversity. Potential impacts on biodiversity are addressed in Chapter 5 (Biodiversity).
Land and Soil	Improper handling and segregation of hazardous or contaminated wastes could lead to the contamination of soil and stones excavated from the site. Potential impacts on land and soils are addressed in Chapter 6.

Hydrology and Hydrogeology	Any connections to the public water network (water supply or foul sewer) during the Construction and Operational Phases will be under consent from Irish Water. Potential impacts on water are addressed in Chapter 7.
Traffic	Waste collection activities at the Proposed Development have the potential to impact upon traffic movements in the Carrigaline area. Potential impacts on traffic are addressed in Chapter 12, Section 12.1.
Conclusions	
Subject to implementation of all mitigation measures, there will be no negative residual impacts upon the Material Assets, Traffic, Waste and Utilities.	

14.5 References

EIAR Chapters 4 to 12 inclusive.

15 MITIGATION AND MONITORING MEASURES

15.2 Introduction

This EIAR has assessed the impacts and resulting effects likely to occur as a result of the Proposed Development on the various aspects of the receiving environment.

The Proposed Development will be operated in a manner that will ensure that the potential impacts on the receiving environment are avoided where possible. In cases where impacts or potential impacts have been identified, mitigation measures have been proposed to reduce the significance of particular impacts. These mitigation recommendations are contained within each chapter exploring specific environmental aspects.

This chapter of the EIAR collates and summarises the mitigation commitments made in Chapter 4 to Chapter 12.

15.3 Summary of Mitigation Measures

15.3.1 Population and Human Health

No likely negative impacts have been identified for the population or land use. Therefore, no mitigation measures are required.

The Proposed Development has been designed to avoid negative impacts in relation to local amenities and recreational facilities by:

- Incorporating the provision of a creche within the design proposal.
- Incorporating amenity facilities within the layout, including a large open space area, play areas and kick about areas, as well as the provision for walking and cycling trails throughout the development that brings further connectivity to the town centre.

Accordingly, no further mitigation measures are required.

No significant risks to human health have been identified within this discipline in relation to the operational phase of the development. Accordingly, no further mitigation measures are required.

15.3.1.1 Construction Phase

15.3.1.1.1 Mitigation

During the construction phase, safety will be a primary concern. A Project Supervisor for the Construction Process (PSCP) will be appointed to oversee site safety. A contractor safety management programme will be implemented identifying potential hazards associated with the proposed works. Temporary contractor facilities and areas under construction will be fenced off from the public with adequate warning signs of the risks associated with entry to these facilities. Entry to these areas will be restricted and they will be kept secure when construction is not taking place. Measures to ensure public safety, with respect to construction

traffic will be included in the final Traffic Management Plan, to be agreed with the Planning Authority prior to commencement of development.

15.3.1.1.2 Monitoring

No specific monitoring is proposed. In general, monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission. Monitoring of compliance with Health and Safety requirement will be undertaken by the Project Supervisor for the Construction Stage (PSCS).

15.3.1.2 Operational Phase

15.3.1.2.1 Mitigation

Measures to avoid potential negative impacts on population and human health have been fully considered in the design of the project and are integrated into the final layout and design. Compliance with the layout and design will be a condition of the permitted development. As such no mitigation measures are required.

15.3.1.2.2 Monitoring

No specific monitoring is proposed. In general, monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission.

15.3.2 Biodiversity

15.3.2.1 Mitigation by Design

15.3.2.1.1 Landscape Plan

Tree Retention

As part of the proposed landscape plan, the majority of the trees present on Site will be retained and incorporated into the final landscape design. In total, there are 19 trees on-site of which 13 will be retained. The trees to be felled were identified in the arborists report as being in “*poor*” condition, suffering from disease, having poor structure or posing a health and safety risk. Species which will be felled include Sycamore, Ash and Alder.

Additional tree planting and habitat creation

While the loss of the 6 no. felled trees will have an initial impact on canopy cover, visual appearance and biodiversity value, the landscaping strategy for the development proposal has taken into consideration loss of existing trees and includes new tree planting which will help to mitigate the initial loss and have a positive impact on the visual appearance, amenity and biodiversity value of the Proposed Development. In total, 252 trees of six different species will be planted across the Site (Table 15-1). The majority of planting will occur in the amenity area to the north of the Site and along the Owenboy River. This will mitigate for the trees lost during the Construction Phase and result in a net gain in tree cover at the Site. However, the landscape plan does not implement a “like for like” planting approach for the felled native trees. This will result in the complete loss of native ash trees and a reduction in the number of native alder trees on Site. Therefore, it is recommended that “like for like” planting be implemented for native trees which are felled (i.e. 2x Ash and 2x Alder).

The riparian zone immediately to the south of the Owenboy River comprised of existing trees and riverbank vegetation will be retained in its natural condition and supplemented with additional native tree planting. This will provide a buffer zone between the waters edge and the river walkway. The river walkway will also be set back a minimum of 7m from the edge of the riverbank to protect and help safeguard the sensitive riparian zone as a biodiversity corridor and reduce visual and noise disturbance to river fauna. Groups of native trees will be planted within the zone in consultation with the project ecologist to help stabilise the bank and increase its habitat value. A native wildflower meadow and temporary pond will be included in the amenity area to the north of the Site. These habitats are designed to support and enrich the biodiversity and habitat value of the Site. Several, mostly non-native shrub species are to be included on-site. However, Hardy fuchsia (*Fuchsia magellanica*) is considered to be invasive in the All-Ireland Pollinator Plan (2015-2020) and will not be planted. Therefore, Hardy Fuchsia will be removed from the planting listed and substituted with an appropriate native alternative.

Table 15-1 Species to be planted on Site. Hardy fuchsia (*Fuchsia magellanica*) will be removed from planting list by landscape architects.

Vegetation Type	Species
Trees	Sessile Oak (<i>Quercus petraea</i>)
	<i>Prunus</i> sp.
	Ulmus 'Lobel'
	Field Maple (<i>Acer campestre</i>)
	Small leaf lime (<i>Tilia cordata</i>)
	Silver Birch (<i>Betula pendula</i>)
Shrubs	Privet Honeysuckle (<i>Lonicera pileate</i>)
	English Lavender (<i>Lavanula 'Hidcote'</i>)
	Hardy fuchsia (<i>Fuchsia magellanica</i>)
	Silver Queen (<i>Euonymus fortune</i>)
	St John's Wort (<i>Hypericum "Hidcote"</i>)
	Japanese Spurge Green Carpet (<i>Pachysandra terminalis</i>)
	Crococsmia (<i>Crococsmia 'Lucifer'</i>)
	<i>Erysimum</i> sp.
	Japanese Skimmia (<i>Skimmia japonica</i>)
	Shrubby cinquefoil (<i>Potentilla fruticosa</i>)
	Sarcococca sp.
	<i>Pittosporum tobira 'Nanum'</i>
	Rosemary (<i>Rosmarius offiialis</i>)
Wild flowers	Black Meddick (<i>Medicago lupulina</i>)
	Centaury (<i>Centaureum erythraea</i>)
	Cornflower (<i>Centaurea cyanus</i>)
	Cowslip (<i>Primula veris</i>)
	Devil's Bit Scabious (<i>Succisa pratensis</i>)
	Eyebright (<i>Euphrasia</i>)
	Kidney Vetch (<i>Anthyllis vulneraria</i>)
	Lady's Bedstraw (<i>Galium verum</i>)
	Marjoram (<i>Origanum majorana</i>)
	Oxeye Daisy (<i>Leucanthemum vulgare</i>)
	Yarrow (<i>Achillea millefolium</i>)
	Yellow Rattle (<i>Rhinanthus minor</i>)
	Red Bartsia (<i>Odontites vernus</i>)

- Sedum carpet to apartment block rooftops to capture, and attenuate stormwater run-off whilst providing a source of food/foraging for pollinating and nectar-feeding insects.
- A proprietary petrol interceptor which prevents petroleum products from entering watercourses and public sewers is included in the design.
- A proprietary modular block attenuation system with a maintenance/inspection tunnel for providing underground surface water attenuation storage and can infiltrate run-off is included in the design.

This will reduce the flow rate of surface water run-off and largely eliminate the risk of pollution to waterbodies arising from surface water run-off during the Operational Phase of the Proposed Development.

15.3.2.1.3 Lighting Plan

To protect bats and other wildlife from night-time lighting associated with the Operational Phase of the Proposed Development, the following Bat Conservation Trust (BCT) Lighting Guidelines (BCT, 2018) are incorporated in the lighting plan.

- *All luminaires used will lack UV/IR elements to reduce impact.*
- *LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.*
- *A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).*
- *Column heights will be carefully considered to minimise light spill. The shortest column height allowed will be used where possible.*
- *Only luminaires with an upward light ratio of 0% and with good optical control will be used.*
- *Luminaires will be mounted on the horizontal, i.e., no upward tilt.*
- *Accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed if deemed necessary by a suitable qualified bat ecologist.*

The lighting along the Owenboy River walkway will be composed of low level (950mm) lighting bollards. These bollards comply with the above BCT guidelines and have an asymmetric light output to light the pathway area only. This will prevent excessive lighting of the Owenboy River and adjacent treelines which is important foraging and commuting habitat for bats and other wildlife.

15.3.2.2 Construction Phase

15.3.2.2.1 Mitigation

15.3.2.2.1.1 Tree Protection

Several protection measures will be implemented for the 13 trees that are to be retained including:

Protective barriers: which are 2.3m high and comprise a vertical and horizontal framework of scaffolding (BS 5837:2012), well braced to resist impacts and securely supporting weldmesh panels will be erected around the base of all trees to be retained on-site. This barrier will be clearly identified on-site by the attachment of all – weather signs of suitable dimension

stating: '*CONSTRUCTION EXCLUSION ZONE – NO ACCESS*'. The line of this fence will be at least the distance defined in the Root Protection Area. No construction traffic, materials or debris will be permitted within this zone of protection.

Access facilitation pruning: If it is deemed appropriate to trim back retained trees to provide adequate access to approved construction works, all such tree works will be undertaken by a competent and suitably qualified tree surgeon. Such works will remedy any tree related conflict with proposed structures or access in a way that ensure that not less than 70% of live buds are retained within the tree canopy. The aim of the tree works will be to retain the general form of the tree by a combination of crown thinning, reduction of end weight and the re-forming of the trees crown to create a pleasing and balanced crown. No branch, limb of trunk greater than 100mm diameter will be cut in the process of reducing end weight.

Demolition within the zone of protection: If it is deemed necessary to carry out demolition works within a construction exclusion zone surrounding retained trees, for example to remove existing paths or kerbs, only pedestrian operated plant or low ground pressure plant that is less than 2 tonnes gross weight fully loaded will be permitted. Such plant will only be operated on existing hard surfaces, or where temporary surfaces have been established. No excavations within the root protection zone of these retained trees will be permitted, except only under supervision or a suitably qualified arborist, with the use of an air spade or by careful use of hand tools in a way that retains, without damage, all exposed roots with a diameter greater than 25mm.

Scaffolding within zone of protection: Where scaffolding is to be established within the 'zone of protection' surrounding retained trees, the existing undisturbed ground surface will be protected by a layer of sharp sand, approximately 50mm thick, overlaid with a geotextile membrane. Stout planks, such as closely side butted scaffold boards, will be laid over the geotextile membrane and scaffolding will be constructed on these planks with additional stays as directed by a competent person. Adequate protection fencing will be maintained between scaffolding and adjacent trees.

Construction of hard surfaces close to retained trees: Where permanent surfaces are to be constructed close to retained trees, within the zone of protection as defined by BS 5837 : 2012, carefully remove accumulated organic material and loose soil, leaving existing topsoil in situ. Protect the root zone with a layer of sharp sand and geotextile membrane and a three-dimensional cell product as defined by a competent Civil or Structural Engineer. Construct the paved area on this sub-base using established design guidelines and a no fines granular material with a porous surface finish such as pavers or porous bitmac.

Alterations of levels on lands adjoining construction exclusion zones: Where it is deemed appropriate to lower ground levels on land adjoining a root protection zone established around a retained tree, all excavations and the subsequent construction supporting structures will be managed in a way that excludes access by construction traffic to the construction exclusion zone. Where such alterations result in the lowering of existing surfaces, the existing ground water environment within the root protection zone will be maintained by the insertion of a root barrier behind proposed supporting structures. This will consist of a non-porous barrier carefully inserted in a way that maintains the existing soil moisture regime surrounding the retained tree. Where alterations result in the raising of levels, these will be designed and detailed by a competent Civil or Structural Engineer to ensure no alterations to ground conditions within the root protection zones.

Landscaping within the root protection zone: If it is deemed necessary to carry out landscaping, planting or re-instatement works within a construction exclusion zone surrounding retained trees, only pedestrian operated plant, or low ground pressure plant that is less than 2 tonnes gross weight fully loaded, will be permitted. Such works will be supervised by a competent Horticulturalist and be timed and designed to ensure that no soil compaction occurs. No excavations within the root protection zone of these trees will be permitted, except under supervision using an air spade or by careful use of hand tools in a way that retains, without damage, all exposed roots with a diameter greater than 25mm.

Temporary surfaces within zone of protection: Where temporary access is to be established within the 'zone of protection' surrounding retained trees, ground surfaces will be protected by a layer of sharp sand, approx. 50mm thick, overlaid with a geotextile membrane on which temporary surface of no fines granular material (compression resistant for example woodchip) at least 150mm thick is laid. Where traffic is turning on this surface, stout planks will be laid over the geotextile membrane and below the granular material.

15.3.2.2.1.2 Surface water mitigation

The following measures set out below will protect surface waters throughout the Construction Phase:

All works carried out as part of the Proposed Development will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990.

Personnel working on the Site will be trained in the implementation of environmental control and emergency procedures. Procedures and relevant documents produced will be formulated in consideration of standard best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004;
- Construction Industry Research and Information Association CIRIA C648: Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006);
- CIRIA C648: Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006); and
- Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.

The following standard operational measures will protect surface water and groundwater during the Construction Phase of the Proposed Development:

- Discharge water generated during placement of concrete will be stored and removed off site for treatment and disposal.

- There will be no washing out of any concrete trucks on-site.
- Specific areas for storage, delivery, loading/unloading of materials will be designated, which will have appropriate containment/spill protection measures where required.
- Leachate generation from stockpiles or waste receptacles will be prevented from entering groundwaters or surface waters by using waterproof covers.
- If contaminated soils are encountered during construction works or if material becomes contaminated by, for example a fuel spill or hydraulic fluid leak the contaminated materials will be segregated, placed on an impermeable membrane so as to prevent contamination of the underlying ground and covered to prevent contaminants being mobilised by rainwater run-off. The materials will remain covered until such time as they can be compliantly removed from site by appropriately authorised waste management contractors.
- Prolonged exposure of contaminated soils or groundwater to the atmosphere will be avoided where practical or unnecessary.
- A regular review of weather forecasts of heavy rainfall will be conducted, and a contingency plan will be prepared for before and after such events to minimise any potential nuisances.
- Refuelling of plant during the Construction Phase will only be carried out at designated refuelling station locations on-site. Each station will be fully equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed before the commencement of works on-site.
- Appropriate bunding, storage and signage arrangements for all deleterious substances will be used.
- Robust and appropriate Spill Response Plan and Environmental Emergency Plans will be implemented for the duration of the works.
- Control measures and spill clean-up equipment adequate to treat spills at the Site will be available and staff will be trained and experienced in using said equipment.
- A register will be kept of all hazardous substances either used on-site or expected to be present. The register will be available at all times and will include as a minimum: valid safety sheets; Health & Safety, environmental controls to be implemented when storing, handling, using and in the event of spillage of materials; emergency response procedures/precautions for each material; the Personal Protective Equipment (PPE) required when using the material.
- All existing services will be mapped, and a plan will be put in place to decommission/divert and manage any drains or sewers which are associated with the Site.
- A plan for dealing with any unknown drains or services which may be encountered during the works will be set out in the CEMP and implemented.
- Any drains or sewers which could act as pathways for contamination from the Site will be blocked where required. Alternatively, storm drain inlets which could receive stormwater from the project will be protected throughout the Construction Phase. Inlet protection will be installed before soil-disturbing activities begin

Direct Watercourse Protection

To prevent direct surface water run-off containing sediment/pollutants entering the Owenboy River, silt trapping measures will be implemented. This will be achieved by the construction of

a filter berm along the northern Site boundary adjacent to the Owenboy River. A filter berm is designed to control erosion and sedimentation by reducing the rate of surface water run-off. The berm will be constructed using aggregate and geotextiles to the specifications (Clean Water Services, 2020) outlined below:

- Use 6 inch. maximum washed and well-graded gravel or crushed rock with less than 5% fines.
- Height and side slopes: 1 foot high with 3:1 side slopes.
- Length: 8 foot per 1 cubic foot per second flow, based on the peak flow for the 10-year storm.
- Use primarily as a base measure (toe of slope)

The berm will **not** be constructed immediately adjacent to the Owenboy River but instead an appropriate buffer zone will be maintained so that the natural riparian vegetation of the watercourse remains intact (IFI, 2016). The berm will be constructed at least 10m from the edge of the watercourse (IFI, 2020). In the case where a 10m buffer zone is not practicable as part of the proposed works, a suitably qualified ecologist will be consulted regarding the positioning of the berm prior to its construction to ensure appropriate protection of the riparian zone of the Owenboy River.

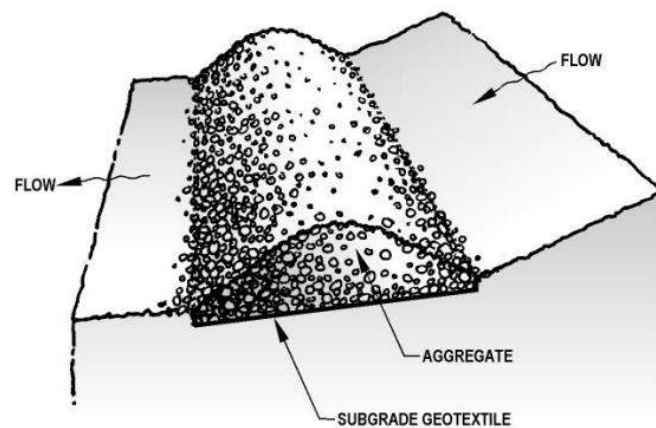


Figure 15-2 Example of filter berm construction (Clean Water Services, 2020)

15.3.2.2.1.3 Noise mitigation

Short-term increases in disturbance levels as a direct result of human activity and through increased generation of noise during the Construction Phase can have a range of effects depending upon the sensitivity of the ecological receptor, the nature and duration of the disturbance and its timing.

To ensure no significant effects occur on the fauna in the vicinity of the Proposed Development, the Contractor undertaking the construction works will implement specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001. These measures will ensure that:

- No plant used on Site will be permitted to cause an ongoing public nuisance due to noise;

- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on Site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools will be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- Any plant, such as generators or pumps that is required to operate outside of normal permitted working hours will be surrounded by an acoustic enclosure or portable screen;

BS 5228-1:2009+A1:2014 includes guidance on several aspects of construction site practices, which include, but are not limited to:

- Selection of quiet plant
- Control of noise sources
- Screening
- Hours of work
- Liaison with the public

The contractor will be required to conduct construction noise predictions prior to works taking place and put in place the most appropriate noise control measures depending on the level of noise reduction required at any one location. Noise control audits will be conducted at regular intervals through the Construction Phase of the Proposed Development. The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions.

15.3.2.2.1.4 Dust mitigation

A potential effect from the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m.

Dust deposition effects on biodiversity can occur due to chemical or physical effects. These include reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as pH changes in the soil. Often effects will be reversible once the works are completed, and dust deposition ceases.

The potential for dust to be emitted will depend on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction. As indicated, dust generation rates depend on the site activity, particle size (in particular the silt content, defined as particles smaller than 75 microns in size), the moisture content of the material and weather conditions. Dust emissions are dramatically reduced where rainfall has occurred, due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under “wet day” conditions where rainfall greater than 0.2mm has fallen. Information collected from Cork Airport Meteorological Station identified that typically 146 days per annum are “wet” which would indicate that for approximately half of the year, conditions are favourable to dust suppression.

Large particle sizes (greater than 75 microns) fall rapidly out of atmospheric suspension and are subsequently deposited in close proximity to the source. Particle sizes of less than 75 microns are of interest as they can remain airborne for greater distances and can give rise to the potential dust nuisance at the sensitive receptors. This size range is broadly described as silt. Emission rates are normally predicted on a site-specific particle size distribution for each dust emission source.

The dust minimisation measures detailed below will ensure that fugitive emissions of dust from the Site will be insignificant and pose no nuisance at nearby receptors.

Dust Minimisation Plan

The objective of dust control at the Site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (BRE 2003), (The Scottish Office 1996) (UK Office of Deputy Prime Minister 2002) and the USA (USEPA 1997), (USEPA 1986).

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on-site.
- Display the name and contact details of person accountable for air quality and dust issues on the Site boundary.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the measures in this document. The desirable measures will be included as appropriate for the Site. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.

Site Management

- Regular inspections of the Site and boundary will be carried out to monitor dust, records and notes on these inspections will be logged.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.
- Hold regular liaison meetings with other high risk construction sites within 500m of the Site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of Site boundary, with cleaning to be provided if necessary.
- Carry out regular Site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of Site inspections by the person accountable for air quality and dust issues on Site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on Site or before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Preparing and Maintaining the Site

- Plan Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the Site boundary that are at least as high as any stockpiles on-site.
- Fully enclose specific operations where there is a high potential for dust production and the Site is active for an extensive period.
- Avoid Site run-off of water or mud.
- Keep Site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used on Site. If they are being re-used on-site cover as described below.
- Covered stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 20 km/hr haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

- Implement a Travel Plan that supports and encourages sustainable travel (e.g. cycling, walking)

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on-site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian or mulches where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overflowing during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Track Out

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%.

- A speed restriction of 5-10 km/hr will be applied as an effective control measure for dust for on-site vehicles.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a Site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the Site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the Site exit, wherever Site size and layout permits.
- Access gates to be located at least 10m from receptors where possible.

Dust Control – Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures.

- Vehicles delivering material with potential for dust emissions to an off-site location will be enclosed or covered with tarpaulin always to restrict the escape of dust;
- Public roads outside the Site will be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- If practicable, a wheel wash facility will be employed at the exit of the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.

15.3.2.2.1.5 Visual Disturbance

An increase in visual stimuli associated with increased activity on Site (i.e. movement of machinery and site operatives during the Construction Phase) has the potential to cause disturbance to aquatic species of birds and mammals utilising the Owenboy River to the north of the Site.

Sections of screening along the northern Site boundary will be erected to shield the site-works from the view of any aquatic species of birds and mammals utilising the Owenboy River. The screening will be kept back a minimum of 10m from the river bank to prevent damage to the

riparian zone. The design and installation of this screening will be approved and overseen by a suitably qualified ecologist.

15.3.2.2.1.6 Construction Phase Lighting

To protect wildlife from excess night-time lighting associated Construction Phase of the Proposed Development, the following wildlife friendly lighting guidelines from Bat Conservation Trust (BCT) (BCT, 2018) will be followed when choosing flood lighting:

- *All luminaires used will lack UV/IR elements to reduce impact.*
- *LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.*
- *A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).*
- *Column heights will be carefully considered to minimise light spill. The shortest column height allowed will be used where possible.*
- *Only luminaires with an upward light ratio of 0% and with good optical control will be used.*
- *Luminaires will be mounted on the horizontal, i.e., no upward tilt.*
- *As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed if deemed necessary by a suitable qualified bat ecologist.*

15.3.2.2.1.7 Protection of Bats

In order to reduce the potential negative impact of the Proposed Development on local bat populations, the following mitigation measures will be fully implemented.

Pre-Pruning & Tree Felling survey

The arborists report recommends pruning of the mature Turkey Oak (*Quercus cerris*) tree on the southern boundary which was identified as being a PBR during Enviroguide Consulting bat surveys. Pruning works will involve clearing the crown of any dead or cracked branches which is potential bat roost habitat. Therefore, the following measures will be followed.

- A 2nd assessment of the trees proposed to be pruned or removed will be undertaken prior to the commencement of the works to determine if there are any active bat roosts present. This will be undertaken in consultation with the tree surgeons. If bats are encountered during this assessment the NPWS will be consulted.
- Where possible, trees, which are to be removed, will be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active).

External Lighting

To protect bats, all lighting on site during the Construction and Operational Phase will follow the guidelines in section 5.6.2.6 above.

15.3.2.2.1.8 Protection of Birds

Any clearance of vegetation will be carried out outside the main breeding season, i.e. 1st of March to 31st of August, in compliance with the Wildlife Act 1976 (as amended). Should any

vegetation removal be required during this period, this vegetation will be checked for birds or nests by a suitably qualified ecologist. If encountered, the precise location within the hedgerow/trees/buildings, the species of bird present will be recorded, the area will be protected and the NPWS will be consulted prior to any works commencing in this area. The Site manager will be informed of the presence of nesting birds and advised that no works can commence in this area until further notice. Appropriate protection measures will be implemented in consultation with the project ecologist.

15.3.2.2.1.9 Protection of mammals

Hedgehog and Pygmy Shrew

As noted in the British Hedgehog Preservation Society's publication *Hedgehogs and development*, during the Construction Phase of the Proposed Development Hedgehogs have the potential to be impacted through the loss of suitable foraging sites in the form of dry meadows and grassy verges on-site.

Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., Hedgehog).

Hedgehog also frequent long grass for foraging and daytime nesting sites so caution when strimming/ mowing these areas of the Site is advised.

As best-practice, all construction-related rubbish on-site e.g., plastic sheeting, netting etc. should be kept in a designated area on-site and kept off ground level so as to protect Hedgehogs from entrapment and death. The above measures will also act to mitigate potential negative impacts on other small mammal species potentially found on-site e.g., Pygmy Shrew.

Work likely to cause disturbance during hibernation – for example removal of hibernation habitats such as log piles and dense scrub – **will not take place during November to March.**

Otter

Otters, along with their breeding and resting places, are protected under the provisions of the Wildlife Act, 1976 (as amended). Whereas no holts will be directly affected by the Proposed Development, a derogation licence is required for any works likely to cause disturbance to active breeding holts (when present within c.150m of a scheme) (NRA, 2008). According to the NRA guidelines (2008) "No works should be undertaken within 150m of any holts at which breeding females or cubs are present. Following consultation with NPWS, works closer to such breeding holts may take place – provided appropriate mitigation measures are in place, e.g. screening and/or restricted working hours on-site."

As such, the following measures will be implemented to protect the Otter during the Construction Phase

- A pre-construction survey for Otter will be undertaken by a suitably qualified ecologist, to assess Otter activity within 150m of the Site and to determine whether active holts and/or breeding females or pups are present. This will be undertaken as early as possible but no later than 2-3 weeks before works commence.

If Otter holts or couches are found within 150m of the Site during pre-construction surveys, the precise location of the holt or couch will be recorded, the area will be protected and the

NPWS will be consulted prior to any works commencing in this area. The Site manager will be immediately informed of the presence of otter holts or couches and advised that no works can commence in this area until further notice. Appropriate protection measures will be implemented in consultation with the project ecologist and the NPWS.

Protection of aquatic species

The mitigation measures outlined in section 5.6.2.2 above will serve to protect aquatic species during the Construction Phase.

Invasive Species

Butterfly bush

To prevent the spread of Butterfly Bush within and outside the Site boundary management options for its removal are provided below:

The Butterfly Bush is a member of the Buddlejaceae family. It is very fast growing and can reach 2m in its first year, producing flowers and setting seed. As Butterfly Bush tolerates very poor soils, it can grow on walls, rock outcrops or sub-soils (NRA, 2010). The following is based on NRA (2010) guidelines:

Management methods such as digging it out are applicable only to minor infestations at the initial stage of invasion. Hand-picking of young plants is feasible but will be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedling. Grubbing of mature stands as a sole attempt at control is not recommended for the same reason. After uprooting, it is essential to plant the ground in order to prevent a flush of new seedling growth. When it is cut, Buddleia grows back from the stump very vigorously. Mowing of young plants does not provide control as they re-sprout with vigour. Where removal of mature plants is not feasible in the short term, the flower heads will be cut off in June before seed set. Chemical control 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 approved herbicides may be adequate for limited infestations of younger plants but will be followed up at 6 monthly intervals. At this point it must be stressed that all Plant Protection Products must be used in accordance with the product label and with Good Plant Protection Practice as prescribed in the European Communities (Authorisation, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003). Again, it should be noted that it is an offence to use Plant Protection Products in a manner other than that specified on the label. The methods outlined are not in accordance with the product label and so it will be necessary to discuss the use of such methods with the Pesticides Control Service with a view to seeking approval under the derogation procedures provided under the Plant Protection Regulations.

Sycamore

Manual removal of sycamore seedlings and saplings is recommended, i.e. hand pulling and digging up, but the roots must be completely removed, or cut stumps must be treated with herbicide in order to prevent regeneration, however this should be a last resort (Weber, 2003; Cross & Collins, 2017).

Himalayan Honeysuckle

This species originates from western China and spreads mostly by bird dispersed seeds, and vegetatively when dislodged stem pieces are in contact with moist soil and form roots. This plant can be removed via physical or chemical approaches. Seedlings and smaller plants of Himalayan Honeysuckle can be hand pulled or dug out. A range of treatments can be used on larger plants, including cutting stems back to near ground level and painting the cut stem with a suitable herbicide (the cut-paint method) or injection of a suitable herbicide into drill holes at the base of the plant (the drill-fill method). Plants can also be sprayed with selective or non-selective herbicides. Herbicide treatments will be used in late spring before the plants produce flowers and fruits. Follow-up treatments may be needed, as larger plants often re-shoot. Dense infestations can be slashed in winter before they bear fruit, the cut material disposed of safely and the regrowth sprayed in spring (Muyt, 2001).

15.3.2.2.1.10 *Timing of Vegetation Clearance*

The following table provides guidance for when vegetation clearance is permissible. Information sources include The Bat Survey Report, and *The Wildlife Act 1976 (as amended)*.

Table 15-2: Seasonal restrictions on vegetation removal. Red boxes indicate periods when clearance/works are not permissible.

Ecological Feature	January	February	March	April	May	June	July	August	September	October	November	December
Breeding Birds	Vegetation clearance permissible		<u>Nesting bird season</u> No clearance of vegetation or works to relevant structures permitted unless confirmed to be devoid of nesting birds by an ecologist.						Vegetation clearance permissible			
Hibernating/reproducing mammals (namely Hedgehog, Pygmy Shew)	<u>Mammal hibernation season</u> No clearance of vegetation or works to relevant structures permitted (January-March) unless confirmed to be devoid of hibernating mammals by an ecologist.		Vegetation clearance permissible						<u>Mammal hibernation season</u> No clearance of vegetation or works to relevant structures permitted unless confirmed to be devoid of hibernating mammals by an ecologist.			
Bats	Tree felling to be avoided								Preferred period for tree-felling		Tree felling to be avoided	

The preferred period for vegetation clearance is within the month of October (Table 5-19). Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present. Vegetation clearance will take place under the supervision of an ecologist to avoid any potential impact on bats, mammals or breeding birds.

15.3.2.2.1.11 *Biosecurity*

In addition, the following will be adhered to, to avoid the introduction of invasive species to the Proposed Development Site during both the Construction and Operational Phases.

- The contractor will be aware of biosecurity issues and will inform sub-contractors through the induction process. Any vehicles which have been used in the management of invasive species are required to be cleaned before leaving the Site of contamination, thereby not introducing the risk of cross contamination to other sites.
- Any material required on the Site will be sourced from a stock that has been screened for the presence of any invasive species by a suitably qualified ecologist and where it is confirmed that none are present.
- Personnel working on contaminated sites will be made aware of their responsibilities in cleaning equipment and PPE before visiting Site.

15.3.2.2.2 Monitoring

Daily on-site and off-site inspections will be undertaken where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of the Site boundary, with cleaning to be provided if necessary.

Carry out regular Site inspections to monitor compliance with the Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked, increase the frequency of Site inspections by the person accountable for air quality and dust issues on-site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

15.3.2.3 Operational Phase

15.3.2.3.1 Mitigation

15.3.2.3.1.1 Bat Box Scheme

To compensate for the loss of potential bat roost habitat during the Construction Phase, a Rocket Bat Box¹⁰ will be installed on-site. Rocket Bat Boxes provides an alternative roost habitat in locations where there are no suitable buildings or trees available on which to mount a bat box. They are often used as an alternative roost near to building sites during construction works.

The bat box scheme will be sited carefully and this will be undertaken by a suitably qualified bat specialist. Bat boxes will be erected prior to construction works with the total number of boxes to be determined by the suitably qualified bat specialist. The bat specialist will oversee the erection of the bat boxes with assistance from the contractor. Some general points that will be followed include:

- Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.
- Bat boxes should be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.
- Locations for bat boxes should be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes.

¹⁰ <https://www.nhbs.com/eco-rocket-bat-box>

15.3.2.3.1.2 Increased Human Presence

Although the proposed river walkway and riparian buffer zone will be set back a minimum of 7m from the banks of the Owenboy River, there is still potential for increased human presence to cause disturbance to river fauna.

To reduce the potential for disturbance, permanent signage will be erected along the river walkway and access path from Carrigaline main street to educate residents and walkers of river fauna (Otter, Grey Wagtail, Dipper, Grey Heron, Mute Swan, Mallard etc.) common to the area and their sensitivities. This signage will encourage the public to keep their dogs on leads and to refrain from entering the riparian buffer zone to avoid disturbance. The exact text to be included on signs will be determined in consultation with a suitably qualified ecologist.

15.3.2.3.2 Monitoring

No monitoring has been proposed for the Operational Phase of the Proposed Development.

15.3.3 Land and Soils

15.3.3.1 Construction Phase

15.3.3.1.1 Mitigation

Soil Structure

The extent of the required work area and the bulk excavation at the Proposed Development Site will be minimised where appropriate to prevent unnecessary excavation of soil and tracking over soil and subsoil outside of the excavation work areas as a result of compaction and rutting from construction traffic.

Dedicated internal haul routes will be established and maintained by the contractor to prevent tracking over unprotected soils.

Exclusion zones will be established where soft landscaping is proposed in particular along Site boundaries and the Owenboy River which are outside of the excavation areas to ensure soil structure is maintained.

Management of Stockpiles (soils)

Soils intended for reuse onsite or for off-site removal and disposal will be segregated and temporarily stored on-site (pending removal or for reuse on-site).

Any reuse of excavated soil and bedrock at the Proposed Development Site will be undertaken in accordance with the engineered design and landscape plan for the Proposed Development Site. Soil including topsoil and subsoil will be segregated and stored appropriately to prevent deterioration of soil structure and quality to ensure the material will be suitable for reuse onsite. Surplus onsite materials will be segregated and stockpiled appropriately for removal offsite in accordance with the resource and management plan.

For any excavated material identified for removal offsite, while assessment and approval of acceptance at a destination reuse, recovery site or waste facility is pending, excavated soil for recovery/disposal will be stockpiled as follows:

- A suitable temporary storage area will be identified and designated.
- All stockpiles will be assigned a stockpile number.
- Material identified for reuse on Site, off site and waste materials will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings.
- Soil stockpiles will be sealed to prevent run-off from the stockpiled material generation and/or the generation of dust.
- Any waste that will be temporarily stored / stockpiled will be stored on impermeable surface high-grade polythene sheeting, hardstand areas or skips to prevent cross-contamination of the soil below or cross contamination with soil.

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Proposed Development Site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.
- Stockpiles will not be located near Site boundaries or sensitive receptors and a set-back of will be established and maintained from any boundary with offsite receptors.

When a stockpile has been sampled for classification purposes, it will be considered to be complete and no more soil will be added to that stockpile prior to removal off site. An excavation/stockpile register will be maintained on-site

Waste will be stored on-site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent reuse, recycling and recovery; and
- Prevent hazards to site workers and the general public during construction phase (largely noise, vibration and dust).

Handling of Chemicals and Fuels

Fuel, oils and chemicals used during construction are classified as hazardous.

Storage of fuel hazardous will be undertaken with a view to protecting any essential services (electricity, water etc.) and the receiving water environment.

Bulk quantities of fuel will not be stored at the Proposed Development Site and fuel required for plant and equipment will be delivered directly from a delivery tanker. Fuel will only be stored in the quantities required for emergency use.

Oils and chemicals used and stored on-site will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas to prevent any seepage to ground. There will be clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.

All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Proposed Development Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

- Bunds will comply with the requirements of Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:
 - 110% of the capacity of the largest tank or drum within the bunded area;
 - 25% of the total volume of substance that could be stored within the bunded area;

- Vehicle or equipment maintenance work will take place in a designated impermeable area within the Proposed Development Site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Proposed Development Site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines;
- Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages;
- All staff on-site will be fully trained on the use of equipment to be used on-site; and
- Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds.

Refuelling of plant and vehicles during the Construction Phase will only be permitted at designated refuelling station locations onsite. Each station will be fully contained and equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed by the Contractor before the commencement of works onsite.

A procedure will be prepared by the appointed contractor which will be adhered to during refuelling of on-site vehicles and plant. This will include the following:

- Fuel will be delivered to plant on-site by dedicated tanker;
- All deliveries to on-site vehicles will be supervised and records will be kept and retained onsite of delivery dates and volumes;
- The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur;
- Where the nozzle of a fuel pump cannot be placed into the tank of a machine then a funnel will be used; and
- All re-fuelling will take place in a designated impermeable area to be specified by the contractor. In addition, oil absorbent materials will be kept on-site in close proximity to the re-fuelling area.

Export of Resource (soil and stone)

All surplus materials and any waste will be removed off-site in accordance with the requirements outlined in the Construction Environmental Management Plan (Horganlynch, 2021) and will be managed in accordance with all legal obligations. It will be the contractor's responsibility to either obtain a waste collection permit or to engage specialist waste service contractors who will possess the requisite authorisations for the collection and movement of waste off-site.

The reuse of soil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate reuse as by-product in accordance with Article 27 of

the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended.

Any surplus soil not suitable for reuse as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Any waste soils will be transported under a valid waste collection permit issued under the Waste Management (Collection Permit) Regulations 2007, as amended and will be delivered to an appropriately authorised waste management facility.

Materials and waste will be documented prior to leaving the Proposed Development Site. All information will be entered into a waste management register kept on the Proposed Development Site.

Vehicles transporting material with potential for dust emissions to an off-site location will be enclosed or covered with a tarpaulin at all times to restrict the escape of dust.

Public roads outside the Proposed Development Site will be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. The wheels of all Lorries will be cleaned prior to leaving the Proposed Development Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain. A wheel-wash will be installed at the egress point if required and a road sweeper will be deployed to ensure that public roads are kept free of debris.

Import of Aggregates

In order to minimise the requirement to import virgin quarried materials, recycled aggregates will be used where available and subject to meeting specified design requirements and all construction and environmental legislation. This will include where suitable, by-products that meet the legislative requirements of Article 27 of the European Communities (Waste Directive) Regulations, 2011 and other applicable statutory requirements.

Contract and procurement procedures will ensure that all imported aggregates required for the Proposed Development Site will be sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations. The importation of aggregates will be subject to management and control procedures which will include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development. Therefore, any unsuitable material will be identified prior to unloading / placement onsite.

Concrete Works

The cementitious grout and other concrete works during the Construction Phase, will avoid any contamination of ground through the use of appropriate design and methods implemented

by the Contractor and in accordance with industry standards (e.g., Guidance for Consultants and Contractors, CIRIA - C532', CIRIA, 2001).

All ready-mixed concrete will be delivered to the Proposed Development Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be emptied into a skip. A suitable risk assessment for wet concreting will be completed prior to works being carried out.

15.3.3.1.2 Monitoring

There are no monitoring requirements for the land, soil and geology related to the Proposed Development Site.

15.3.3.2 Operational Phase

15.3.3.2.1 Mitigation

There is no requirement for mitigation measures for the Operational Phase of the Proposed Development.

15.3.3.2.2 Monitoring

There are no monitoring requirements for the land, soil and geology related to the Proposed Development Site.

15.3.4 Hydrology

It is not anticipated that any of the activities of the Proposed Development will result in a specific risk that requires mitigation measures, other than those embedded in the design as a good practice measure. This section sets out these measures which are envisaged to avoid, prevent, or reduce any residual significant adverse effects on the aquatic environment identified and, where appropriate, identify any proposed monitoring arrangements. It covers both the Construction and Operational Phases. Construction works will take place in accordance with the Construction Environmental Management Plan (CEMP) which will be developed by the appointed contractor.

15.3.4.1 Construction Phase

15.3.4.1.1 Mitigation

The proposed SHD will be designed to avoid/mitigate as much as possible any potential water pollution causing scenarios during construction. Some of the mitigation measures that will be implemented during construction include:

- Avoid working on floodplains and/or sequence construction to avoid temporary increase in flood risk and water pollution incidents,
- The compensatory and attenuation storages will be constructed in advance of constructing the buildings and the car park,
- The Site Compound will be located outside of the floodplain,
- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses.
- The CEMP will be implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the CEMP.
- Surface water runoff from work areas and construction dewatering water will be directed to on-site settlement ponds will be discharge at controlled rate.
- Any works in or adjacent to the River Owenboy will be carried out after consultation with Inland Fisheries Ireland (IFI) and the Office of Public Works (OPW).
- Washing of trucks and other construction equipment will take place off site. If within the Site, the discharge from this area must be directed to on-site settlement ponds.
- Oil and fuel will be stored in designated bunded areas and away from surface water drainage features.
- Refuelling of construction machinery will be undertaken in designated areas away from surface water drainage to minimise potential contamination of the water environment. Spill kits will be kept in these areas in the event of spillages.
- Hazardous construction materials will be stored appropriately to prevent contamination of the river or groundwater.
- Spill kits will be kept in designated areas for re-fuelling of construction machinery.
- A 10m riparian buffer corridor is created along the Owenboy River by erection of 1m high barrier prior to Site clearance with relevant signage to notify Site users no construction activity or discharge of any kind is permitted in this exclusion zone.

15.3.4.1.2 Monitoring

No routine monitoring requirement is anticipated during construction phase. However, it may be necessary to deploy sondes upstream/downstream of the works to monitor water quality before discharging to receiving waters during construction.

15.3.4.2 Operational Phase

15.3.4.2.1 Mitigation

Predicted impacts for the Operational Phase are mitigated by means of imbedded design solutions that and hence the operational phase impact is deemed imperceptible. As such no changes to hydrology are expected as the drainage design includes a storage solution to compensate for loss of floodplain and attenuation pond to mitigate against any potential increase in surface runoff rates. There are 1no. surface water outfall to the River Owenboy from the Site. Direct discharge to this outfall is avoided by controlling the runoff rate from the attenuation pond.

Accidental spills are also controlled in a similar manner as direct discharge to the river is avoided by means of the attenuation pond. It is therefore considered that the likely impact is imperceptible and temporary in the absence of mitigation measures.

15.3.4.2.2 Monitoring

It is not anticipated that any of the Operational phases of the SHD will result in a specific impact that requires mitigation measures, other than those embedded in the design. Therefore, no routine monitoring requirement is required during Operational Phase.

15.3.5 Hydrogeology

This section describes the mitigation measures to reduce or avoid potential impacts where possible, for both the construction and operational phases of the proposed project.

The mitigation strategy outlined in this section will be incorporated by the appointed contractor into future design proposals for the proposed project.

15.3.5.1 Construction Phase

15.3.5.1.1 Mitigation

General

As outlined in the Construction Environmental Management Plan (CEMP), the adopted construction techniques will comply with the requirements of statutory bodies (e.g. Building Control Amendment Regulations, Health Service Executive inspections).

Precautionary measures will be taken to contain any areas within the planning boundary at risk of contaminated run-off including the following:

- Potential pollutants will be adequately secured against vandalism and will be provided with proper containment according to the relevant codes of practice. Any spillages will be immediately contained, and contaminated soil will be removed from the Proposed Development and properly disposed of in an appropriately licensed facility.
- Silt traps will be placed in gullies to capture any excess silt in the run-off from working areas.
- Soil and water pollution will be minimised by the implementation of good housekeeping (daily site clean-ups, use of disposal bins, etc.) and the proper use, storage and disposal of these substances and their containers as well as good construction practices.
- A contingency plan for pollution emergencies will also be developed by the contractor prior to the commencement of the works and regularly updated during construction. This contingency plan will identify the actions to be taken in the event of a pollution incident in accordance with the CIRIA Guidance 37 which requires the following to be addressed:
 - Containment measures;
 - Emergency discharge routes;
 - List of appropriate equipment and clean-up materials;
 - Maintenance schedule for equipment;
 - Details of trained staff, location and provision for 24-hour cover;
 - Details of staff responsibilities;
 - Notification procedures to inform the EPA or Environmental Department of Cork County Council;
 - Audit and review schedule;
 - Telephone numbers of statutory water consultees; and
 - List of specialist pollution clean-up companies and their telephone numbers.

Existing Waterbodies

The CEMP to be prepared by the Contractor prior to construction commencing will outline a list of good construction management practices that will be employed to minimise the risk of pollution of existing water courses and water bodies due to the storage and transport of the excavated materials.

Examples of measures to be implemented include:

- Where feasible all excavated spoil will be treated to remove excess fluid prior to stockpiling and transportation;
- Where feasible transfer of excess soil materials from stockpile areas off-site will be undertaken during dry periods;
- Stockpile and transfer of excess soil material will be restricted to specified and impermeable areas that are isolated from the surrounding environment;
- Wheel washes will be provided at Site entrances to clean vehicles prior to exiting the work Site; and
- All staff will be trained and follow vehicle cleaning procedures. Details of these procedures will be posted in all work sites for easy reference.
- The implementation of the above measures will ensure that the risk of pollution of groundwater and nearby water bodies resulting from the construction activities will be minimised.
- Further details on specific construction mitigation measures for hydrogeology will be included in the CEMP that will be prepared by the Contractor prior to construction commencing.

Pollution from Construction Activities

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, adjacent watercourses and groundwater. The construction management of the Site will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams et al., 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Measures, as recommended in the guidance above, that will be implemented to minimise the risk of spills and contamination of soils and waters, include:

- Training of Site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;
- Careful consideration will be given to the location of any fuel storage facilities. These will be designed in accordance with guidelines produced by CIRIA, and will be fully bunded;
- 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;

- Ensure that all areas where liquids are stored or where vehicle cleaning is carried out are in designated impermeable areas that are isolated from the surrounding area e.g. by a roll-over bund, raised kerb, ramps or stepped access;
- Minimise the use of cleaning chemicals; and
- Use trigger-operated spray guns, with automatic water-supply cut-off.

15.3.5.1.2 Monitoring

The works will be monitored by a Resident Engineer.

Visual monitoring will be undertaken as part of the regular Site audits during the construction of the Proposed Development to ensure the groundwater resource is not impacted by the Proposed Development.

15.3.5.2 Operational Phase

15.3.5.2.1 Mitigation

No mitigation measures are considered necessary for the operational phase of the Proposed Development as no significant adverse effects are predicted.

15.3.5.2.2 Monitoring

No monitoring is proposed during operation of the Proposed Development.

15.3.6 Air Quality and Climate

15.3.6.1 Construction Phase

15.3.6.1.1 Mitigation

It is not expected that adverse air quality impacts are likely to occur at sensitive receptors as a result of the Proposed Development. However, appropriate mitigation measures, as outlined within the Construction and Environmental Management Plan (CEMP), which has been prepared by Enviroguide Consulting, will be employed as necessary to further prevent such impacts occurring:

- Vehicle and wheel washing facilities will be provided at Site exit where practicable. If necessary, vehicles are to be washed down before exiting the Site.
- Engines and exhaust systems will be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
- Dust emission over the Site boundary will be minimised using static sprinklers or other watering methods as necessary.
- No burning of materials to be permitted on Site.
- Water sprays for dust suppression will be affixed to mechanical excavators/munchers involved in demolition works.
- Demolition waste will be removed from Site as quickly as possible to minimise risk of dust generation and any fine material will be covered with a tarpaulin or similar material and tied down.
- Water sprays and cannons will be used where possible during cutting, with protective measures applied to retained finishes local to the cutting.
- Prior to commencement, the Main Contractor will identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions.
- In areas of poor natural ventilation, dust capture/extraction methods will be employed by the Main Contractor.
- The Main Contractor will be required to allocate suitably qualified and experienced personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
- The Main Contractor will be required to appoint a senior member of its Site management team to act as the liaison with third parties in respect of complaints regarding dust and or Site activities.
- Monitoring of dust deposition will be undertaken at nominated boundary locations to ensure that dust levels comply with the TA Lift limit value of 350mg/(m²/day) based on a 30-day average using Bergerhoff gauges (Limits to be agreed with local authority).

15.3.6.1.2 Monitoring

The monitoring of construction dust during the Construction Phase of the Proposed Development is recommended to ensure that impacts are not experienced beyond the Site boundary. Monitoring of dust can be carried out by using the Bergerhoff Method. This involves placing Bergerhoff Dust Deposit Gauges at a strategic locations along the Site boundaries for a period of 30 +/- 2 days. The selection of sampling point locations will be carried out in consideration of the requirements of *VDI 2119* with respect to the location of the samplers

relative to buildings and other obstructions, height above ground, and sample collection and analysis procedures. After the exposure period is complete, the Gauges will be removed from the Site; the dust deposits in each Gauge will then be determined gravimetrically and expressed as a dust deposition rate in $\text{mg}/\text{m}^2/\text{day}$ in accordance with the relevant standard.

15.3.6.2 Operational Phase

15.3.6.2.1 Mitigation

It has been determined that the Operational Phase air quality impact is negligible and therefore no site-specific mitigation measures are proposed.

15.3.6.2.2 Monitoring

Due to the negligible impact on air quality and climate from the Operational Phase of the Proposed Development, no specific monitoring is recommended.

15.3.7 Microclimate

15.3.7.1 Construction Phase

15.3.7.1.1 Mitigation

Not applicable.

15.3.7.1.2 Monitoring

There is no requirement to monitor wind impact during construction phase for pedestrian comfort and distress as the designated amenity areas will not be in use during this phase of the project and pedestrian are not accessing construction sites.

15.3.7.2 Operational Phase

15.3.7.2.1 Mitigation

Not applicable.

15.3.7.2.2 Monitoring

The Proposed Development has been designed to conform to acceptable Lawson Criteria for Comfort and Distress in accordance with the Wind Beaufort Scale and considering the historical wind conditions of the Proposed Development Site, there is no further element to monitor for this scope as far as the landscaping is maintained in place as designed.

15.3.8 Noise and Vibrations

15.3.8.1 Construction Phase

15.3.8.1.1 Mitigation

In order to sufficiently ameliorate the likely noise, dust, litter and other environmental impacts, a schedule of suggested control measures has been formulated and outlined within the Construction Environmental Management Plan (Enviroguide Consulting, May 2022) for the Construction Phase.

- Limiting the hours during which site activities likely to create high levels of noise, vibration or dust are permitted.
- Establishing channels of communication between the contractor/developer and Local Authority.
- Appointing a site representative responsible for matters relating to noise, vibration, dust and other impacts of site activity
- Notifying the neighbouring community of any forthcoming unusual construction activities
- All complaints will be recorded and investigated. If it is found that the complaint is legitimate, amelioration measures will be introduced to negate the re-occurrence.

Furthermore, it is also proposed that a variety of practicable control measures will be employed. This will include the following:

- Selection of plant of low inherent potential for generation of noise and / or vibration.
- Plant and equipment will be properly maintained.
- Erection of barriers as necessary around plant of high impact.
- Situate noisy/vibratory plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated structures where necessary.
- Any plant that is not in use for extended periods of time will be switched off.
- All access roads will be kept as level as possible so as to mitigate the potential for vibration from lorries.
- Appropriate signs will be erected both reminding and requesting site personnel to keep noise to a minimum within the construction site.

For controlling vibration reference should be made to BS 5228:2009+A1:2014 which offers detailed guidance on the control of vibration from demolition and construction activities. In general, BS5228:2009+A1:2014 advises the following:

- Use rubber linings in, for example, chutes and dumpers to reduce impact noise.
- Minimize drop height of materials.
- Regular and effective maintenance by trained personnel to be carried out to reduce vibration from plant and machinery.
- Hand demolition, cutting of the separate on joints of the buildings in advance and small robotic breakers and 'munchers'.

15.3.8.1.2 Monitoring

On commencement of construction, a noise and monitoring specialist will be appointed to carry out quarterly monitoring of noise and vibration for the duration of the Construction Phase. The first monitoring commencing the first week of construction. The monitoring will be carried out at the nearest sensitive locations which are presented in Table 15-3.

Table 15-3: Noise Sensitive Locations

Name	Type	Coordinates		Orientation Relative to Site Boundary	Distance from the Site Boundary
Alandale	Residential	51.81215	-8.39564	South	6m
Abbey Lodge	Residential	51.81209	-8.39685	South	6m
Cahirmore	Residential	51.81165	-8.39738	South	13m
Saint Raphael's	Residential	51.81168	-8.39675	South	44m
Bella Vista	Residential	51.81172	-8.39652	South	49m
Greenaun	Residential	51.81173	-8.39631	South	48m
Rockboro	Residential	51.81174	-8.39613	South	48m
Kilmoney Rd Lower	Residential	51.81175	-8.39582	South	40m
Carrigaline Chiropractic	Health	51.81173	-8.39564	South	25m
Owenabue Lodge	Residential	51.81180	-8.39527	South	24m

15.3.8.2 Operational Phase

15.3.8.2.1 Mitigation

During the operational phase of the development, noise mitigation measures with respect to the outward impact of the development are not deemed necessary.

15.3.8.2.2 Monitoring

No noise monitoring is proposed for the Operational Phase.

15.3.9 Landscape and Visual

15.3.9.1 Construction Phase

15.3.9.1.1 Mitigation

The proposed remedial measures relate to implementation of appropriate site management procedures – such as the control of site lighting, delivery of materials and site boundary hoarding to minimise impacts on receptors in the vicinity of the Proposed Development.

15.3.9.1.2 Monitoring

The contract works will be supervised by a suitably qualified landscape architect as required by conditions of the planning grant. The planting works will be undertaken in the planting season after completion of the main civil engineering and building work.

15.3.9.2 Operational Phase

15.3.9.2.1 Mitigation

Mitigation by design was carried out during the design development process.

The development has been designed to deliver a high-quality residential, retail and town park development in response to the zoning of the site. The primary objective has been to deliver attractive and safe neighbourhoods with excellent amenities for residents. The development will have distinctive landmark qualities at the edge of town and will provide a new town park and riverside pedestrian/cyclist link to the main street of the town. Remedial mitigation includes a comprehensive tree, shrub and groundcover planting programme to enhance the environment across the site.

15.3.9.2.2 Monitoring

Monitoring of the mitigation measures will form part of the landscape management plan. Replacement trees, replacement planting and pruning measures will be captured in landscape maintenance plans, and are intrinsically linked to the proposed mitigation measures. All landscape works will be in an establishment phase for the initial year of operation. A landscape maintenance plan accompanies the planning application. Prior to completion of the landscape works, a competent landscape contractor will be engaged and a detailed maintenance plan, scope of operation and methodology will be put in place.

15.3.10 Archaeology and Cultural Heritage

15.3.10.1 Construction Phase

15.3.10.1.1 Mitigation

A programme of geophysical survey will be undertaken across the undisturbed portions of the Proposed Development Site prior to the commencement of the Proposed Development. This will be followed by a programme of linear archaeological test trenching which will include targeted investigations of any geophysical anomalies that are of archaeological potential. These investigations will be carried out under licences issued by the National Monuments Service.

The area of hardstand within the site will act as a constraint that will preclude geophysical or trenching investigations. In the event that this feature, which was constructed at the location of a potential subcircular feature identified on aerial imagery as part of this assessment, is removed at any point during or subsequent to the Relief Road construction works or during any works associated with the Proposed Development, then this work will be archaeologically supervised and the underlying surface of the natural subsoil will then be carefully cleaned back and appraised for the presence of any potential unrecorded archaeological features.

If archaeological features are revealed during the testing programme or during any inspection of the hardstanding area (should it be removed), these features will be recorded in written, drawn and photographic formats and left remain *in-situ* within securely cordoned off areas until consultations are undertaken with the National Monuments Service to determine appropriate future mitigation strategies, which may entail preservation by avoidance or preservation by record through full archaeological excavation.

No impacts on the architectural or other elements of the cultural heritage resource are predicted and, therefore, no mitigation measures for these resources are required.

15.3.10.1.2 Monitoring

There are a number of obligatory processes to be undertaken as part of archaeological licence applications for site investigation works and these will allow for monitoring of the successful implementation of the pre-construction archaeological mitigation measures. Method statements detailing the proposed strategy for site investigations will be submitted for approval to the National Monuments Service as part of the licence application process. These will clearly outline the proposed extent of works and outline the consultation process to be enacted in the event that any unrecorded archaeological sites or other features of cultural heritage significance are identified. A report will be compiled on all site investigations which will clearly present the results in written, drawn and photographic formats. Copies of these reports will be submitted to the National Monuments Service, Cork County Council and the National Museum of Ireland. In the event that any sub-surface archaeological deposits, features or artefacts are identified during site investigations, the Planning Authority and the National Monuments Service will be consulted to determine further appropriate mitigation measures which may entail preservation *in situ*, by avoidance or preservation by record through full archaeological excavation.

15.3.10.2 Operational Phase

15.3.10.2.1 Mitigation

Given the absence of any identified archaeological, architectural and cultural heritage assets within the Proposed Development Site and its close environs and following the implementation of the mitigation measures presented in Section 11.6.1 of this EIAR, the operational phase of the Proposed Development will not result in any predicted impacts on the cultural heritage resource of the area that will require mitigation.

15.3.10.2.2 Monitoring

Following the successful implementation of the mitigation and monitoring measures outlined above no further monitoring measures will be required during the operational phase.

15.3.11 Materials Assets – Traffic

15.3.11.1 Construction Phase

15.3.11.1.1 Mitigation

During the construction phase the appointed Works Contractor on site will be responsible for the planning, design, implementation, maintenance and removal of traffic safety and management measures required in order to facilitate and complete the works. The closure of the any roads to traffic during the works period will not be permitted.

The Contractor should be aware that during working hours it is a specific requirement of the Contract that STOP/GO under the control of flagmen be employed for traffic management operations. Two-way traffic should be provided at all times with STOP/GO only permitted during peak hour traffic periods, between 07.00-09.00 in the AM peak traffic period and between 16:30-18:00 in the PM peak period.

The Contractor will notify all businesses within the extent of the Works of the start date and duration of the Works through a letter/email drop 2 weeks in advance of the start date. Further information leaflets will be issued at monthly intervals throughout the duration of the Works or as may be required to advise of any interference with access.

During the construction phase the appointed Works Contractor will comply at all times with the requirements of the Department of the Environment Chapter 8 -Traffic Signs Manual, Temporary Traffic Management Design Guidance, Temporary Traffic Management Operations Guidance, Temporary Traffic Measures and Signs for Roadworks and also the Guidance for the Control and Management of Traffic at Road Works (Second Edition, 2010) prepared by the Local Government Management Services Board and any additional requirements detailed in the Design Manual for Roads and Bridges.

The design and implementation of Traffic Safety and Management measures will be conducted by a Traffic Management Design Specialist appointed by the Contractor.

15.3.11.1.2 Monitoring

No specific monitoring of traffic is proposed during the construction phase.

15.3.11.2 Operational Phase

15.3.11.2.1 Mitigation

During the operational phase of the project the Mobility Management Plan for the project will evolve over time and depends upon ongoing implementation, management, and monitoring. Its successful implementation requires organisational support, an internal Mobility Manager and financial resourcing. To implement the MMP the following inputs will be required:

- Management Company support and commitment.
- A Mobility Management Plan manager as the plan coordinator.
- A steering group to oversee the plan.
- Working groups on various related issues.

➤ Consultations with development occupants and external organisations.

To secure effective results from any initial sustainable travel investment, it is imperative to obtain the agreement of all the stakeholders and the support of external partners, such as the Local Authority, public transport operators, etc.

Ideally, the Mobility Management Plan will be managed by a Mobility Management Plan manager or Mobility Management Plan coordinator with the clear mandate to implement and evolve the plan. The Mobility Management Plan manager will also be best suited to monitor the results of the plan. This role may for example be performed by a member of the development Management Company. Travel surveys of staff (and of visitors, if practicable) should be carried out in the early stages and repeated annually, to monitor the initial success of the Mobility Management Plan and to gain a better understanding of travel habits. These survey results can also serve as a sustainable travel performance benchmark to indicate how the Mobility Management Plan is performing in comparison to previous years and against the sustainable travel targets initially outlined in the plan.

15.3.11.2.2 Monitoring

No specific monitoring of traffic is proposed during the operational phase.

15.3.12 Materials Assets – Waste and Utilities

Specific avoidance, remedial and mitigation measures to be taken during the Construction and Operational Phase with respect to water supply, surface water drainage and foul water are detailed within Chapter 7, Water (Hydrology and Hydrogeology), of this EIAR. All works will be carried out in accordance with the Construction and Environmental Management Plan prepared for the Proposed Development and the Irish Water Code of Practice for Water Infrastructure (July 2020) and the Irish Water Code of Practice for Wastewater Infrastructure (July 2020). Laying of watermains/wastewater sewers and testing of pipelines and infrastructure will be in accordance with Irish Water standard details.

New connections for electricity and telecommunications will be coordinated with the relevant utility provider and Cork County Council and will be carried out and tested by approved contractors, as per standard protocols.

15.3.12.1 Construction Phase

15.3.12.1.1 Mitigation

The CDWMP (Enviroguide Consulting, 2022) provides guidance to the Main Contractor on waste management during the Construction Phase. In the event that hazardous soil, or historically deposited waste is encountered during the site bulk excavation phase, the contractor will notify CCC and provide a Hazardous/Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s). According to the CDWMP, it is anticipated that there will be no asbestos containing materials (ACMs) generated during the Construction Phase of the Proposed Development. If ACMs are identified on site at a later stage, a full asbestos report will be carried out. Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACM's will only be removed from site by a suitably permitted/licenced waste contractor. in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.

15.3.12.1.2 Monitoring

The monitoring of C&D waste during the Construction Phase of the Proposed Development is recommended to ensure that impacts are not experienced beyond the Site boundary. The Main Contractor will be responsible for monitoring and record keeping in respect of waste leaving the facility and that these records will be maintained on site.

15.3.12.2 Operational Phase

15.3.12.2.1 Mitigation

An OWMP (Enviroguide Consulting, 2022) has been produced for the Proposed Development which outlines measures to be taken to achieve waste prevention, maximum recycling and recovery of waste with a focus on diversion of waste from landfill wherever possible. Waste segregation will be implemented at the Proposed Development to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery. The Management Company will be responsible for the provision of a leaflet to all new tenants encouraging good waste segregation and pictorial information detailing the waste streams that

can be placed in each bin. In addition to this, clauses that support waste segregation targets will be included in relevant legal documentation e.g., tenancy agreements where possible.

The OWMP also states that the facilities management company must employ suitably permitted or licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contractor handle, transport and reuse / recover / recycle / dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

15.3.12.2.2 Monitoring

The building management company, residents, tenants, retail units and creche operators will be required to maintain the bins and storage areas in good condition as required by the CCC Waste Bye-Laws. The waste strategy presented in the OWMP will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy. The areas will be fitted with CCTV for monitoring.