GREENFIELD LRD

VOLUME II | EIAR

Murnane & O'Shea Ltd.
BUILDING CONTRACTORS

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GREENFIELD LRD

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CHAPTER ONE

INTRODUCTION

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CHAPTER ONE

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CHAPTER 1 | Introduction

1.1 Background Context

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of Murnane & O'Shea Limited, to assess the environmental effects of a proposed residential development at Greenfield, Ballincollig, Cork.

The EIAR has been completed in accordance with Directive 2011/92/EU (as amended by 2014/52/EU) and relevant Irish legislation as well as in conformity with guidance in the European Commission's 'Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report' 2017 and guidance in the 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' 2022 (Environmental Protection Agency).

The proposed development consists of the demolition of an existing dwelling house and farmyard with associated agricultural buildings and the construction of a mixed-use residential development of 544 no. residential units consisting of 232 no. dwelling houses, 312 no. apartment/duplex units, a two storey creche facility, commercial/retail unit and all ancillary site development works. The proposed 232 no. dwelling houses will include 100 no. 4 bedroom detached/semi-detached dwelling houses, 124 no. 3 bedroom semi-detached/townhouse dwelling houses and 8 no. 2 bedroom townhouse units. The proposed 312 no. apartment/duplex units will include 61 no. 3 bedroom units, 171 no. 2 bedroom units and 80 no. 1 bedroom units, to be provided in 28 no. apartment/duplex buildings ranging in height from 3-4 storeys. One of the proposed apartment buildings (Block 3) will provide the ground floor commercial/retail unit. Vehicular access to the proposed development will be via a new access road and junction from Greenfields Road (L2216), with a secondary vehicular entrance also from Greenfields Road, with the proposed development also providing for separate pedestrian/cycle connections to Greenfields Road.

A full description of the proposed development is provided in Chapter 2 of this EIAR.

1.2 The Applicant

The Murnane & O'Shea Group (MOS) was founded in 1958 and is one of Ireland's leading building contractors. MOS have a proven track record and played a leading role in the provision of new of housing, particularly in the Cork Metropolitan Area having delivered residential developments which include Crawford Woods and Springmount Woods (Glanmire), Clarendon Brook (Douglas), Ard Na Ri, (Banduff), Crann Darach (Montenotte) Cork and the North West Regeneration in Knocknaheeny amongst a wide variety of residential schemes. MOS are currently delivering the 'Elmbury' and 'Heathfield' residential developments in Carrigtwohill and Ballincollig and are committed to the continued delivery of residential accommodation at sustainable locations, positively contributing to the realisation of population and housing growth targets of the Cork Metropolitan Area into the future.

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Figure 1.1 Aerial Photograph of Subject Lands

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1.3 Purpose and Background of EIA Process

EIA requirements are now governed by Directive 2014/52/EU, which amends Directive 2011/92/EU ("the EIA Directive"). The primary function of the EIA Directive is to ensure that projects that are likely to have significant effects on the environment are subjected to an assessment of their likely impacts.

EIA Directives have been transposed into Irish law and the planning consent process through the Planning & Development Acts 2000 (as amended), and the Planning & Development Regulations, 2001 (as amended). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018) commuted the 2014 Directive into Irish law.

Article 1(1)(g) of the 2014 EIA Directive (2014/52/EU) outlines the stages and steps taken when completing an EIA.

(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.

This is reflected in Article 171A of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which states that 'Environmental Impact Assessment' means a process—

(a) consisting of—

(i) the preparation of an environmental impact assessment report by the applicant in accordance with this Act and regulations made thereunder,

(ii) the carrying out of consultations in accordance with this Act and regulations made thereunder,

(iii) the examination by the planning authority or the Board, as the case may be, of—

(I) the information contained in the environmental impact assessment report,

(II) any supplementary information provided, where necessary, by the applicant in accordance with section 172(1D) and (1E), and

(III) any relevant information received through the consultations carried out pursuant to subparagraph (ii)

(iv) the reasoned conclusion by the planning authority or the Board, as the case may be, on the significant effects on the environment of the proposed development, taking into account the results of the examination carried out pursuant to subparagraph (iii) and, where appropriate, its own supplementary examination, and

(v) the integration of the reasoned conclusion of the planning authority or the Board, as the case may be, into the decision on the proposed development, and

(b) which includes—

(i) an examination, analysis and evaluation, carried out by the planning authority or the Board, as the case may be, in accordance with this Part and regulations made thereunder, that identifies, describes and assesses, in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following:

(I) population and human health;

(II) biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive;

(III) land, soil, water, air and climate;

(IV) material assets, cultural heritage and the landscape;

(V) the interaction between the factors mentioned in clauses (I) to (IV), and

(ii) as regards the factors mentioned in subparagraph (i)(I) to (V), such examination, analysis and evaluation of the expected direct and indirect significant effects on the environment derived from the vulnerability of the proposed development to risks of major accidents or disasters, or both major accidents and disasters, that are relevant to that development;

This EIAR has been prepared in accordance with guidance contained in the Directive 2011/92/EU (as amended by Directive 2014/52/EU), the Planning & Development Acts 2000 (as amended), the Planning & Development Regulations, 2001 (as amended), Annex IX of the 2014/52/EU Directive and Schedule 6 of the European Union (Planning and Development) (Environmental Impact Assessment) (Regulations) 2018 (S.I. No. 296/2018), which identifies the specific information to be assessed in an EIAR.

The purpose of these Directives to ensure that projects likely to have significant effects on the environment are subject to a comprehensive and systematic assessment of environmental effects prior to development consent being given. The amended Directive (Directive 2014/52/EU) uses the term environmental impact assessment report (EIAR) rather than environmental impact statement (EIS). Where current national guidelines and regulations refer to an environmental impact statement or an EIS, this can be taken to be the same as an environmental impact assessment report (EIAR).

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The guidelines provide practical guidance to planning authorities, An Bord Pleanála, and other relevant stakeholders, on procedural issues and the EIA process, and outline the key changes introduced by Directive 2014/52/EU.

The EPA 2022 Guidelines list the following fundamental principles to be followed when preparing an EIAR:

- Anticipating, avoiding and reducing significant effects.
- Assessing and mitigating effects,
- Maintaining objectivity.
- Ensuring clarity and quality.
- Providing relevant information to decision makers and
- Facilitating better consultation.

The amended EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and the environmental impact assessment should identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the prescribed environmental factors which are:

(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).

This EIAR documents the assessment process of the prescribed environmental factors in relation to the proposed development.

1.4 EIA Methodology

As per Article 5(1) of the 2014 Directive, an EIAR should provide the following information:

- Description of Project.
- Description of Baseline Scenario.
- Description of Likely Significant Effects.
- Description of Avoidance / Mitigation Measures.
- Description of Reasonable Alternatives (and rationale for chosen option) and
- A Non-Technical Summary.

Annex IV of the Directive sets out a more detailed outline of the information required in an EIAR. The subject EIAR has been prepared in full accordance with these stated requirements of Annex IV.

In addition to the 2014 Directive, this EIAR has been informed by, but not limited to:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, (Department of Housing, Local Government and Heritage, August 2018).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency 2022).
- Environmental Impact Assessment of Projects: Guidance on Screening (European Commission, 2017).
- Environmental Impact Assessment of Projects: Guidance on Scoping (European Commission, 2017).
- Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017).
- Advice Notes for Preparing Environmental Impact Statements, Draft, (EPA, September 2015).
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Union, 2013).
- Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems - Key Issues Consultation Paper, Department of Housing, Planning, Community and Local Government, 2017.
- Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017).

We would also note that the pre-application discussions with the Planning Authority informed the content/ scoping of the EIAR. The EIA process has been project managed to ensure that the EIAR documentation and relevant analysis are confined to topics which are explicitly described in the legislation, and where environmental impacts may arise. Evaluation and analysis have been limited to topics where the indirect, secondary or cumulative impacts are either wholly or dominantly due to the project or development under consideration.

The EIA process can be broadly described as containing the following steps.

- EIA Screening.
- EIA Scoping.
- Preparation of an EIAR which informs planning consent process.

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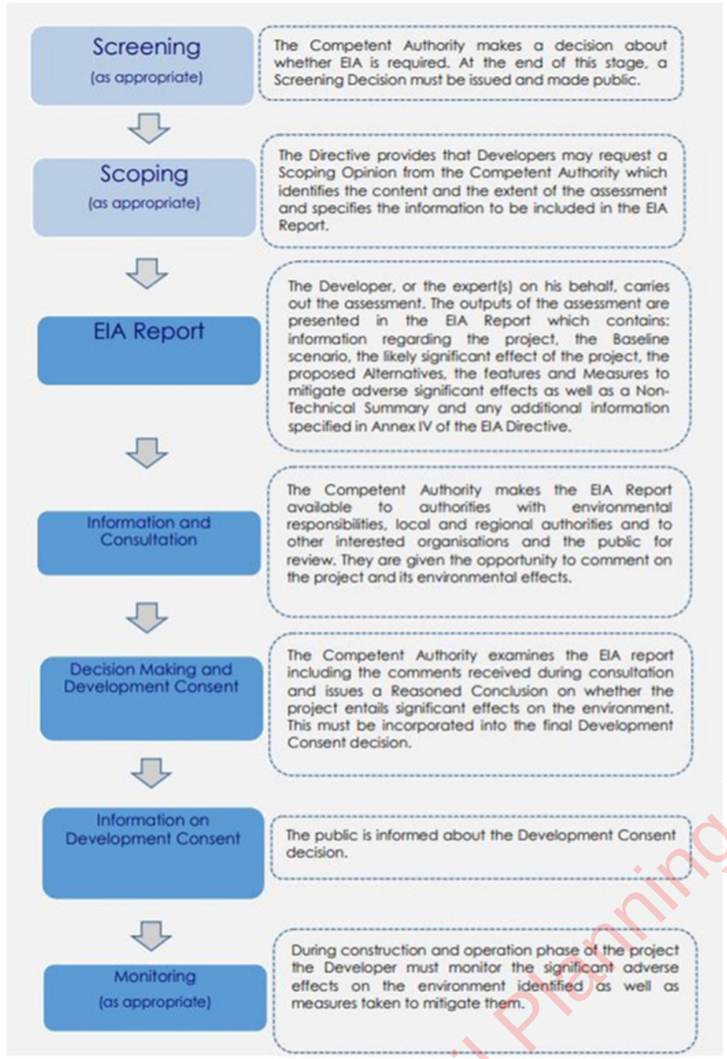

Figure 1.2 EIA Process (Source: Page 12 of Preparation Of Guidance Documents For The Implementation Of EIA Directive (Directive 2011/92/EU as amended by 2014/52/EU).

1.5 EIA Screening

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 by reference to the type and scale of the proposed development and the significance or the environmental sensitivity of the receiving baseline environment.

Article 93 and Schedule 5 of the Planning and Development Regulations, 2001 sets out the classes of development for which a planning application must be accompanied by an environmental impact assessment report (EIAR).

Part 1 and Part 2 Schedule 5 of the Planning and Development Regulations, 2001 prescribes the categories of, and thresholds for, prescribed development requiring EIA.

The subject proposal does not come under any of the prescribed development contained in Part 1 of Schedule 5.

Paragraph 10(b) of Part 2 of Schedule 5, which refers to Infrastructure Projects refers to the thresholds where a Mandatory EIAR is required.

> *"b) (i) Construction of more than 500 dwellings*
>
> *(ii) Construction of a car-park providing more than 400 spaces, other than a car-park provided as part of, and incidental to the primary purpose of, a development.*
>
> *(iii) Construction of a shopping centre with a gross floor space exceeding 10,000 square metres.*
>
> *(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.)"*

As the proposed development comprises the construction of 544 no. residential units, an EIAR is required as prescribed by Classes 10(b)(i) of the Regulations.

1.6 EIA Scoping

Scoping is the process of determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR. The primary objective of the EIAR is to identify baseline environmental and socio-economic conditions in the area of the proposed development, predict potential beneficial and/or adverse effects of the development during both construction and operational phases and propose appropriate mitigation measures where necessary. This EIAR also assesses the inter relationship between these aspects and the cumulation of effects with other existing and/or approved projects in the area.

The EPA 2022 Guidelines state that 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. Scoping is defined in the European Commission EIAR guidance (EC, 2017) as:

> *"The process of identifying the content and extent of the information to be submitted to the Competent Authority under the EIA process."*

The content of this EIAR was informed by an informal scoping process carried out by the applicant, the design team and appointed EIAR consultants to identify the core issues likely to be most important during the Environmental Impact Assessment process.

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Scoping for this EIAR involved an assessment of all relevant guidance as outlined in Section 1.3 of this report and Pre-Planning consultation meetings held with Cork City Council in accordance with Sections 247 and Section 32B of the Planning and Development Act 2000 (as amended) in December 2024 and May 2025. The recorded minutes of the 'Stage 1' Section 247 and 'Stage 2' Section 32 LRD meetings are included as Appendix 1-1, with the LRD Meeting Opinion issued by Cork City Council on 28th May 2025 contained in Appendix 1-2 of this EIAR.

A series of meetings have taken place with the technical staff of Cork City Council which assisted in the preparation of this EIAR and the planning application. Scoping also included notifying the following prescribed bodies of the extent of the proposed development and that an EIAR regarding same was being prepared.

1. An Taisce
2. Cork City Childcare
3. Department of Education
4. Department of Local Government, Housing and Heritage
5. Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media
6. Eirgrid
7. Environmental Protection Agency
8. Electricity Supply Board
9. Gas Networks Ireland
10. Geological Survey Ireland
11. Heritage Council
12. Inland Fisheries Ireland
13. Uisce Eireann
14. Department of the Environment, Climate and Communications.
15. National Monuments Service
16. National Parks and Wildlife Service
17. National Transport Authority
18. Office of Public Works
19. Teagasc
20. Transport Infrastructure Ireland
21. Health & Safety Authority
22. Department of Agriculture Food and the Marine
23. Irish Farmers Association
24. Cork County Council

The particulars sent to the above bodies are contained in Appendix 1-3 with any responses received contained in Appendix 1-4.

1.7 Structure of the EIAR

The EIAR is divided into 3 volumes:

- The main report consisting of 15 chapters as outlined in the table of contents;
- The Appendices numbered in accordance with the chapter they relate.
- A set of non-technical summaries for each relevant chapter.

Each chapter includes the following elements:

Introduction and Methodology

Description of Existing Environment

Impact Assessment which considers the following effects as necessary.

- Indirect Effects
- Cumulative Effects.
- Do-Nothing Effects
- Worst Case Effects
- Indeterminable Effects
- Irreversible Effects
- Residual Effects
- Synergistic Effects

Mitigation Measures, Monitoring & Residual Impacts – Description of mitigation measures proposed for both construction and operational phases of the proposed development and identify any residual impacts.

Difficulties in Compiling Information - Any difficulties/restrictions on gathering information if applicable is stated.

References - Any external references in the report cited and listed at the end of each chapter.

Non-technical Summary. The non-technical summary is a brief summary of each chapter, including summary of significant impacts, proposed mitigation and residual impacts. In compiling these summaries every effort have been made to present findings using non-technical language, which is clear to the general public.

All impacts or effects are described in following terms as in accordance with the EPA 2022 Guidelines.

Quality: Positive, Neutral, Negative

Significance: Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound

Extent and Context: Size of area, population etc.

Probability: Likely, unlikely

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Duration: Momentary (seconds to minutes); Brief (less than a day), Temporary <1 yr; Short-term 1-7 yrs, Medium Term 7-15yrs, Long Term 15-60 yrs, Permanent >60 yrs, Reversible (can be undone), Frequency (once, rarely, occasionally, frequently, constantly or hourly, daily, weekly, monthly, annually).

Figure 3.4 of the 2022 guidelines below, shows how comparing the character of the predicted effect to the sensitivity of the receiving environment can determine the significance of the effect.

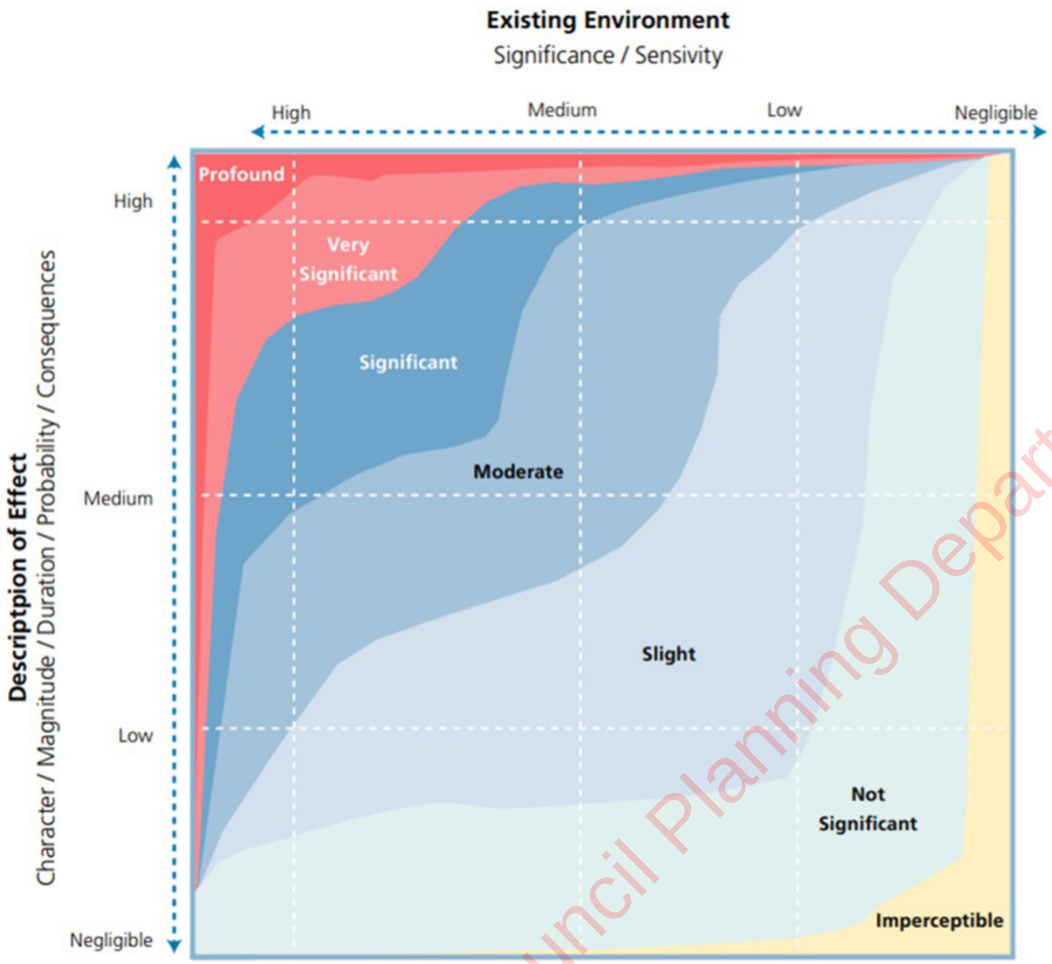

Figure 1.3 Chart Showing Typical Classifications of the Significance of Effects (Figure 3.4 of the 2022 EPA Guidelines)

A Natura Impact Statement has also been prepared for the proposed development and is included as Appendix 8-5 of this EIAR. Following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the qualifying interests of the SAC and SPA and the implementation of the proposed mitigation measures, it has been concluded by the authors of this report that there will be no residual impacts and the proposed project will not have an adverse effect on the integrity of the Great Island Channel Special Area of Conservation (SAC) and Cork Harbour Special Protection Area (SPA).

1.8 EIAR Team & Qualifications

HW Planning have coordinated the subject EIAR. Environmental specialist consultants were also commissioned for the various technical chapters of the EIAR document which are mandatorily required as per the EIA Directive and Planning and Development Regulations 2018.

The amended EIA Directive (Directive 2014/52/EU) states the following in relation to the persons responsible for preparing the environmental impact assessment reports:

> *'Experts involved in the preparation of environmental impact assessment reports should be qualified and competent. Sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality".*

Each environmental specialist was required to characterise the receiving baseline environment; evaluate its significance and sensitivity; predict how the receiving environment will interact with the proposed development and to work with the EIA project design team to devise measures to mitigate any adverse environmental impacts identified.

In accordance with the EIA Directive 2014/52/EU, we confirm that the EIAR has been carried out by fully qualified and competent experts in their relevant fields as outlined in this chapter. A full list of all consultants and the corresponding chapters that have been prepared is detailed below.

Planning Consultants: HW Planning.

Address: 5 Joyce House, Barrack Square, Ballincollig, Cork, P31 KP84.

Chapters Prepared: Chapter 1 – Introduction, Chapter 2 - Project Description & Alternatives Considered (in conjunction with Deady Gahan Architects), Chapter 13 - Population & Human Health, Chapter 14 - Interaction of Impacts and Chapter 15 - Summary of Mitigation & Monitoring Measures.

Personnel: Harry Walsh, (BA HONS, Master of Regional and Urban Planning, MIPI), Director at HW Planning. Harry has over 25 years experience in the planning profession comprising Local Authority roles and private practice. Harry has acted as planning lead on a wide variety of projects which have required EIAR's including a variety of Strategic Housing Developments (SHD's), the development of the 'Castletreasure Urban Expansion Area' in Douglas, Cork on behalf of the applicants, the expansion of the whiskey maturation facility at Ballymona North, Dungourney, Co. Cork and the proposed Midleton Distillery Expansion Project, on behalf of Irish Distillers Limited.

Landscape & Visual: Modelworks.

Address: The Old Courtyard, Newtownpark Ave, Blackrock, Co. Dublin, A94 YD61

Chapters Prepared: Chapter 3 – Landscape & Visual

Personnel. Richard Butler (MIPI MILI) Qualifications: MSc (Spatial Planning), BLArch(Hons) (Landscape Architecture), Dip Proj Mgmt. Memberships: Member of the Irish Planning Institute, Member of the Irish Landscape Institute. Richard has 25+ years' in development and environmental planning, specialising in Landscape and Visual Impact Assessment (LVIA). Recent LVIA experience includes: (1) Cartron LRD, Oranmore, Galway, (2) O'Devaney Gardens, Dublin, (3) Project Montrose LRD, Dublin, (4) Sandford Road LRD, (5) St Vincent's Hospital and Residential Development, Fairview, Dublin, (6) the Guinness Quarter, Dublin, (7) Phases 1, 1B and 2 of the Pembroke Quarter (former Irish Glass Bottle site, Dublin), (8) Augustine Hill, Galway, (9) Emmet Road SHD, Inchicore, Dublin, (10) Newtownpark Avenue SHD, Blackrock, Co. Dublin.

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Traffic Consultants: Egis.

Address: 3 Eastgate Road, Eastgate Business Park, Little Island, Co Cork, T45KH74.

Chapters Prepared: Chapter 4 - Material Assets – Traffic & Transportation.

Personnel: This assessment was prepared by Kwok Chuen Lam, Chartered Engineer who is a Senior Traffic Engineer with EGIS. Kwok Chuen Lam has 19 years' experience specialising in the field of Traffic and Transport Engineering. He has been engaged as team member on a variety of Transportation and Traffic projects. His experience includes the design and management of road improvement projects, preparation of mobility management plans and traffic impact assessments.

This chapter has been reviewed by Tara O'Leary a chartered Transport Planning Professional with over 20 years' experience.

Civil Engineers: DOSA Consulting Engineers.

Address: Joyce House, Barrack Square, Ballincollig, Cork, P31 KP84.

Chapters Prepared: Chapter 5 - Material Assets – Services, Infrastructure & Utilities.

Personnel: Liam O'Toole (BE CEng (Hons) MIEI), Director at Denis O Sullivan & Associates (DOSA) Consulting Engineers. Liam is a Chartered Civil Engineer and has over 25 years' experience in the industry working locally, nationally and internationally.

Geology & Hydrology: Keohane Geological & Environmental Consultancy

Address: Ivy House, Clash, Carrigrohane, Cork.

Chapters Prepared: Chapter 6 – Land & Soils, Chapter 7 - Water (Hydrology & Hydrogeology)

Personnel: Dan Keohane of Keohane Geological & Environmental Consultancy (KGEC). KGEC is a Cork-based consultancy, established in 2004, and specialising in geological and environmental sciences. Mr. Keohane has over 30 years' experience in environmental assessment. In the past 20 years, KGEC has prepared planning applications, EIARs and/or geotechnical assessments for commercial, industrial and residentials developments throughout Ireland and UK. Mr. Keohane (BSc Hons Geology; MSc Applied Geophysics) received an honours degree in Geology from UCC in 1989, and a Master's Degree in Applied Geophysics from UCG in 1991. Mr. Keohane has been working on environmental impact assessment for residential/ commercial developments, roads, quarries, waste management facilities and wind farms for the past twenty years. Areas of expertise include geological assessment, landslide risk assessment, groundwater assessment, surface water, hydrology and erosion control during construction. He has practical experience in project construction, performing environmental oversight and monitoring during the construction phase.

Project Ecologist: Dixon Brosnan - Environmental Consultants.

Address: Lios Ri Na hAoine, 1 Redemption Road, Cork.

Chapters Prepared: Chapter 8 - Biodiversity

Personnel: Carl Dixon MSc (Ecology) is a senior ecologist who has over 25 years' experience in ecological and water quality assessments. Carl Dixon holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. He is a senior ecologist with over 25 years' experience in ecological assessment. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included Rural Environmental Protection Scheme (REPS) planning for landowners and ecological assessments. Carl has particular experience in freshwater ecology including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to badgers and bats. Other competencies include surveys for invasive species and bird surveys. Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has particular experience in large-scale developments, including residential and industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include gas pipelines, incinerators, electrical cable routes, oil refineries, quarries and LRDs.

Dr. Sorcha Sheehy PhD (ecology/ornithology) is an experienced ecological consultant specialising in bird behaviour. Sorcha received a BSc in Applied Ecology from UCC and subsequently went on to receive a PhD in behavioural ornithology at UCC. During her PhD research, Sorcha studied bird-aircraft collision with a particular focus on bird behaviour. Sorcha has worked for over 15 years in a professional ecology role and specialises in the coordination of ecology projects and assessments. She has coordinated and contributed to Habitats Directive Assessments (AA screenings and NIS) and Environmental Impact Assessment Reports (EIAR) for a range of small and large-scale projects with particular expertise in assessing impacts on birds. She has particular experience in large-scale developments, including residential and industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams.

Built Heritage/Archaeology: Lane Purcell Archaeology

Address: 64 Father Mathew Road, Turners Cross, Cork,

Chapters Prepared: Chapter 9 - Cultural Heritage

Personnel: Avril Purcell, (MA Archaeology, NUI Cork, 1994, BA Archaeology and History, NUI Cork, 1992, Licence eligible by National Monuments Service since 1997). Avril is the director of Lane Purcell Archaeology (LPA) and is a licensed archaeologist with 28 years' experience in research, consultancy, surveying and excavation. Avril has been involved in a large number of diverse EIAR projects throughout the country. In some cases, her involvement has been from the initial constraint study stage through pre-development investigations, resolution and construction. Avril has presented expert witness evidence at An Bord Pleanála oral hearings.

Musetta O'Leary (MA Archaeology, NUI Cork, 2000, BA Archaeology and Geography, NUI Cork, 1998). Musetta has over 15 years of experience in all aspects of archaeological consultancy and primarily manages the archaeological and cultural heritage components of projects at the pre-planning consultancy stage. She has co-ordinated and written the Cultural Heritage section of a large number of diverse EIAR/EIS projects for road construction, industrial, residential and sporting developments, energy delivery and quarrying. Musetta has presented expert witness evidence at An Bord Pleanála oral hearings.

Environmental Consultant: AWN Consulting/ Trinity Consultants.

Address: The Tecpro Building, Clonshaugh Business & Technology Park, Dublin 17

Chapters Prepared: Chapter 10 - Noise & Vibration, Chapter 11 – Air Quality, Chapter 12 - Climate

Personnel: Tanmay Gojamgunde, Environmental Consultant in the Air Quality & Climate section of AWN Consulting, a Trinity Consultants Company. He holds a MSc in Air Pollution Management and Control from the University of Birmingham and has also completed BTech in Environmental Engineering. As part of the MSc, he worked on 'The Impact of bus-fleet electrification on air quality in Birmingham' utilising advanced dispersion modelling tools and emission inventory toolkit. Prior to joining AWN, Tanmay contributed to several key environmental projects in India, including Delhi's first air quality monitoring program (R ASMAN), air quality and traffic planning assessments with IIT Kanpur, and an Environmental Impact Assessment Report (EIAR) for an industrial district in Kanpur. He also specialises in conducting air dispersion modelling assessments of emissions, emission inventories, R programming and extends to broader aspects of environmental engineering.

Ciara Nolan, Principal Environmental Consultant in the Air Quality & Climate section of AWN Consulting. She holds a BSc in Energy Systems Engineering from University College Dublin and has also completed an MSc in Applied Environmental Science at UCD. She is a Member of the Institute of Air Quality Management (MIAQM) and the Institution of Environmental Sciences (MIEnvSc). She has over 8 years of experience in undertaking air quality and climate assessments. She has prepared air quality and climate impact assessments as part of EIARs for residential developments including Woodbrook, Shankill (Planning Application Ref. ABP30584419), Ballygossan Park, Skerries (Planning Application Ref. LRD0010/S3), SHD Ratoath (Planning Application Ref. SH305196), SHD Rathmullen, Drogheda (Planning Application Ref. SH305552), commercial and industrial developments by Dublin Airport Authority, Abbvie, Mountpark, Pfizer, Takeda, as well as renewable energy developments such as Crockahenny Windfarm, Upperchurch Windfarm, Knocknamona Windfarm and Keerglen Windfarm. She also specialises in

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conducting air dispersion modelling assessments of emissions from data centres, energy centres and the chemical industry as part of EPA Industrial Emissions Licences for Echelon DC, AWS, Takeda, MSD and Regeneron. She has undertaken air quality and climate impact assessments for transportation schemes, primarily regional and national road schemes, from constraints, through to route selection and EIAR stage.

Aoife Kelly (Senior Acoustic Consultant) with AWN Consulting Ltd. Aoife holds a BSc(Hons) in Environmental Health and a PhD in Occupational Noise. She has completed the Institute of Acoustics Diploma in Acoustics and Noise Control. Working in the area of acoustics since 2013, she has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, specialising in infrastructure, wind energy, industrial, commercial and residential.

Project Architects: Deady Gahan Architects.

Address: Eastgate Village, Little Island, Co. Cork

Chapters Prepared: Chapter 2 - Project Description & Alternatives Considered (in conjunction with HW Planning).

Personnel: Eamonn Gahan, Director - Architects Registration No. 04148 - Eamonn is a founding director of Deady Gahan Architects, set up in 2004 and has over 20 years architectural experience. He is a registered RIAI Architect, is an RIAI Grade 3 Conservation Architect and a qualified Passive House Designer.

1.9 Cumulative Impacts

The potential environmental effects of the proposed development have not been assessed in isolation. The potential impacts of this project have been considered in combination with other relevant permitted or proposed projects in the vicinity of the site and plans for the area, which may result in cumulative environmental impacts.

The geographical boundaries for cumulative projects were developed within the wider design team having regard to the location of the Project; defined EIAR boundary; the nature of the proposed development works; the receiving environment; and the potential for cumulative impacts to arise relative to each individual EIAR topic chapter. In relation to the latter, this included consideration of the following practical elements:

Population and Human Health: In defining the EIA study area for this chapter a focused analysis of Census boundaries was undertaken, including both Electoral Divisions (ED) and Census Small Areas (SA) which are a sub-division of the ED units and generally cover 65-90 households. Using a combination of these units a study area was defined that:

- Includes the smaller settlements, established and planned residential areas and employment areas served by the Urban Town of Ballincollig. This takes the form of a belt of urban areas built up along the R608 regional road.
- The area is largely delimited by the physical barrier of the River Lee to the north and the and N22/N40 Road to the south.
- Prior to Cork City Boundary extension in 2019 the traditional catchment area of the then County 'Main Town' of Ballincollig was all located within the administrative area of Cork County Council. This catchment now straddles the boundary of Cork City and County Councils, with the Urban Town of Ballincollig and lands to the east falling within the Cork City area. However, Ballincollig and its traditional catchment has remained a relatively discrete and self-contained area, and this is reflected in the study area in terms of population, urban amenities and services and employment.

The study area principally comprises the following Census 2022 EDs - Ballincollig ED (Ref. 4701619) and Ovens ED (Ref. 47127019). However, to capture the full extent of the Killumney/Ovens settlements, which form a natural part of the wider Ballincollig Catchment, the following Census 2022 SA's are also included: 047028003, 047028003, 047028002, 047028004, 047028001, 047270004, 047270002, 047270003. The population of the study area in the 2022 Census was 22,790. The majority of these residents were living within the 2 EDs approximating the area of the settlements of Ballincollig and Ovens (20,8554).

Biodiversity: Consideration of terrestrial ecology habitats and survey work within the environs of the site and Natura 2000 European designated sites.

Air Quality: Sensitive receptor locations (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 within 200 metres of stated impacted road links (TII criteria) and potential sensitive dust receptors within 250 metres of the site boundary.

Climate: The study area with respect to the Greenhouse Gas Emissions Assessment (GHGA) is Ireland's Climate budget. The study area with respect to the Climate Change Vulnerability Assessment (CCRA) is the project boundary and its assets.

Noise & Vibration: The extent to which the proposed development could interact with other projects in the area, and identified potential sensitive receptors in the area.

Cultural Heritage: An appraisal of all sites listed in the Record of Monuments and Places (RMP) within a 1.5km radius of the proposed development site. In addition, the assessment considers all assets designated as Protected Structures (PS) in both the Cork City and Cork County Development Plans 2022–2028, as well as entries in the National Inventory of Architectural Heritage (NIAH) within the same 1.5 km study area.

Water: Stated surface water catchments and hydrological cumulative impact potential based on the proposed development.

Material Assets: Potential for cumulative telecoms, broadcast and aviation impacts, and impact of proposed development on traffic volumes in the area, inclusive of other known projects and having regard to the delivery route for construction traffic.

Landscape and Visual: An assessment of statutory landscape related designations in the wider area including scenic routes, protected views and areas of high landscape value. Aerial imagery, OSI Discovery series mapping were also reviewed to gather accurate information on the wider study area.

Land and Soils: Assessment of underlying geological conditions of the site and its environs and sites of geological interest in the wider Cork Metropolitan Area.

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1.9.1 Projects

Each of the projects listed in Table 1.1 and highlighted in Figure 1.4 have been assessed for potential cumulative impacts. These projects were identified by using both Cork City Council and Cork County Council Planning Enquiry Systems, An Bord Pleanála's website and the Department of Housing, Local Government and Heritage's EIA Portal.

Table 1.1 Cumulative Impacts – Projects Considered

Application Reference	Applicant(s)	Date Received	Grant Date	Description	Outcome/Current Status
N/A	N/A	N/A	N/A	Luas Cork Project	Public Consultation.
N/A	N/A	N/A	N/A	Bus Connects Project	Public Consultation.
24/43308	Coleman New Homes (Blarney) Limited	7/10/2024	01/04/2025	The construction of a two-storey creche at Maglin Road, Ballincollig, Cork.	Development permitted.
23/42446	Coleman New Homes (Blarney) Limited	14/11/2023	19/08/2024	A Large-Scale Residential Development (LRD) of 162 no. residential units, landscaping and all ancillary site works Maglin Road, Ballincollig, Cork. (Cois Caislean Phase 2)	Development permitted and under construction
22/41644	MOS Homes Limited	16/12/2022	29/01/2024	Construction of 99 no. dwellings at Heathfield, Ballincollig, Cork.	Development permitted and under construction
ABP-308111-20	Stonecrest Construction Limited	8/9/2020	23/12/2020	Strategic Housing Development Application for the construction of 113 no. residential units (59 no. houses, 54 no. apartments), childcare facility and associated site works at Maglin Road, Ballincollig, Cork.	Development largely constructed. Apartment building with 54 no. units and creche to be completed.

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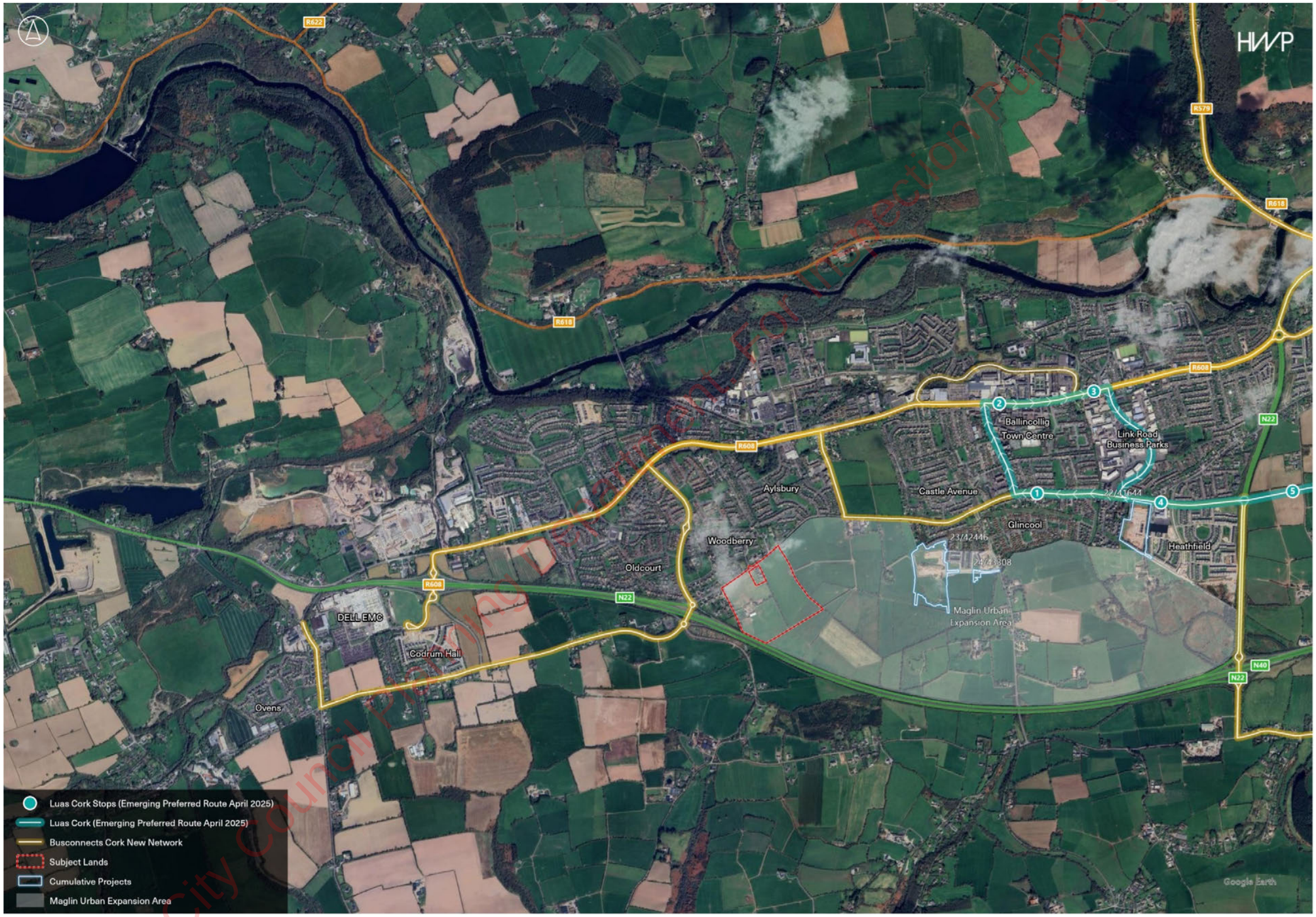

Figure 1.4 Evolving Site Context

1.9.2 Plans

The Cork City Development Plan 2022-2028 (CDP) outlines policies and objectives for housing development in the Cork City administrative area. The CDP is underpinned by a number of key principles which include sustainability, social inclusion, high quality design and climate change adaptation. The Plan establishes a hierarchical network of settlements in the County, allocating related population and housing growth projections. Chapter 2 of the CDP outlines the Core Strategy for the City over the lifetime of the Plan. The strategy identifies a hierarchy in the network of settlements and divides the city into different strategic areas to focus growth in appropriate locations and ensure a sustainable, plan-led future for the city.

The site is situated within the South Ballincollig/Maglin Urban Expansion Area (MUEA) as defined in the Core Strategy of the CDP. The CDP 'Environmental Reports' appendices contains the SEA Statement and Natura Impact Report. These describe the different development scenarios that were assessed by Cork City Council as part of the preparation of the Development Plan and the SEA process and the reasons for choosing the plan as adopted, in the light of the reasonable alternatives dealt with in accordance with Article 9 of the European Directive (2001/42/EC) on the Assessment of the Effects of Certain Plans and Programmes on the Environment (the SEA Directive).

Three alternative scenarios were considered during the preparation of the 2022-2028 CDP. Alternative/Scenario 3 'Compact Liveable Growth' was identified as the preferred scenario following the evaluation of the three proposed alternative scenarios for their respective impacts on the environment was undertaken. The potential impact on the environment of the CDP was assessed for cumulative impacts and were considered in the preparation of this EIAR.

1.10 Difficulties Encountered

No particular difficulties were encountered in compiling any of the specified information contained in the EIAR, such that that the prediction of impacts has not been possible. The relevant chapters of the EIAR, identify any specific difficulties which were encountered during preparation of this EIAR.

1.11 Availability of EIAR Documentation

This EIAR will be available in printed form at the offices of Cork City Council (City Hall, Anglesea Street, Cork, T12 T997). The EIAR will also be available to view electronically at Cork City Councils online planning enquiry system and at the following website. www.GreenfieldLRD.ie

1.12 EIAR Quality Control & Review

HW Planning oversaw the preparation of this EIAR. A key aspect of the EIAR has been to make the documentation as accessible and clear as possible to the public and other relevant stakeholders. This EIAR has been prepared in accordance with the relevant legislation.

1.13 Typographical Errors

Every effort has been made to ensure that the content and findings of this EIAR is consistent and error free. However, it is acknowledged that some minor grammatical/spelling and typographical errors may occur. These typographical minor inconsistencies are unlikely to result in any material impacts on the overall findings and conclusions of the EIAR.

1.14 Chapter Appendices

Appendix 1-1 – Minutes of Section 247 & Section 32 LRD Meetings.

Appendix 1-2 – Cork City Council LRD Opinion dated 28th May 2025.

Appendix 1-3 – Scoping Letters to Statutory Bodies.

Appendix 1-4 - Scoping Responses from Statutory Bodies.

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CHAPTER TWO

PROJECT DESCRIPTION & ALTERNATIVES CONSIDERED

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CHAPTER TWO

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CHAPTER 2 | Project Description & Alternatives Considered

2.1 Introduction

The EIA Directive requires that an EIAR should provide an overview of:

- the location, site, design, size, etc.;
- the physical characteristics of Project (including any demolition or land-use requirements);
- the characteristics of the operational phase of the Project;
- any residues, emissions, or waste expected during either the construction or the operational phase.

As the European Commission's EIAR Guidelines state, the requirement to include a description of the project in the EIA Report is not new, however, the key difference brought about by the 2014 amendments is the inclusion of relevant requisite demolition works during the construction and operational phases. In addition, an estimate of residues and emissions during the construction phase is to be included, where previously such estimates concerned only the operational phase. Article 5 requires other relevant features of the Project to be included. In addition, a description of the location of the Project is now specifically required by Annex IV. Finally, the operational phase of the Project is not limited to production processes, as it was previously.

In addition, the lists of characteristics given in Annex IV, have been expanded upon:

- any requisite demolition works must now be described, where relevant;
- energy demand and energy used should be described in context of the operational phase;
- natural resources must now be described in the context of the operational phase
- the list of expected residue and emission estimates is no longer exhaustive, and subsoil has been added as type of pollution;
- estimates of quantities and types of waste produced must now be given.

This chapter describes the nature, location and specific characteristics of the proposed development during construction and operational phases in accordance with the 2014 Directive.

2.2 Existing Environment/Baseline Scenario

The subject lands of 15.2 hectares in area are situated in the townland of Greenfield to the southwest of Ballincollig. The greenfield lands are bound to the northwest by the existing established urban footprint of Ballincollig, with undeveloped agricultural lands to the west and northeast. The land is accessed to the north by two entrances from Greenfields Road with a short cul-de-sac to the west and the N22 Ballincollig Bypass bounding the most southern area of the lands. The lands are situated approximately 2 kilometres southwest of the town centre of Ballincollig with the settlements of Killumney/Ovens also located to the west of the site.

The subject lands are situated in a strategically important location in the future expansion of Ballincollig. The lands serve as the western gateway to the South Ballincollig (Maglin) Urban Expansion Area (MUEA) as identified in the Core Strategy of the Cork City Development Plan 2022-2028 (CDP) and are situated within a 15 minute walking/10 minute cycle distance of.

- **Public Transport Opportunities** - The existing 'West End' neighbourhood centre which is identified as a bus stop location to serve 'Sustainable Transport Corridors' (STC) E, Ballincollig to City in Draft BusConnects. The existing 220 no. bus route which runs from Ovens-Carrigaline (via Ballincollig Main Street) operates a peak frequency of every 15 minutes. The site is also situated within 15 minutes only walking distance from another STC Bus Stop at Coolroe to the northwest of the lands and from bus stops serving the existing 220 no. 24 hour bus route which runs from Ovens-Carrigaline (via Ballincollig Main Street) operates a peak frequency of every 15 minutes. The lands are also situated within 1.5 kilometres, equivalent to approximately 18 minutes walk of the potential future 'Carriganarra Road' stop as identified on the Emerging Preferred Route of the Luas Cork project.
- **Retail Opportunities -** The 'West End' neighbourhood centre and 'West City Retail Park' are both situated within 15 minutes walking distance from the site and include a wide variety of retail and commercial opportunities including Quishes SuperValu, Lidl, Jysk and other services, service stations, and beauticians/ hairdressers. Ballincollig town Centre and Main Street are within a 10-minute cycle from the subject site and provide an even broader range of retail and commercial opportunities including Ballincollig Shopping Centre.
- **Educational Facilities** – Ballincollig is well served by several primary and secondary schools and other educational outlets. Scoil Barra, Ballincollig Community School Le Chéile Secondary School and Our Lady of Good Counsel School situated at Innishmore within approximately 15 minutes walking distance from the subject lands and comfortable within 10 minutes cycling distance. Other schools within a 10-minute cycle distance of the site include Scoil Eoin on Station Road, and Gaelscoil Ríordáin on the Carriganarra Road. Colaiste Choilm on Ballincollig Main Street is situated within 10-15 minutes cycle distance from the site. Gaelscoil an Chaisleain which operates from the grounds of Ballincollig Rugby club is also situated less than 10 minutes cycling distance from the subject site.
- **Recreational Outlets** – Ballincollig is home a wide variety of recreational, sporting and amenities which are within 10 minutes cycle and 15 minutes walking distance from the subject site including bars and restaurants. Other amenities within this distance include Ballincollig Rugby Club, Ballincollig Community Centre and Ballincollig Regional Park. The Oriel/Talbot Hotel which serves an important local amenity is also situated within a 10 minutes walking distance from the subject site.
- **Employment Opportunities** - DELL Technologies facility at Ovens is situated approximately 10-15 minutes cycle distance from the subject lands. Due to the excellent public transport opportunities and established local economy, Ballincollig is a self-sufficient town with a wide range of employment and commercial opportunities with Main Street, the Barrack Square office campus and the various commercial/industrial estates on the Link Road/Leo Murphy Road in particular serving as important employment centres for the towns population.

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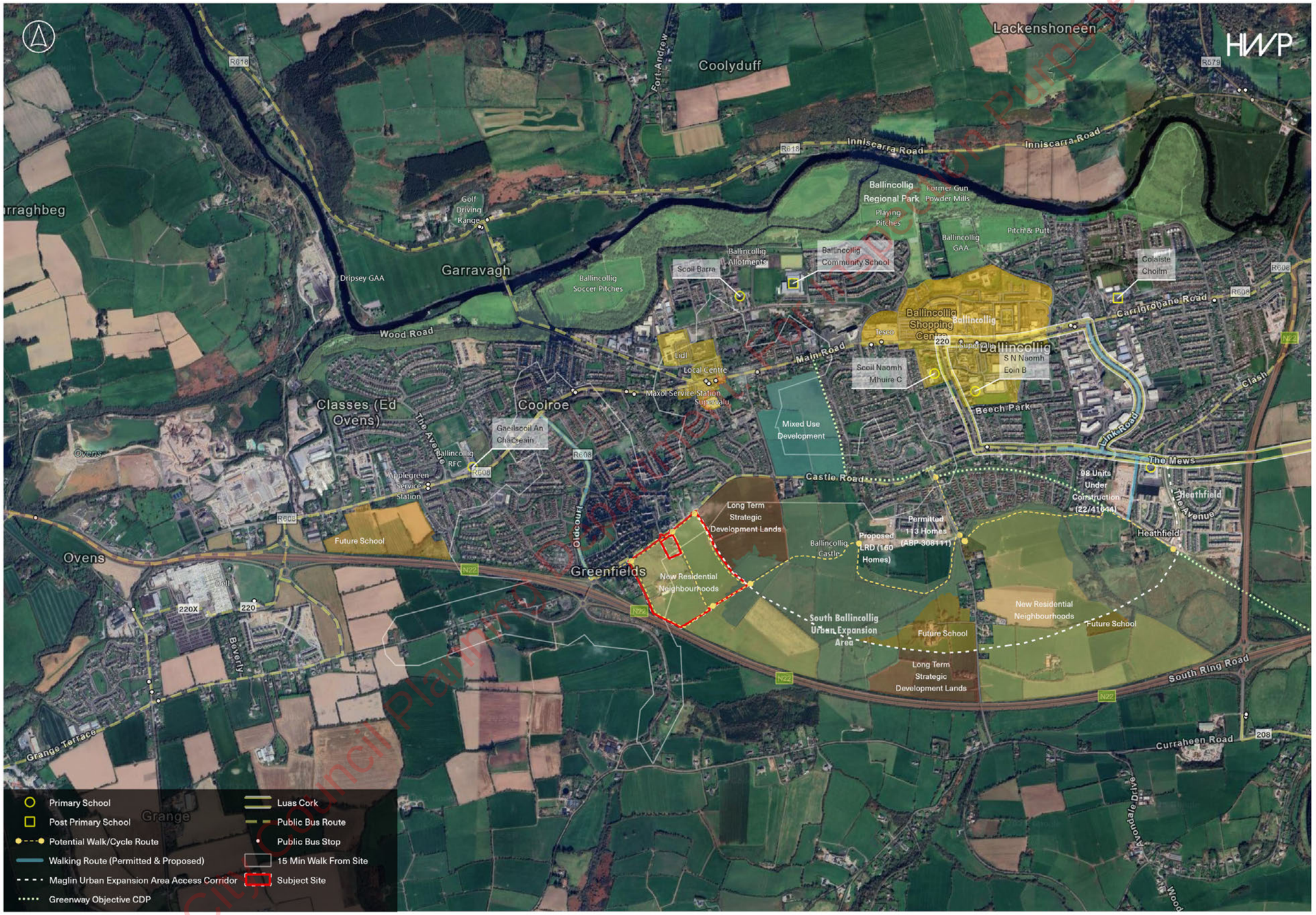

Figure 2.1 Site Context within wider settlement of Ballincollig.

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An existing dwelling house, agricultural yard and sheds are located in western areas of the lands, which are accessed via the aforementioned western boundary cul de sac which also serves a number of private individual dwellings. An existing dwelling house is also situated in northern areas of the lands, however, is not included within the project red line boundary.

Figure 2.2 Existing dwelling house in western areas of the lands.

Figure 2.3 Existing agricultural building/farmyard on site.

Figure 2.4 Existing Entrances to the lands from Greenfields Road.

Figure 2.5 Other Existing Entrances to the lands from Greenfields Road

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As described in greater detail in Chapter 6 of this EIAR, the lands are primarily agricultural in nature comprising of several individual field parcels, separated by existing field boundaries and hedgerows. The dominant soil type of the site and immediate area is Acid Brown Earths (70%). The site geology consists of a thin layer of topsoil over between approximately 2m and 13.5m of glacial tills, resting on karstified limestone bedrock. The topography of the site gently slopes from the north and west to a low point on the southeastern boundary which is approximately +18.42m AOD. The elevation height along the perimeter from the north, west and southern side varies from +30.0m to +19.0m AOD. According to the GSI mapping, there is one bedrock outcrop (exposure) at the site. This occurs at the north-western corner, coinciding with high point of the site.

As detailed in EIAR Chapter 8, the subject lands are not located within any European designated sites. The Cork Harbour SPA is situated 11.5km east (17.3km downstream) from the site with the Ballincollig Cave pNHA and Lee Valley pNHA both located within 1 kilometre of the site boundary. Full details of the sites baseline biodiversity and ecological context is provided in Chapter 8 of this EIAR. The site is mainly in GA 1 (Improved Agricultural Grassland), with an area of scattered trees and parkland habitat (WD5 and flower beds (BC4) in western areas. The site is characterised by existing boundary hedgerows Existing mature hedgerows are along the site boundaries in addition to 2 no. existing internal field hedgerow ditches within the site.

Figure 2.6 Site Habitats

There are no recorded monuments within the proposed development site listed in the Record of Monuments and Places (RMP) for Co. Cork or the Sites and Monuments Record (SMR) database of the Archaeological Survey of Ireland. The nearest RMP site is a fulacht fia (CO073-061), located approximately 150m to the southeast. There are no Protected Structures (PS) in the Cork City Development Plan (2022–2028) or structures listed in the National Inventory of Architectural Heritage (NIAH) within the proposed development site. The nearest Protected Structure is Ballincollig Castle and its bawn (PS1225), which is also listed in the RMP (CO073-062 and CO073-062001) and is situated circa 450 m east of the lands. The closest NIAH-listed structure is a railway bridge (20907330), situated approximately 95m to the south. There is an existing dwelling house and associated farm buildings and yards at the southwest of the proposed development site. The house was constructed in the first half of the 20th century and is shown the OS 6-inch map of 1939.

The southeastern most area of the site, which is included within the ZO 15 ‘Public Open Space’ zoning objective of the Cork City Development Plan 2022-2028 (CDP), is identified as being at risk of fluvial flooding in the Strategic Flood Risk Assessment of the CDP. However as confirmed in the Flood Risk Assessment prepared by Malachy Walsh & Partners (Appendix 7-3 of this EIAR) there is no recorded history of flooding within the proposed development site.

2.3 Evolving Development Context

2.3.1 Strategic Policy Context

The subject lands are situated within an evolving developmental area both locally and within the wider Cork Metropolitan Area. The lands are within the South Ballincollig (Maglin) Urban Expansion Area (MUEA) as identified in the Core Strategy of the Cork City Development Plan 2022-2028 (CDP). Section 2.47 of the Core Strategy of the CDP identifies the CUEA as one of seven strategic consolidation and expansion areas in the city which will need to accommodate significant levels of housing and population growth during the lifetime of the plan. The delivery of large-scale residential development within the seven strategic consolidation and expansion areas is critical for the city to meet its ambitious growth targets within the lifetime of the CDP, but also to reach longer term targets for Cork set out in the Regional Spatial & Economic Strategy for the Southern Region (RSES) and the National Planning Framework 2040 (NPF).

Tables 2.2 and 2.3 of the CDP’s Core Strategy outline the population and growth targets of the various areas of the city, in order to promote compact and sustainable growth. Ballincollig is identified to accommodate significant growth in population and housing by 2028. The CDP sets a population target of 27, 987 no. people in Ballincollig by 2028, an increase of over 54% from 2016 figures to be accommodated in an additional 3,947 units.

Core Strategy 2028: Compact Liveable Growth[1]

Cork City	Baseline Populations (2016)		Future Population Growth (2028)		Targeted Population Growth (2028)	
	Existing Population	% of Total Population	Future Population	% of Total Growth	Targeted Population Growth	Proportionate Growth Rate Target
Ballincollig	18,159	8.6%	27,987	19.3%	9,828	54.1%

Growth Strategy 2028[3]

Location	Underutilised Sites (Net Hectare's)	Potential Tier 1 & 2 Yield (Units)	Tier 1 Potential Yield (Units)	Tier 2 Potential Yield (Units)	Longterm Strategic Development
Ballincollig	141.2	3,947	2,026	1,921	573

Figure 2.7 Growth Targets for Ballincollig in Core Strategy of CDP

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The delivery of large-scale residential development within the seven strategic consolidation and expansion areas is critical for Cork City to meet its ambitious growth targets within the lifetime of the CDP but also to reach longer term targets for Cork set out in the Regional Spatial & Economic Strategy for the Southern Region (RSES) and the National Planning Framework 2040 (NPF). Ballincollig's ability to deliver the housing growth required to enable the town to fulfil its strategic functions within the RSES is heavily dependent on the timely delivery of the MUEA to meet its housing targets. Of the 4,582 no. additional residential units required for the settlement by 2031, 78% are to be provided within the MUEA.

Location	Brief Description and Indicative Yield: Yields are indicative only, will be revised in the context of compact growth targets, departmental guidelines and development plans.	Infrastructure Priorities subject to required appraisal, planning and environmental assessment processes
Ballincollig	Ballincollig is the largest and fastest growing town in Cork, building on its IT specialism and potential for improved public transport links to the City via the Cork Science and Innovation Park. Urban Expansion Area of Maglin. ***Potential Residential Yield:*** **4582 (includes Maglin UEA 3,570).**	As per Chapter 3 Objective on investment for holistic infrastructure for metropolitan areas. • Maglin Urban Expansion Area Phased Infrastructure Packages. • CMATS recommendations re road network / public transport (LRT in particular). • Waste Water Infrastructure upgrades. • Water Supply Upgrades. • Local Road improvements (Killumney Road Upgrade, Maglin Road realignment). • Delivery of Cork Northern Ring Road. • Sustainable Urban Drainage Strategy. • Investment in retrofitting infrastructure and services (physical, social and recreational) to improve quality of life for communities.

Figure 2.8 The future of Ballincollig as identified in Section 7.2 of the RSES.

2.4 Project Description – Construction Phase

This section provides an overview of the construction and demolition phases of the proposed development. In addition, a Construction and Environmental Waste Management Plan (CEWMP) prepared by DOSA Consulting Engineers is included as Appendix 2-1 of this EIAR. All measures set out in this section of the EIAR, and the CEWMP will be implemented during the construction phase of the project.

2.4.1 Construction Programme and Phasing

It is envisaged that the construction phase of the project will be for a period of approximately 8-10 years. The project will be constructed in four sequential phases comprising.

- **Phase 1A –** Demolition of existing dwelling house and agricultural buildings, establishment of site compound, delivery of sections of active travel paths on Greenfields Road and connections and service infrastructure and the construction of 140 no. residential units in the northwestern areas of the site.
- **Phase 1B –** Completion of active travel paths on Greenfields Road, the construction of the Sustainable Access Corridor to serve the MUEA, 150 no. residential units and creche facility in northeastern and central areas of the site.
- **Phase 2A -** 106 no. residential units in the southwestern area of the site.
- **Phase 2B** – 148 no. residential units and retail/commercial unit in the southeastern areas of the site.

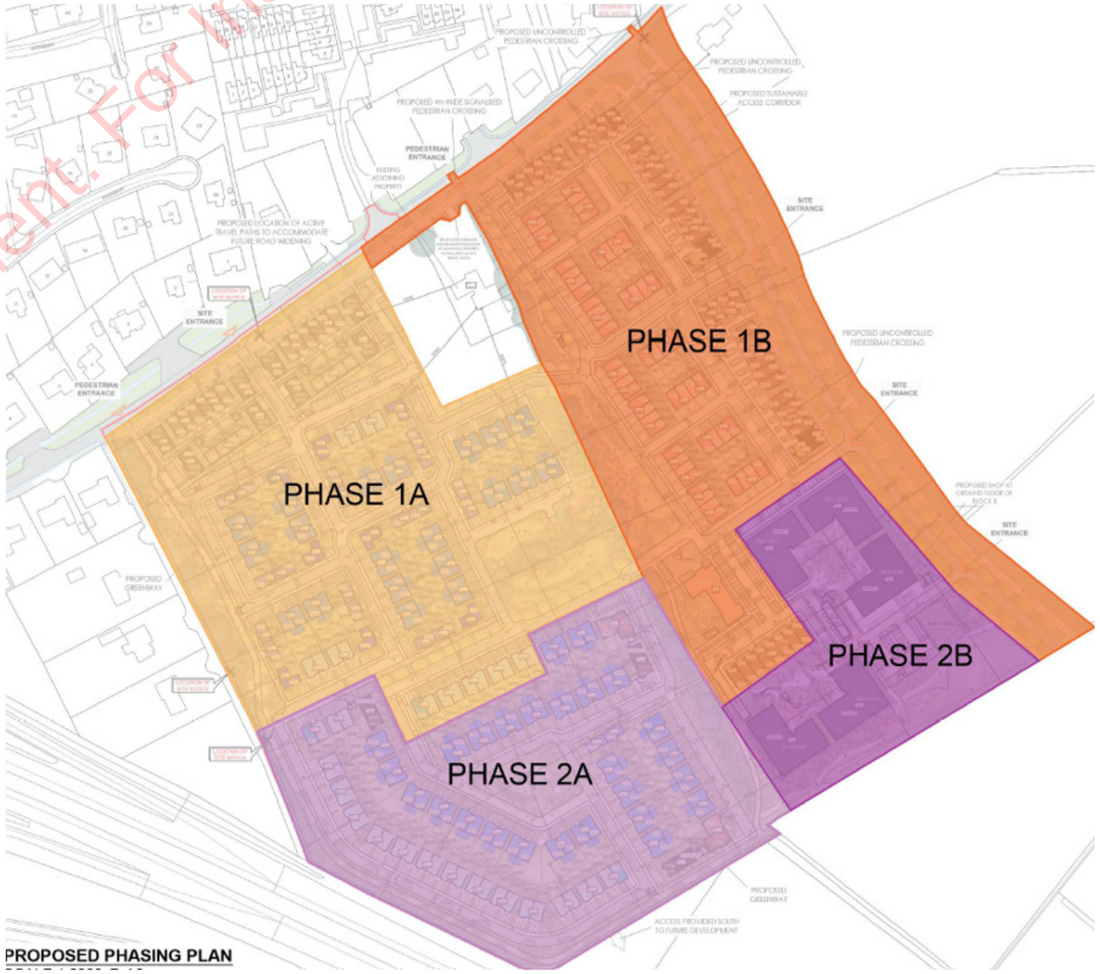

Figure 2.9 Construction Phasing Strategy

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Table 2.1 Anticipated construction schedule

Year	Anticipated No. of Units Constructed	Phase
1	0	Phase 1A
2	70	Phase 1A
3	70	Phase 1A
4	75	Phase 1B
5	75	Phase 1B
6	90	Phase 2A
7	90	Phases 2 A & B
8	74	Phase 2B

As detailed CEWMP the sequence of construction activities will include.

- Erection of stock-proof fencing around site permitter.
- Establishment of a site compound.
- Site Excavations/Earthworks.
- Site Establishment works at the site compound including erection of site offices, canteen, toilets, changing facilities, temporary water services and construction parking areas.
- Demolition of existing structures on-site.
- Landscaping works including the implementation of protective measures for existing trees and hedgerows.
- Site Infrastructure and residential unit construction.

2.4.2 Construction Compounds/Site Facilities During Construction

The CEWMP 'Site Facilities / Compound' plan prepared by DOSA Consulting Engineers details the location of the proposed construction compound during the phased delivery of the project. The construction compound will provide a construction office, canteen, toilets, changing facilities, temporary water services and construction parking areas.

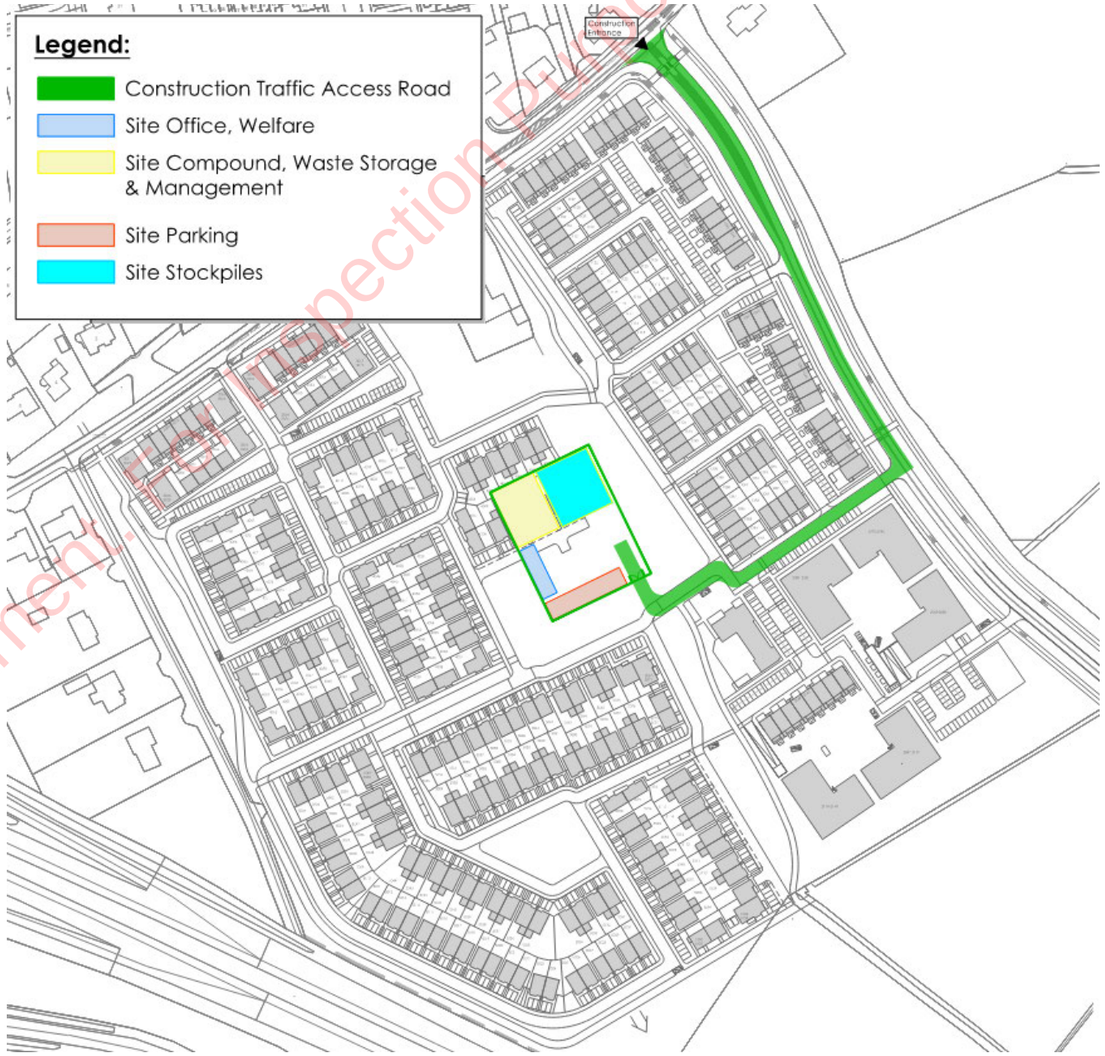

Figure 2.10 Construction Compound Location & Facilities

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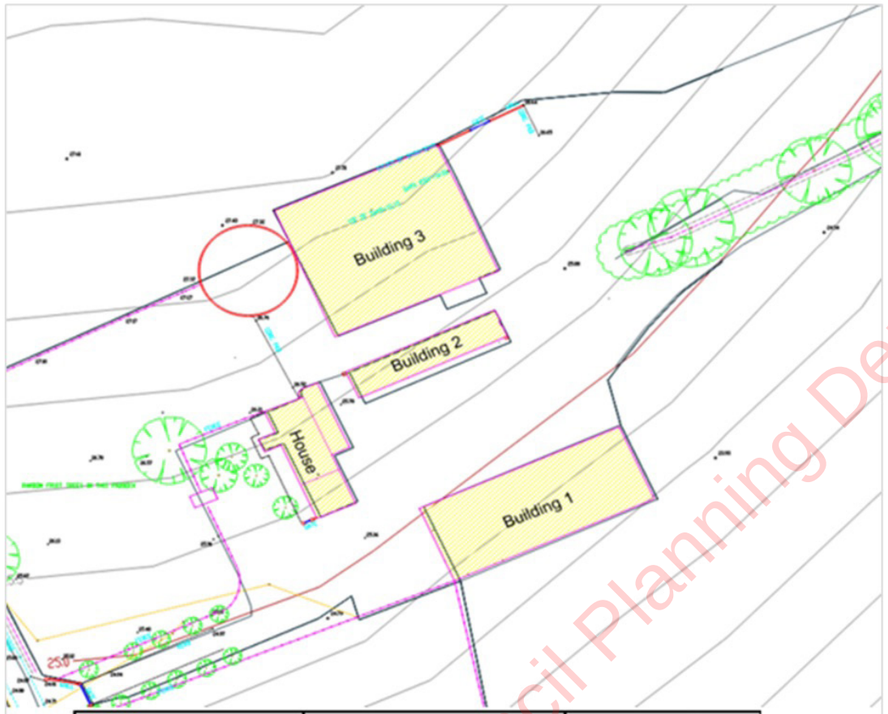
2.4.3 Construction Traffic Management Plan

A Construction Phase Traffic Management Plan (CTMP) has been prepared and is included as Appendix 2-2 of this EIAR. The CTMP details the traffic management procedures, identification of haulage routes, predicted construction traffic levels during various phases of the development and mitigation/monitoring measures to be implemented during the construction stage of the project.

2.4.4 Demolition and Waste Management

Section 10 of the CEWMP (Appendix 2.1) details measures that will be implemented to address waste arising from construction and demolition phases of the proposed development. The proposed development involves the demolition of an existing dwelling house and existing agricultural structures in the western area of the site totalling circa 1,550 sqm. The demolition of these structures will occur in the initial construction Phase 1A. (Also see Figures 2.2 and 2.3 above).



Building	Building Type	Area (m^2)
House	Derelict Dwelling	190m^2
1	Outbuilding	511m^2
2	Outbuilding	135m^2
3	Outbuilding	714m^2
Total GIA for Demolition		**1550m^2**

Figure 2.11 Overview and Schedule of Demolition Works

2.4.5 Working Hours

Construction works will occur within the hours outlined below.

- Monday to Friday: 07:30 to 18:00hrs
- Saturdays: 07:30 to 12:00hrs
- Sundays & Bank Holidays: Periodically 08:00 to 12:00hrs

It is anticipated that occasionally and with the prior agreement of the planning authority, working hours may be extended and/or works may take place on a Sunday and/or Bank Holiday at times when critical elements of work need to be advanced. Accordingly, traffic generated by core construction personnel will be mainly during the off-peak times reducing potential impacts on the road network.

2.5 Project Description - Operational Phase

2.5.1 Development Description

The proposed development comprises a 10-Year Planning Permission for a Large-Scale Residential Development (LRD) at Greenfield, Ballincollig, Cork.

The proposed development consists of the demolition of an existing dwelling house and farmyard with associated agricultural buildings and the construction of a mixed-use residential development of 544 no. residential units consisting of 232 no. dwelling houses, 312 no. apartment/duplex units, a two storey creche facility, commercial/retail unit and all ancillary site development works. The proposed 232 no. dwelling houses will include 100 no. 4 bedroom detached/semi-detached dwelling houses, 124 no. 3 bedroom semi-detached/townhouse dwelling houses and 8 no. 2 bedroom townhouse units. The proposed 312 no. apartment/duplex units will include 61 no. 3 bedroom units, 171 no. 2 bedroom units and 80 no. 1 bedroom units, to be provided in 28 no. apartment/duplex buildings ranging in height from 3-4 storeys. One of the proposed apartment buildings (Block 3) will provide the ground floor commercial/retail unit.

Vehicular access to the proposed development will be via two entrances from Greenfields Road (L2216) with separate pedestrian/cycle connections also provided from Greenfields Road. Ancillary site works include the provision of bicycle parking and bin storage facilities serving the proposed apartment/duplex buildings, creche and commercial/retail unit, landscaping and servicing proposals including the upgrade of public footpaths/active travel infrastructure and water service infrastructure, 2 no. pedestrian crossings on Greenfields Road and the installation of a noise attenuation screen along the site's southern boundary.

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CRECHE	128 Child - 839.4 sq m	1
SHOP/ COMMERCIAL	710.9 sq m	1

4 BEDS	100 NO. UNITS	18.5%
3 BEDS	185 NO. UNITS	34%
2 BEDS	179 NO. UNITS	32.5%
1 BEDS	80 NO. UNITS	15%
TOTAL	**544 NO. UNITS**	**100%**

UNIT TYPE SCHEDULE		
DETACHED	8 NO. UNITS	1.5%
SEMI-DETACHED	160 NO. UNITS	29.5%
TOWNHOUSE	64 NO. UNITS	12%
DUPLEX APARTMENT	164 NO. UNITS	30.0%
APARTMENT BLOCK	148 NO. UNITS	27.0%
TOTAL	**544 NO. UNITS**	**100%**

AREAS SCHEDULE	
SITE AREA	15.2 Ha
DEV. AREA	12.1 Ha
NO.UNITS	544
OPEN SPACE	15.3% Usable
DENSITY	45 Unit/Ha

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Figure 2.12 Proposed Site Layout Plan – Deady Gahan Architects

2.5.2 MUEA Sustainable Access Corridor

The proposed development provides for the construction of the first part of the western section of the MUEA Sustainable Access Corridor (SAC). This is consistent with the strategy developed successfully by the applicants at the eastern end of the SAC, where the first section of the eastern portion of the SAC was constructed in tandem with the development of Heathfield. The route and design of the SAC provides for a new priority junction with Greenfields Road, with 2 metre wide cycle paths and footpaths on both sides of the SAC with landscape buffer zones which can accommodate future widening of the SAC, to provide for dedicated public transport lanes as required. As detailed in Chapter 4 of this EIAR (Material Assets – Traffic & Transportation) prepared by Egis, it has been concluded that the provision of a signalised junction with the MUEA SAC and Greenfield Road is not required for the traffic generated by the proposed development.

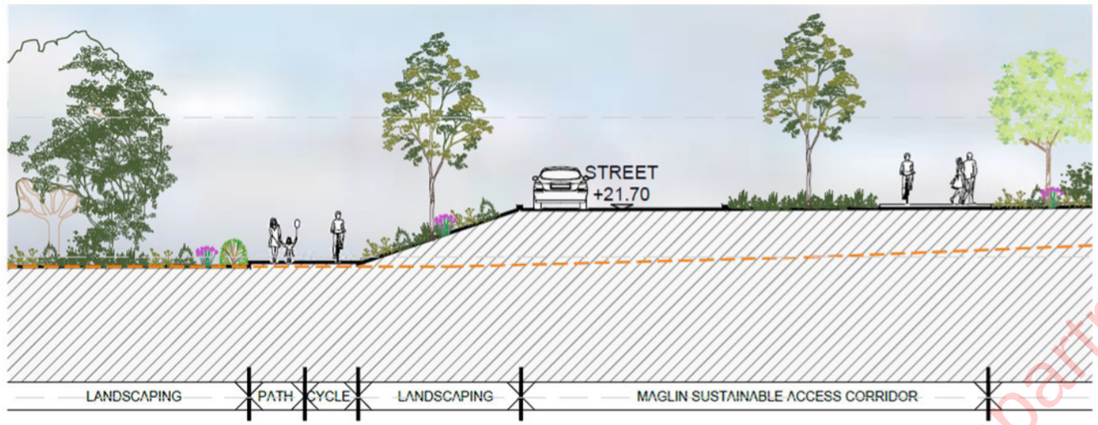

Figure 2.13 MUEA Sustainable Access Corridor Cross Section

Figure 2.14 Existing initial section of the Eastern MUEA Sustainable Access Corridor at Heathfield.

2.5.3 Access, Connectivity & Public Realm

The access strategy of the proposed development provides for 3 no. eastern vehicular entrances from the SAC with an additional vehicular access point from Greenfields Road to the north. The proposed development also provides for dedicated pedestrian entrances from Greenfields Road in addition to the upgrade of public realm on Greenfield Road including the provision of a pedestrian crossing, connecting to the existing footpath network on the northern side of the Greenfields Road. Crucially, the proposed development provides for active travel infrastructure along Greenfields Road which can accommodate any potential future road widening proposals. The proposed development also provides for the delivery of a new greenway along the sites western and southern boundaries providing an attractive active amenity for future residents of the scheme.

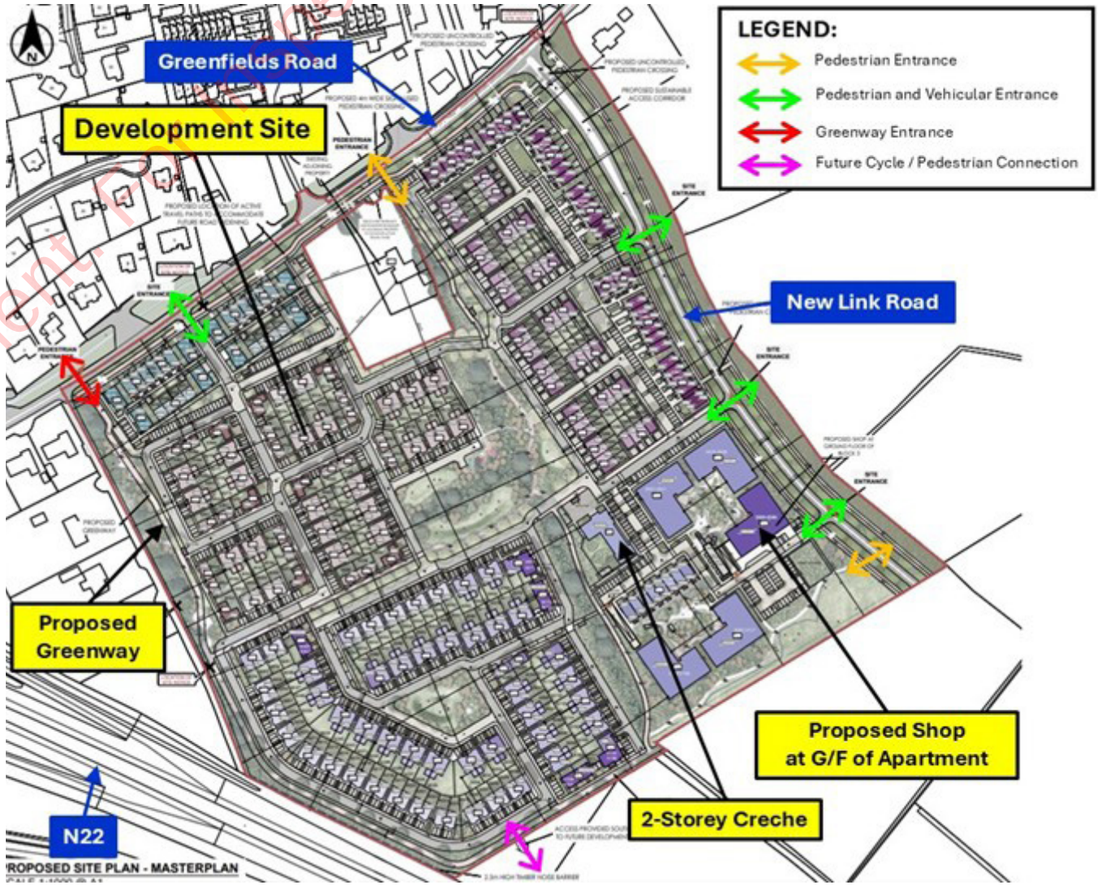

Figure 2.15 Site Access Strategy

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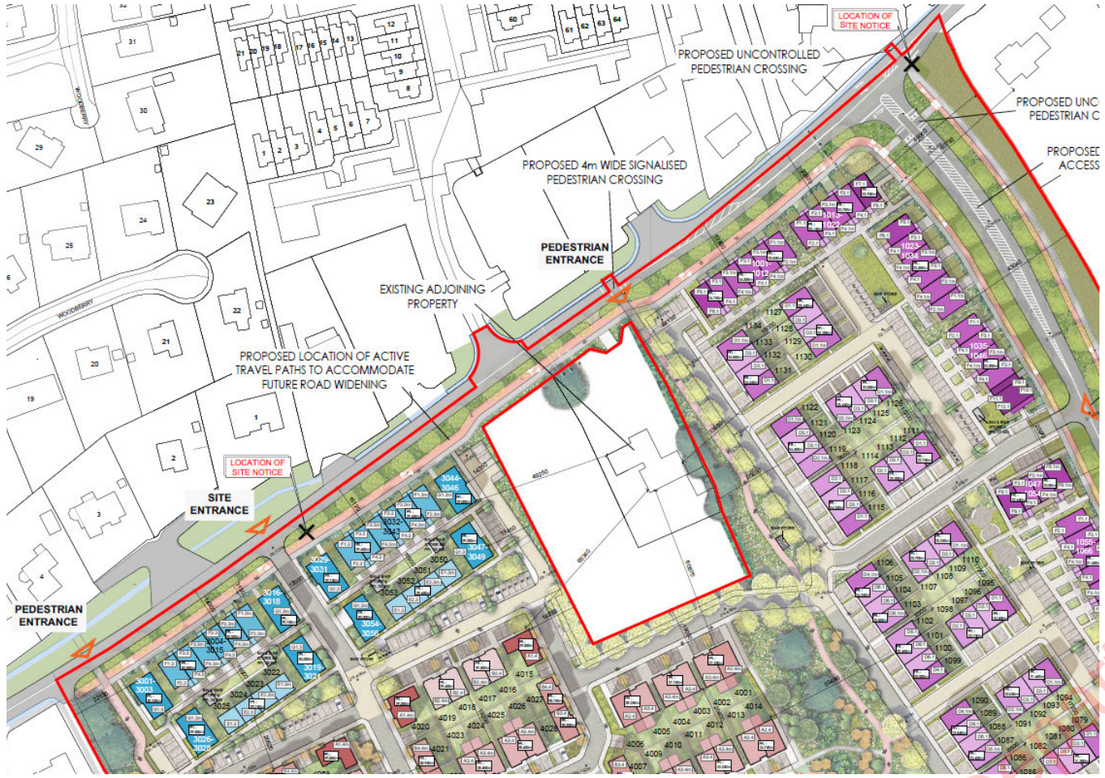

Figure 2.16 Public Realm Upgrades to Greenfield Road

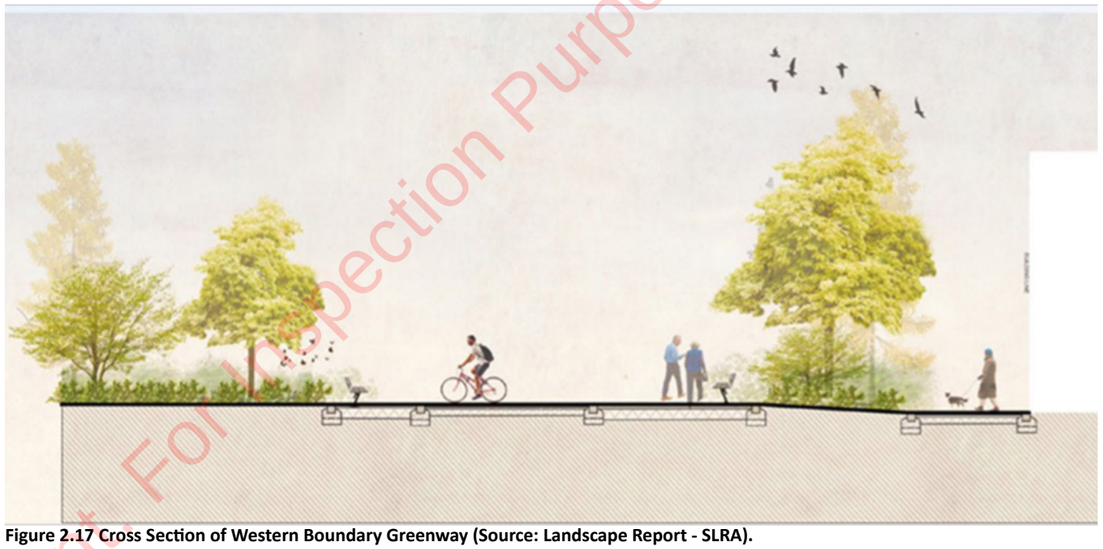

Figure 2.17 Cross Section of Western Boundary Greenway (Source: Landscape Report - SLRA).

2.5.4 Proposed Layout & Landscape Strategy

The design rationale for the proposed development has been 'landscape led', with the site topography and setting in its local and wider contexts forming a critical component of the development strategy of the lands. The proposed landscape, recreation and amenity strategy is based on a number of key principles including

- The promotion of a sense of place by providing attractive and distinctive environments throughout the proposed residential neighbourhoods.
- To prioritise pedestrian and cyclist permeability and connectivity within the site and in its local context.
- To provide a hierarchy of public open spaces.
- To promote a child-centred approach to play provision, based on 'home–zone' principles that enable children of all ages to play safely around their neighbourhood; play within sight of their home; play at purposefully designed play elements; and encourage interactive play.
- To provide legible routes, focal points and clear delineation of public, semi-private and private spaces.
- To integrate the proposed development into the local landscape setting.
- To provide robust boundary treatments which will promote biodiversity and respect the existing character of the area. the adoption of a collaborative approach between the sites landscape, ecological and drainage strategies. Where feasible the proposed development has sought to retain existing field hedgerows within the site and integrate within the proposed developments natural/public open space areas.
- The proposed layout, pedestrian links, amenity areas/walks and landscaping treatments will result that the proposed development will not only provide for the amenities of future residents of the scheme, but also serve as a local 'destination' in its own right, benefiting the existing residents of the settlement.

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A Green & Blue Infrastructure/Landscape Design Rationale Report prepared by Simon Ronan Landscape Architecture is included as Appendix 2-5 of this EIAR which describes in detail the proposed landscape strategy and all green/blue infrastructure proposals within the project. The landscape strategy incorporates a noise attenuation barrier along the site's southern boundary with the N22, ensuring that sufficient noise mitigation is provided for future residents while also while also ensuring high quality visual screened boundary of the site.

2.5.5 Proposed Neighbourhood Centre

The proposed development includes a mixed-use neighbourhood centre to the southeast of the site, accommodating a two storey 128 no. child creche facility and a mixed-use building providing for ground floor retail/commercial unit (Block 3). The provision of the neighbourhood centre at this location will serve as a natural 'destination point' in the wider development and provide on-site retail, recreational and employment opportunities for future residents providing an opportunity to deliver a sustainable -mini-economy' where residents can avail of these opportunities within walking and cycling distance of their homes.

2.5.6 Utilities and Servicing

Full details of all utilities and servicing proposals relating to the proposed development are detailed in Chapter 5 of this EIAR 'Material Assets – Services, Infrastructure & Utilities' and the Infrastructure Report included as Appendix 2-4 of this EIAR prepared by DOSA Consulting Engineers. Impact Assessment.

2.6 Impact Assessment

2.6.1 Do-nothing Scenario

A 'do nothing scenario' will result in no predicted impacts at the subject lands, and the site would remain in its existing undeveloped, agricultural use. The existing dwelling house and agricultural structures within the site would remain. Over time, in the 'do nothing scenario' the subject lands would remain undeveloped and in agricultural use. It is considered likely that the 'Long Term Strategic Development Lands' to the east will be developed for residential development, resulting in an increasingly urban setting in the area. It is considered the do-nothing scenario will result in an inefficient use of zoned, serviced lands, which will have convenient access to active travel opportunities and local amenities.

2.6.2 Construction Phase

The construction phase will be temporary in nature and will be implemented in accordance with the requirements of the accompanying construction management plans. Without the implementation of the proposed mitigation measures, the construction stage of the development could result in potential significant indirect, cumulative and residual effects on the surrounding environment such as impacts on the local road network, potential ground/water contamination, noise, vibration, dust, air quality, pollution and waste management.

2.6.3 Operational Phase

Once operational, the proposed development will result in several long-term positive impacts for Metropolitan Cork and the local area. The proposed development will result in the provision of an additional 544 no. residential units at a location which is identified as an expansion area of Cork City in the Core Strategy of the CDP. The proposed development will contribute to an increase in population and housing supply, which can support public transport services and local businesses in the Ballincollig area. The proposed creche and retail uses will provide for a diversification to the existing economy and additional childcare provision for the settlement. `

The proposed delivery of the initial western section of the MUEA Sustainable Access Corridor reflects an integrated approach between the provision of enabling infrastructure, compact urban development, community/social infrastructure, future public transport upgrades and the promotion of walking and cycling as viable modes of transport. The proposed development presents an opportunity to deliver a residential community which will not only achieve the creation of a new '15 minute neighbourhood' at a location identified for compact growth in the CDP Core Strategy, but also facilitate the delivery of development at the MUEA in tandem with the delivery of strategic walking/cycling infrastructure which can have considerable benefits for the town.

The proposed landscape/recreation and amenity strategy capitalises on the sites natural resources and setting by incorporating existing natural features into the wider layout. This includes the provision of a variety of public open spaces, green spaces, greenway, and play areas located throughout the scheme layout which will positively contribute to human health of future residents and visitors to the scheme.

The proposed evolution of the site, from existing agricultural to proposed mixed-use, will result in an increase in energy consumption and demand on local infrastructural services. The proposed buildings have been designed to incorporate sustainable building methods and materials, to reduce unnecessary energy usage.

2.7 Mitigation, Monitoring & Residual Impacts

Chapter 15 of this EIAR, 'Summary of Mitigation Measures' provides a list of all proposed mitigation and monitoring procedures to be implemented during the operational and construction phases of the project.

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2.8 Alternatives Considered

2.8.1 Introduction

Article 5(1) of the Directive 2011/92/EU, as amended by Directive 2014/52/EU states that.

> *d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
>
> *f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

Annex IV point 2 expands further.

> *2) A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.*

Article 94 and Schedule 6, paragraph 1(d) of the Planning and Development Regulations 2001, as amended, requires the following information to be furnished in relation to alternatives:

> *"(d) A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment."*

The purpose of this section is to describe the reasonable alternatives considered by the developer, including alternatives considered through the design and consultation phases of the project, taking into account and comparing environmental effects and illustrating the manner in which, and reasons for, choosing the proposed development.

Regarding 'Reasonable Alternatives', the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment' (2018) states that:

> *"The Directive requires that information provided by the developer in an EIAR shall include a description of the reasonable alternatives studied by the developer. These are reasonable alternatives which are relevant to the project and its specific characteristics. The developer must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment.*
>
> *Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each.* ***A 'mini- EIA' is not required for each alternative studied."***

Further the EPA's 2022 EIA Guidelines are also instructive in stating:

> *'Analysis of high-level or sectoral strategic alternatives should not be expected within a project level EIAR. It should be borne in mind that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics.'*

This section provides an outline of the main alternatives examined throughout the design and consultation process to indicate the primary reasons for choosing the proposed development, considering and providing a comparison of the environmental effects.

2.8.2 'Do-Nothing' Alternative

The 'do nothing' scenario would reflect that serviced and zoned greenfield lands, within the defined MUEA, would remain undeveloped and in agricultural use. The 'do nothing' scenario would also result in the proposed Sustainable Access Corridor which is to serve the wider Maglin Urban Expansion area not being delivered. Over time, in the 'do nothing scenario', the subject lands would remain undeveloped and in agricultural use. The do-nothing scenario would also result in the existing dwelling house and associated outbuildings remaining.

A "do-nothing" scenario is considered to represent an inappropriate unsustainable and inefficient use of these serviced residential zoned lands within the defined MUEA of Cork City.

2.8.3 Alternative Locations

As stated above, regarding alternative locations, Section 3.4.1 of the 2022 EPA Guidelines, recognise that

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

The subject lands are situated within the ZO 2 'New Residential Neighbourhoods' and CUEA in the Cork City Development Plan 2022-2028 (CDP). The CDP has been subject to Strategic Environmental Assessment which will have taken into account of environmental considerations associated, for example, with the cumulative impact of an area zoned for development on a sensitive landscape.

We note the 2022 EPA Guidelines, which state.

> *'Analysis of high-level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR… It should be borne in mind that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics.'*

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2.8.4 Alternative Uses

The subject lands are included within an area zoned as 'ZO 2 New Residential Neighbourhoods' in the CDP, with a portion of the site to the east included within the 'ZO 15 Public Open Space' zoning objective which state respectively.

> *ZO 2 - 'To provide for new residential development in tandem with the provision of the necessary social and physical infrastructure.'*
>
> *ZO 15 – 'To protect, retain and provide for passive and active recreational uses, open space, green networks, natural areas and amenity facilities.'*

Paragraph ZO 2.2 expands further on appropriate uses at ZO 2 'New Residential Neighbourhoods' zoned lands.

Figure 2.18 CDP Zoning Map

> *'This zone covers primarily greenfield, undeveloped lands for new sustainable residential areas. Development in this zone, while primarily residential, must provide an appropriate mix of housing types and tenures along with the amenity, social, community and physical infrastructure required to promote compact growth, balanced communities and sustainable, liveable communities.'*

The lands are also situated within the MUEA as defined in the CDP. CDP Objective 10.57 and Section 2.47 of the Core Strategy of the CDP identify the MUEA as one of seven strategic consolidation and expansion areas in the city which will need to accommodate significant levels of housing and population growth during the lifetime of the plan. It is also considered that an alternative consisting of only open space, recreation, community or education uses would not be in accordance with the zoning objectives, reflect the most efficient use of the lands, and that a development which contributes to MUEA's residential growth targets comprises the most appropriate land-use alternative of the lands and is in accordance with the proper planning and sustainable development of the area.

2.8.5 Alternative Layouts and Designs

Since the inception of the project, the developer considered several different layouts and options for the development of the subject lands. Each stage of the project required a reappraisal of the design strategy of the project and an evaluation of how each proposed layout responded to the site's context. The design rationale for the proposed development adopted several key principles which underpinned the wider development strategy for the lands including.

- That the scale of residential development is reflective of the site's existing and evolving contexts within MUEA and that delivers on the ambitious housing and population targets for Ballincollig, set out in the CDP and RSES.
- That the proposed MUEA Sustainable Access Corridor, which will provide access to the lands, is designed to accommodate a two-way cycle path and makes provision for potential future public transport corridors.
- That any layout directly responds to the site's topography, natural features and receiving environment.
- That the residential amenities of existing residents in the area is respected during both construction and operational phases of the project.
- That high quality public open spaces and communal areas are provided, which will benefit the wider community and the creation of enhanced public realm and pedestrian/cyclist upgrades, which will not only serve the proposed development, but the wider Ballincollig area.

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2.8.5.1 Alternative Layout A – S.247 Meeting Layout – May 2024

Alternative A comprised a scheme of 521 no. residential units, creche facility, shop/retail unit at the subject lands and was presented to Cork City Council during a 'Stage 1' Section 247 Consultation meeting which took place on the 17th of May 2024. The development reflected a density of circa 41.5 units per hectare and provided for 15% useable public open space. The scheme was developed was developed following an assessment of the existing road network in the area, and in particular the provision of a new junction and route of the MUEA Sustainable Access Corridor. The layout sought to retain as many existing boundary and internal hedgerows as possible.

Alternative A aimed to create a strong urban edge in the form of 4-storey apartment blocks and 3-storey duplex units along proposed Sustainable Access Corridor to the east and Greenfield Road to the north. This option also provided for active travel routes throughout the site and along old railway line along the sites western boundary. Dwellings were orientated to passively survey public open spaces throughout the site and allowed for adequate distances between dwellings to limit overlooking An overview of the proposed Alternative A is summarised as follows.

Table 2.2 Alternative A -Key Statistics

Key Figures of Alternative A Layout	
No. of residential units	521
Net Residential Density	41.5 units per hectare
Housing Mix	104 no. 4 beds (20%) 162 no. 3 beds (31%) 176 no. 2 beds (34%) 79 no.1 beds (15%)
Creche & Retail/shop unit	Creche located in northern area of the site fronting onto the Greenfields Road. Shop located at northwestern area of the site near the junction of the Sustainable Access Corridor with the Greenfields Road.
Public Open Space	15% useable public open space
Access	New junction for the Sustainable Access Corridor with Greenfields Road with 2 no. vehicular connections from the Sustainable Access Corridor serving the development. An additional vehicular entrance to the development further west on Greenfields Road.

Figure 2.19 Alternative A Layout – May 2024

Following an assessment of the scheme, it was recognised that enhancements/amendments should be adopted to create a more inclusive scheme of higher quality urban design and form. In advancing the scheme from Alternative A it was considered that a stronger urban edge along the frontage of Greenfields Road and the Sustainable Access Corridor would benefit the urban design approach to scheme which will serve as the gateway development to the western areas of the MUEA. It was concluded that he proposed creche facility and shop retail unit may need to be relocated elsewhere in the site to achieve this and further investigations were also needed to assess an appropriate step-back from Greenfields Road, to accommodate potential future road widening in addition to the scale of development to Greenfields Road. It was also acknowledged that the redesign of some apartment buildings to be arranged around semi-private courtyards would provide a greater variety and contribute to a high-quality design approach. It was also concluded that a residential development of this site could accommodate a development of increased density in accordance with the policies and objectives of the CDP and the National Compact Settlement Guidelines 2024 (CSG's).

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2.8.5.2 Alternative B – July 2024

Alternative B comprised a residential development of 551 no. units, creche facility, shop/retail unit at the subject lands. Alterative B was a working layout which sought to address the comments of the Planning Authority outlined during the previous Section 247 pre-consultation meeting. An overview of the proposed Alternative B is summarised as follows.

Table 2.3 Alternative B -Key Statistics

Key Figures of Alternative B Layout	
No. of residential units	551
Net Residential Density	45.5 units per hectare
Housing Mix	102 no. 4 beds (18.5%) 144 no. 3 beds (26.1%) 202 no. 2 beds (36.7%) 103 no.1 beds (18.7%)
Creche & Retail/shop unit	Creche & retail unit relocated to southeastern area of the site.
Public Open Space	15% useable public open space
Access	New junction for the Sustainable Access Corridor with Greenfields Road with 4 no. vehicular connections from the Sustainable Access Corridor serving the development. An additional vehicular entrance to the development further west on Greenfields Road.

It was considered that the proposed in Alternative B reflected an improvement that previously proposed in Alternative A in many aspects, including.

- That a density of circa 45 units per hectare was more appropriate at the lands and more consistent with local and national policy objectives.
- Reduced scale of development to Greenfields Road to form an more appropriate relationship with existing established development.
- The development provided for a more diverse housing/accommodation mix addressing a broader cohort of the housing need of the area.
- Alterative B provided for an improvement in terms of the inter-relationship between the scheme and the Greenfields Road Sustainable Access Corridor. The relocation of the creche/neighborhood centre within the scheme

The Alternative B internal layout retained many of the core objectives of Alternative A including the retention and incorporation of existing hedgerows and vegetation within the scheme and the retaining of the junction and route of the Sustainable Access Corridor serving the development and wider MUEA. However, following a review of the detailed design, it was considered that further improvements/amendments could be achieved in the evolution of the layout including.

- A stronger urban form could be achieved at the junction of the Greenfields Road/Sustainable Access Corridor. It was considered that the edge formed by apartments along Sustainable Access Corridor were too permeable and should be tightened to minimise through access and benefit urban design.
- The revised layout provided for the reduction in size of the main central public open space within the scheme. Any future iterations of the layout should provide for a larger public space at this location to assist with the project's recreation, SuDS, biodiversity and landscape strategies.
- That the linear apartment blocks along Sustainable Access Corridor could arrange to form central semi-private courtyards
- The proposed development should accommodate a reduction in surface car parking to promote walking and cycling as more attractive means of mobility.

Figure 2.20 Alternative B Layout – July 2024

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2.8.5.3 Alternative C – S.247 Meeting Layout – December 2024

Alternative C comprised a scheme of 566 no. residential units, creche facility, shop/retail unit at the subject lands and was presented to Cork City Council during second 'Stage 1' Section 247 Consultation meeting which took place on the 11th of December 2024. An overview of the proposed Alternative C is summarised as follows.

Table 2.4 Alternative C -Key Statistics

Key Figures of Alternative C Layout	
No. of residential units	566
Net Residential Density	46.5 units per hectare
Housing Mix	112 no. 4 beds (20%) 194 no. 3 beds (34%) 174 no. 2 beds (31%) 86 no.1 beds (15%)
Creche & Retail/shop unit	Creche & retail unit relocated to southeastern area of the site.
Public Open Space	15% useable public open space
Access	New junction for the Sustainable Access Corridor with Greenfields Road with 3 no. vehicular connections from the Sustainable Access Corridor serving the development. An additional vehicular entrance to the development further west on Greenfields Road.

Alternative C provided for an increase in density and the number of residential units from that previously presented in Alternatives A and B. The main central open space was made larger to serve future residents of the scheme from that previously proposed in Alternative B. The proposed creche building was also redesigned to accommodate more efficient set-down, outdoor areas. However, during the Section 247 Consultation meeting the Planning Authority expressed concerns regarding the internal road network of the layout and that a 'rat-run' could be created from the Greenfields Road to the Sustainable Access Corridor due to the presence of the second western entrance from the Greenfields Road. The Planning Authority also requested further details of the detailed design if public open spaces within the scheme, natural drainage measures and greater detail relating to the proposed pedestrian/cycle connections through the site to promote effective circulation and permeability.

Figure 2.21 Alternative C Layout – December 2024

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2.8.5.4 Alternative D – S.32 LRD Meeting Layout – May 2025

Alternative D was presented to Cork City Council and discussed during a 'Stage 2, Section 32 LRD Meeting which took place on the 1st of May 2025. Alternative D comprised a development of 548 no. residential units, a 128 no. child creche and retail/ commercial unit.

Figure 2.22 Alternative D Layout – May 2025

SITE STATISTICS	
Total Number of Units Proposed	548 no residential units + 1 no creche + 1 no shop
Total Red Line (Gross) **Site Area**	154,000 sqm (15.4 Ha)
Total Net Site Area (Developable Area)	121,000 sqm (12.1 Ha)
Total Gross Floor Area (Inc. creche & shop)	54,735.4 sqm
Total Building Footprint Area (inc. external walls)	27,974.6 sqm
Overall Net Density	45.3 units per Ha
Plot Ratio (Gross Site Area)	0.355
Plot Ratio (Net Site Area)	0.452
Site Coverage (Gross Site Area)	18.1%
Site Coverage (Net Site Area)	23.1%

AREAS SCHEDULE		
SITE AREA	15.4 Ha	
DEV. AREA	12.1 Ha	
NO.UNITS	548	
OPEN SPACE	15.3% Usable	
DENSITY	45.3 Unit/Ha	
CRECHE	128 Child - 839.4 sq m	1
SHOP/ COMMERCIAL	517.2 sq m	1

Figure 2.23 Alternative D - Key Statistics

Alternative D provided for a development of circa 45 units per hectare with a creche capacity of 128 no. children in accordance with the stated recommendations of Cork City Childcare (See Appendices 1-3 and 1-4). The proposed internal street was revised to discourage vehicular drivers of using the proposed western entrance from Greenfields Road as a 'rat run' and that the Sustainable Access Corridor would serve as the primary vehicular entrance to the scheme. The access strategy of the proposed development provides for 3 no. eastern vehicular entrances from the SAC with an additional vehicular access point from Greenfeld Road to the north. The proposed development also provides for dedicated pedestrian entrances from Greenfield Road in addition to the upgrade of public realm on Greenfield Road including the provision of a pedestrian crossing, connecting to the existing footpath network on the northern side of the Greenfield Road. Crucially, the proposed development provides for active travel infrastructure along Greenfield Road which can accommodate any potential future road widening proposals.

The layout was also informed by the preparation of a Site-Specific Flood Risk Assessment and Hydraulic Analysis Report which concluded that the development would not result in any negative flood risk impacts. The development also provided comprehensive landscape and drainage strategies which were not developed in previous alternative layouts. It was discovered that due to the underlying geology of the area, some SuDS measures are not suitable at the subject lands, however SuDS features such as tree pits, filter drains, green roofs, bioretention pits, and infiltration basins are all proposed within the proposed development.

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2.8.5.5 Alternative E – Proposed Development

A full description of the proposed development for which permission is sought pursuant to this application is provided in the 'Project Description' section of this EIAR Chapter. The end result of the various alterations and layout revisions is the proposed development. The proposed density of the scheme has been increased and the proposed 544 no. residential units on a developable area of 12.1 hectares.

Table 2.5 Alternative E – Proposed Development Key Statistics

Site Statistics		
Total Number of Units Proposed	544 no residential units + 1 no creche (128 Child) + 1 no. retail commercial unit	
Total Red Line (Gross) Site Area	15.2 hectares	
Total Net Site Area (Developable Area)	12.1 hectares	
% Useable Public Open Space	15.3 % useable.	
Overall Net Density	45 units per hectare	
Schedule of Accommodation		
4 Beds	100 no. units	18.5%
3 Beds	185 no. units	34%
2 Beds	179 no. units	32.5%
1 Beds	80 no. units	15%
TOTAL	**544 no. units**	**100%**
Unit Type Schedule		
Detached	8 no. units	1.5%
Semi-Detached	160 no. units	29.5%
Townhouse	64 no. units	12%
Duplex Apartment	164 no. units	30%
Apartment Block	148 no. units	27%
TOTAL	**544 no. units**	**100%**

The layout and detailed design of the proposed development has been advanced in response to the LRD Opinion issued by Cork City Council dated 1st May 2025 (Included as Appendix 1.2) of this EIAR. Proposed Alternative Layout E evolved from that previously proposed in Alternative Layout D, including.

- Various minor alterations to the scheme resulted in an overall reduction of 4 no. units from that previously proposed in Alternative D. The proposed scale and density of development is more consistent with achieving compact growth and sustainability, the evolving development context of the area and the policies and objectives of the CDP.
- Detailed design of the proposed noise attenuation barrier to be provided at the site's boundary with the N22 has now been clarified following invitations by AWN Consulting (See Chapter 10 of this EIAR).
- Further clarification on the proposed surface water drainage strategy for the site has been provided which has led to the enhancement of the site's biodiversity and landscape strategies.
- Details of the phased delivery of the project.
- Alternative roof profile on the duplex units suggested to create higher scale along Sustainable Access Corridor to create higher scale and more appropriate urban edge has been provided in addition to a comprehensive assessment of the interactions of the development with Ballincollig Castle. (See Chapter 3 - Landscape & Visual and Chapter 9 – Cultural Heritage).
- Further rationalisation and justification of the design and locations of pedestrian crossings on the Sustainable Access Corridor.
- Elevational changes to the upper floor of the apartment blocks to the east of the site which front onto the Sustainable Access Corridor to create higher scale and a better urban edge and various revisions to house types and apartment buildings within the scheme.
- A greater rationalisation and analysis of the useability of public open spaces and enhanced permeability throughout the site.
- The incorporation of the final recommendations of a Road Safety Audit.

2.8.6 Alternative Processes

As described above, various access/design strategies and layouts were considered which would have impacted alternative processes. The final design and layout of the scheme has been arrived at following a salient assessment of all aspects of construction and operational phase considerations. This included various phasing strategies and the determination that a 10-year planning permission should be sought due to nature of the proposed development.

2.8.7 Alternative Mitigation Measures

During the evolution of the proposed alternative layouts, alternative mitigation measures were under considered with an emphasis on adopting 'Mitigation by Design' principles where possible. In preparation of this EIAR and throughout the scheme design process, the mitigation and monitoring measures recommended by project sub-consultants during both construction and operational phases will be implemented.

2.8.8 Comparison of Environmental Impacts – Construction Phase

This section provides a summary of the comparison of environmental impacts during the construction phase between the various alternatives outlined above. Due to the evolution of the site access strategy in later alternative layouts, a comparison of environmental impacts evolved considerably throughout the design stage of the project.

2.8.8.1 Landscape & Visual

The construction phase will result in the evolution of landscape aspects. The increase of residential units between various alternatives would have resulted in potentially increased impacts, however the objective of reducing cut and fill across the site and the maximization of retention of existing site boundaries would likely have offset these increases, resulting in similar impacts.

2.8.8.2 Traffic & Transportation

The increase in the number of residential units in the various alternatives (A-E), will reflect a likely increase of construction traffic during this phase of the project. However throughout the evolution of the project greater focus has been placed in implementing effective construction phase mitigation measures including a traffic management plan. It is considered that construction phase traffic impacts across all alternatives assessed would be similar.

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2.8.8.3 Services, Infrastructure & Utilities

It is not considered that Services, Infrastructure & Utilities considerations differ significantly between the various alternatives described. The increase in the number of residential units across alternatives may have resulted in increased demand for these services during the construction phase. However, there is sufficient infrastructural capacity locally to accommodate the development. In accordance with the Cork City Councils LRD Opinion, greater natural drainage and SUDs measures are proposed in Alternative E than previous Alternative layouts.

2.8.8.4 Land, Soils & Geology

Following an assessment of various alternative layouts, it is not considered that land and soils considerations differ significantly between the various alternatives described.

2.8.8.5 Water - Hydrology & Hydrogeology

It is not considered that water (hydrology & hydrogeology) considerations differ significantly between the various alternatives described.

2.8.8.6 Biodiversity

Due to the evolution of the site layout and focused construction phase mitigation measures recommended by the project ecologist, which will be implemented in the final CEWMP for the project, it is considered that biodiversity impacts during the construction phase improved incrementally across all alternative proposals at the site.

2.8.8.7 Cultural Heritage

It is not considered that cultural heritage considerations differ significantly between the various alternatives described.

2.8.8.8 Noise & Vibration

Following an assessment of various alternative layouts, it is not considered that noise or vibration considerations differ significantly between the various alternatives described

2.8.8.9 Air Quality

It is not considered that air quality considerations differ significantly between the various alternatives described

2.8.8.10 Climate

It is not considered that climate considerations differ significantly between the various alternatives described.

2.8.8.11 Population & Human Health

It is not considered that there would be significant differences between the various alternatives impacting population and human health. During the construction phase, impacts such as additional traffic, noise, dust could negatively impact human health in the absence of appropriate mitigation measures. However, the evolution of the scheme layout has also been developed in response to more detailed construction management procedures and mitigation measures which have evolved throughout the alternatives considered. The proposed construction of the MUEA Sustainable Access Corridor and public realm upgrades on Greenfields Road in the early stages of the construction phase and will benefit existing residents and occupiers of initial phases of the subject scheme.

2.8.8.12 Comparison of Environmental Impacts – Construction Phase Summary

Table 2.6 as shown provides an objective comparison analysis of the evolution of the proposed development in context of the categories outlined above.

Table 2.6 Comparison of Impacts - Construction Phase

Criteria	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Landscape & Visual	=	=	=	=	=
Traffic & Transportation	-	x	=	√	=
Services, Infrastructure & Utilities	=	=	=	=	=
Land, Soils & Geology	=	=	=	=	=
Water & Hydrology	=	=	=	=	=
Biodiversity	x	√	√	√	√
Noise & Vibration	=	=	x	√	√
Cultural Heritage	=	=	=	=	=
Air Quality	=	=	=	=	=
Climate	=	=	=	=	=
Population & Human Health	x	√	√	√	√

√ Where it has been considered that there has been an improvement from the previous alternative

= Where the impact is considered similar for all options

X Where a particular option is considered to have a more negative impact on a particular aspect of the environment than other alternatives.

2.8.9 Comparison of Environmental Impacts – Operational Phase

This section provides a summary of the comparison of environmental impacts during the operational phase between the various alternatives outlined above.

2.8.9.1 Landscape & Visual

It is considered that evolution of the landscape and visual impacts have improved significantly throughout all alternative layouts. The evolution of the site layout through the design phase of the project has resulted in more appropriate building heights, the creation of more useable public open spaces, reduction of cut and fill and more comprehensive replacement

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and supplementary planting proposals. As noted in Chapter 3 of this EIAR 'Landscape & Visual', the site is situated within an evolving landscape setting in the context of the delivery of the wider MUEA.

2.8.9.2 Traffic & Transportation

The increase in the number of residential units in the various alternatives (A-E), will reflect a likely increase of operational phase traffic. However, the incremental improvement and amendments to the layout which include the improvement of permeability within the scheme and to surrounding areas and the delivery of the initial section of the eastern MUEA Sustainable Access Corridor will result in considerable strategic benefits to the town.

2.8.9.3 Services, Infrastructure & Utilities

The proposed servicing and utility strategies evolved throughout the design phase of the project. As requested by Cork City Council, the final layout provides for increased levels of natural drainage and SUDs measures which will reduce the pressures on the surface water network in the area.

2.8.9.4 Land & Soils

It is not considered that land and soils considerations differ significantly between the various alternatives described.

2.8.9.5 Water - Hydrology & Hydrogeology

It is not considered that water related considerations differ significantly between the various alternatives described.

2.8.9.6 Biodiversity

The enhancement of biodiversity measures in the form of more detailed landscaping proposals, natural drainage and proposals have all contributed to an enhanced biodiversity and ecological context as the scheme has evolved.

2.8.9.7 Cultural Heritage

It is not considered that cultural heritage considerations differ significantly between the various alternatives described.

2.8.9.8 Noise & Vibration

It is considered that noise and vibration impacts do improve considerably in Alternatives D and E where specific noise mitigation measures are identified including the noise attenuation barrier along the sites southern boundary.

2.8.9.9 Air Quality

It is not considered that air quality considerations differ significantly between the various alternatives described.

2.8.9.10 Climate

It is not considered that climate considerations differ significantly between the various alternatives described.

2.8.9.11 Population & Human Health

The evolution of the proposed layout has resulted in a continuous improvement in terms of human health and impacts on the local population. The proposed public realm upgrades, public open spaces, connectivity strategy in addition to the delivery of new housing, community, commercial and childcare uses have evolved since project inception stage.

2.8.9.12 Comparison of Environmental Impacts – Operational Phase Summary

Table 2.7 as shown provides an objective comparison analysis of the evolution of the proposed development in context of the categories outlined above.

Table 2.7 Comparison of Impacts – Operational Phase

Criteria	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Landscape & Visual	x	√	√	√	√
Traffic & Transportation	x	√	√	√	√
Services, Infrastructure & Utilities	=	=	=	=	√
Land, Soils & Geology	=	=	=	=	=
Water & Hydrology	=	=	=	=	=
Biodiversity	x	√	√	√	√
Noise & Vibration	=	=	=	√	√
Cultural Heritage	=	=	=	=	=
Air Quality	=	=	=	=	=
Climate	=	=	=	=	=
Population & Human Health	x	√	√	√	√

√ Where it has been considered that there has been an improvement from the previous alternative

= Where the impact is considered similar for all options

X Where a particular option is considered to have a more negative impact on a particular aspect of the environment than other alternatives.

2.8.10 Reasons for Chosen Alternative

When all construction and operational aspects are assessed, it is objectively considered that 'Alternative E', consisting of 544 no. residential units, creche, is the most appropriate and efficient alternative layout assessed.

- Alternative E reflects the observations of Cork City Council during Section 247 and Section 32 LRD discussions, and represents a more efficient development than that previously proposed in Alternatives A-D.
- Alternative E provides for a more efficient density of residential development, reflective of the site's location and as a Gateway to the MUEA. Alternative E provides for a greater interactions and permeability with the wider area and provides a diverse housing mix accommodating a diverse new residential neighbourhood in Ballincollig.

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- Alternative E provides for a more appropriate scale of development to Greenfields Road to reflect the existing scale of existing properties.
- Alternative E provides for an improvement in terms of urban design useable public open spaces, natural drainage and the promotion of active travel from previous alternatives. Alternative E also incorporates the recommendations of Cork City Council in Section 247 and Section 32 Meetings
- It is considered that the proposed layout has incrementally improved across all alternative layouts considered and will positively contribute to the future residential and economic growth of the settlement. Once operational the proposed development will result in several positive environmental and socio-economic impacts to the locality.

2.9 References

www.cso.ie

https://www.corkcoco.ie/en/planning/planning-enquiry-online-submissions

http://planning.corkcity.ie/searchtypes

https://busconnects.ie/busconnects-cork/

Cork Metropolitan Area Transport Strategy 2040 (CMATS)

Cork City Development Plan 2022-2028

CycleConnects – National Transport Authority

2.10 List of Chapter Appendices

Appendix 2-1 – Construction & Environmental Waste Management Plan – DOSA Consulting Engineers.

Appendix 2-2 – Construction Traffic Management Plan – DOSA Consulting Engineers

Appendix 2-3 – Proposed Site Layout – Deady Gahan Architects.

Appendix 2-4 - Infrastructure Report – DOSA Consulting Engineers.

Appendix 2-5 - Green & Blue Infrastructure/Landscape Design Rationale Report – Simon Ronan Landscape Architecture.

Appendix 2-6 – Landscape Masterplan – Simon Ronan Landscape Architecture.

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CHAPTER THREE

LANDSCAPE AND VISUAL IMPACT ASSESSMENT

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CHAPTER THREE

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CHAPTER 3 | Landscape and Visual Impact Assessment

3.1 Introduction

This chapter assesses the potential impacts of the proposed development on the landscape character and visual amenity of the receiving environment. The chapter should be read in conjunction with the book of verified photomontages included at the rear of this chapter.

3.2 Methodology

The LVIA was carried out with reference to:

- *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition, 2013 (GLVIA), published by the Landscape Institute;
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2022, published by the EPA;
- *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*, 2018, published by the Department of Housing, Planning and Local Government.

The EPA guidelines 2022 provide a general methodology and impact ratings for all EIA topics. The GLVIA provides specific guidelines for landscape and visual impact assessment. Therefore, a combination of the EPA guidelines and the GLVIA has informed the methodology for this assessment.

3.3 Key Principles of the GLVIA

3.3.1 Assessment of Both Landscape and Visual Effects

The GLVIA requires that effects on views and visual amenity be assessed separately from the effects on landscape, although the two topics are inherently linked.

- 'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations and spatial distribution of these elements create variations in landscape character. Landscape impact assessment identifies the changes to this character which would result from the proposed development, and assesses the significance of those effects on the landscape as a resource.
- Visual impact assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

3.3.2 Assessment of Landscape Effects

Assessment of potential landscape effects involves (a) classifying the sensitivity of the landscape resource, and (b) describing and classifying the magnitude of landscape change which would result from the development. These factors are then combined to arrive at a classification of significance of the effects.

3.3.2.1 Landscape Sensitivity

The sensitivity of the landscape is a function of its character, which may be determined by its land use pattern, field pattern or urban grain, building typologies and architecture, cultural and natural heritage elements (including topography, vegetation and drainage features), and the quality of the public realm. These factors determine the value that is placed on the landscape. The policy pertaining to the area (e.g. the land use zoning), and any related trend of change, are taken into account. The nature and scale of the proposed development are also considered (a particular landscape can have varying sensitivity to different development types). Five categories are used to classify sensitivity, as set out in Table 3.1.

Table 3.1 Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The landscape character is such that its capacity to accommodate change is very low. These attributes are recognised in 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 landscape character is such that it has limited/low capacity to accommodate change. These attributes are recognised in policy or designations as being of national, regional or county value and the principle management objective for the area is the conservation of existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The landscape character is such that there is some capacity for change. These areas may be recognised in 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 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 the principle management objective may be 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 is such that its capacity to accommodate change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands, 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.

3.3.2.2 Magnitude of Landscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape by a development, with reference to its key elements, features and characteristics and the affected surrounding character areas (collectively termed 'landscape receptors'). Five categories are used to classify magnitude of change, as set out in Table 3.2.

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Table 3.2 Categories of Magnitude of Landscape Change

Magnitude	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, and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape.
High	Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the landscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, 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.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the landscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character.

3.3.2.3 Significance of Effects

To classify the significance of effects (for both landscape and visual impacts) the magnitude of change is measured against the sensitivity of the receiving environment/receptor using the guide in Table 3.3 below.

Table 3.3 Guide to Classification of Significance of Landscape and Visual Effects

		Sensitivity of the Landscape/View				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Landscape/Visual Change	**Very High**	Profound	Profound to Very Significant	Very Significant to Significant	Moderate	Slight
	High	Profound to Very Significant	Very Significant	Significant	Moderate to Slight	Slight to Not Significant
	Medium	Very Significant to Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate to Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight to Not Significant	Not significant	Imperceptible	Imperceptible

This matrix is derived from the EPA's *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2022 (specifically Figure 3.4 of the Guidelines).

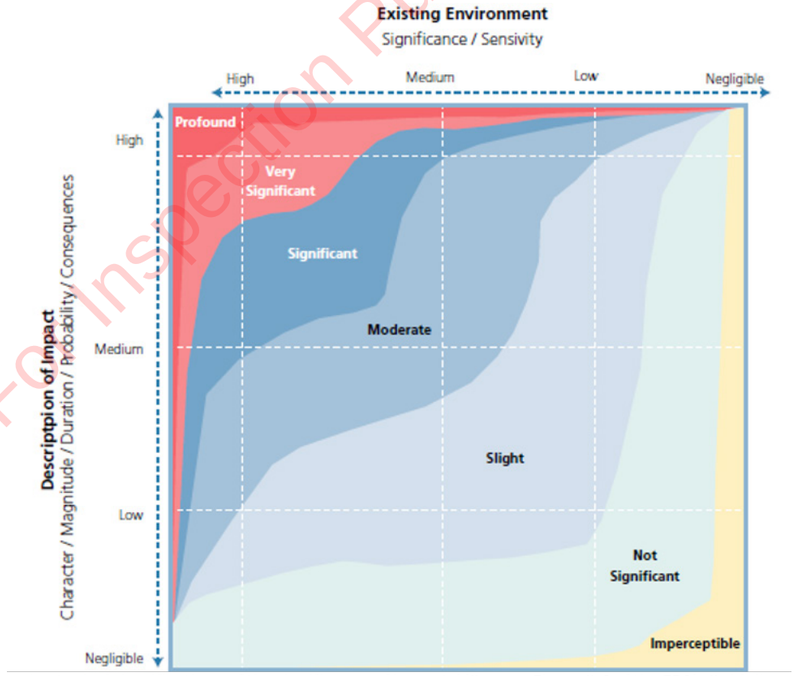

Figure 3.1 'Chart showing typical classifications of the significance of impacts' (Source: Figure 3.4 of the EPA's Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022)

The matrix (Table 3.3) and the EPA's chart (Figure 3.1) are only a guide to the classification of impact significance. The assessor also uses professional judgement informed by their expertise, experience and common sense to arrive at a classification of significance that is reasonable and justifiable. In the EPA Guidelines 2022 the chart is accompanied by a footnote that states:

> *"The depiction of significance classifications is indicative and should not be relied on as being definitive. It is provided for general guidance purposes."* (EPA Guidelines 2022, Section 3, page 53)

The matrix and chart are therefore used as a starting point for the impact significance classification – with the assessor using their judgement to arrive at a classification that is reasonable and sensible. For example, according to the EPA chart a change of high magnitude affecting a receptor of medium sensitivity may be classified as either 'significant' or 'moderate'. That judgement must be made by the assessor. The impact significance classifications are taken from the EPA Guidelines 2022, which defines the classifications as follows (Table 3.4):

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Table 3.4 Impact Significance Classifications

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 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.

3.4 Assessment of Visual Effects

Assessment of visual effects involves identifying a number of key/representative viewpoints in the site's receiving environment, and for each of these: (a) classifying the viewpoint sensitivity, and (b) classifying the magnitude of change which would result in the view (informed by verified photomontages). These factors are combined to arrive at a classification of significance of the effects on each viewpoint.

3.4.1 Viewpoint Sensitivity

Viewpoint 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 is focused 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 attractions and places of congregation where the setting contributes to the experience. Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation where the surrounding landscape does not influence the experience, and people in their place of work or shopping.
- 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. appearing in arts).

Five categories are used to classify a viewpoint's sensitivity, as set out in Table 3.5.

Table 3.5 Categories of Visual Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints (views 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 change is very low. The principle 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 (e.g. views from houses or outdoor recreation amenities focused on the landscape). The composition, character and quality of the view may be such that its capacity to accommodate change may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Views that may not have features or characteristics that are of particular value, but have no major detracting elements, and which thus provide some visual amenity. These views may have capacity for appropriate change and the principle management objective is to facilitate change to the composition that does not detract from visual amenity, or which enhances it.
Low	Views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category includes views experienced by people involved in activities with no particular focus on the landscape. For such views the principle management objective is to facilitate change that does not detract from visual amenity or enhances it.
Negligible	Views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g. in derelict landscapes). For such views the principle management objective is to facilitate change that repairs, restores or enhances visual amenity.

3.4.2 Magnitude of Visual Change

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 view, or in glimpses). It also takes into account the geographical extent of the change, as well as the duration and reversibility of the visual effects. Five categories are used to classify magnitude of visual change to a view, as set out in Table 3.6.

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Table 3.6 Categories of Magnitude of Visual Change

Magnitude	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 dominant in 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.

3.4.3 Significance of Effects

As for landscape effects, to classify the significance of visual effects the magnitude of change to the view is measured against the sensitivity of the viewpoint using the guidance in Table 3.3 and Figure 3.1 above.

3.5 Quality of Effects

In addition to predicting the significance of the effects, EIA methodology requires that the quality of the effects be classified as positive/beneficial, neutral, or negative/adverse. For landscape to a degree, but particularly for visual effects, this is an inherently subjective exercise. This is because landscape and visual amenity are perceived by people and are therefore subject to variations in the attitude and values - including aesthetic preferences - of the receptor. One person's attitude to a development may differ from another person's, and thus their response to the effects of a development on a landscape or view may vary.

Additionally, in certain situations there might be policy encouraging a particular development in an area, in which case the policy is effectively prescribing landscape and visual change. (This is relevant because, in the case of land use, the policy is written by the democratically elected local government. Therefore, the policy can be assumed to reflect the values of the local population). If a development achieves the policy objective, the resulting effect might be considered positive, even if the landscape character or views are profoundly changed. The classification of quality of landscape and visual effects should seek to take these variables into account and provide a reasonable and robust assessment.

3.6 Receiving Environment

3.6.1 Site Location

The site is located within the settlement boundary of Ballincollig, at the southern edge of the existing urban area, between Greenfields Road and the N22 Ballincollig Bypass, which forms the southern boundary of the town. The site is part of the South Ballincollig (Maglin) strategic land bank, which is identified in the Cork City Development Plan 2022-2028 (CCDP) as one of seven strategic areas for consolidation and expansion of Cork City.

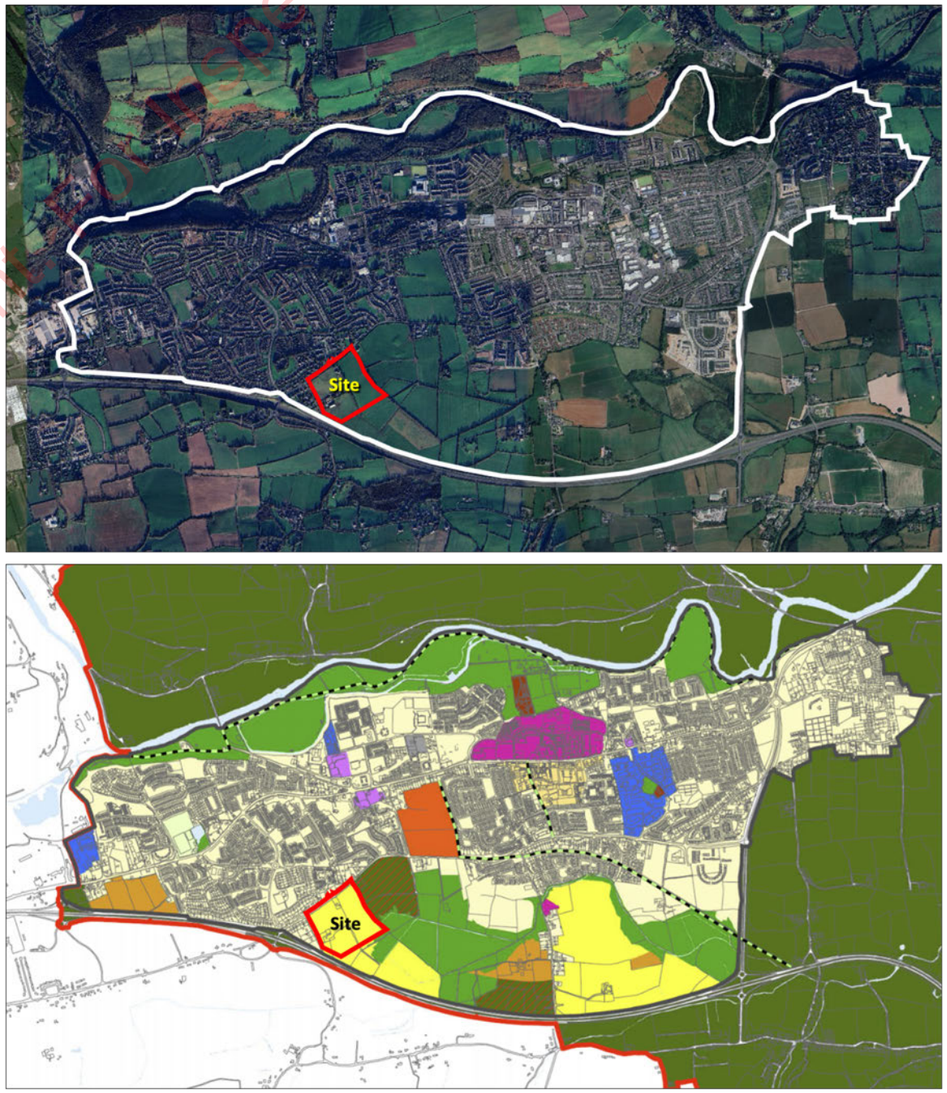

Figure 3.2 Site location in the context of Ballincollig

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3.6.2 The Site

The site is comprised of three large fields, with a cluster of farm buildings and paddocks positioned between the two western fields. This farm is accessed from a narrow lane that runs outside the site's west boundary, terminating in a cul-de-sac against the N22. The site excludes a single large dwelling alongside Greenfields Road, which passes to the north. The site boundaries are varied:

- Along Greenfields Road to the north, there is a c. 1.8m stone wall on the boundary of the north western field (see Figure 3.7), and a hedgerow on the boundary of the eastern field.
- Along the lane to the west of the site there is a is hedgerow featuring several large trees. The hedgerow and trees are locally significant landscape (and biodiversity) assets (see Figures 3.5, 3.6).
- The eastern site boundary (shared with neighbouring fields) is marked by a mature hedgerow. This hedgerow is a townland boundary (marking the edge of the Greendfield townland) and is thus a landscape/visual, biodiversity and cultural heritage asset.
- Along the southern boundary there is roadside vegetation where the site abuts the N22, and a ditch on the boundary of the eastern field.

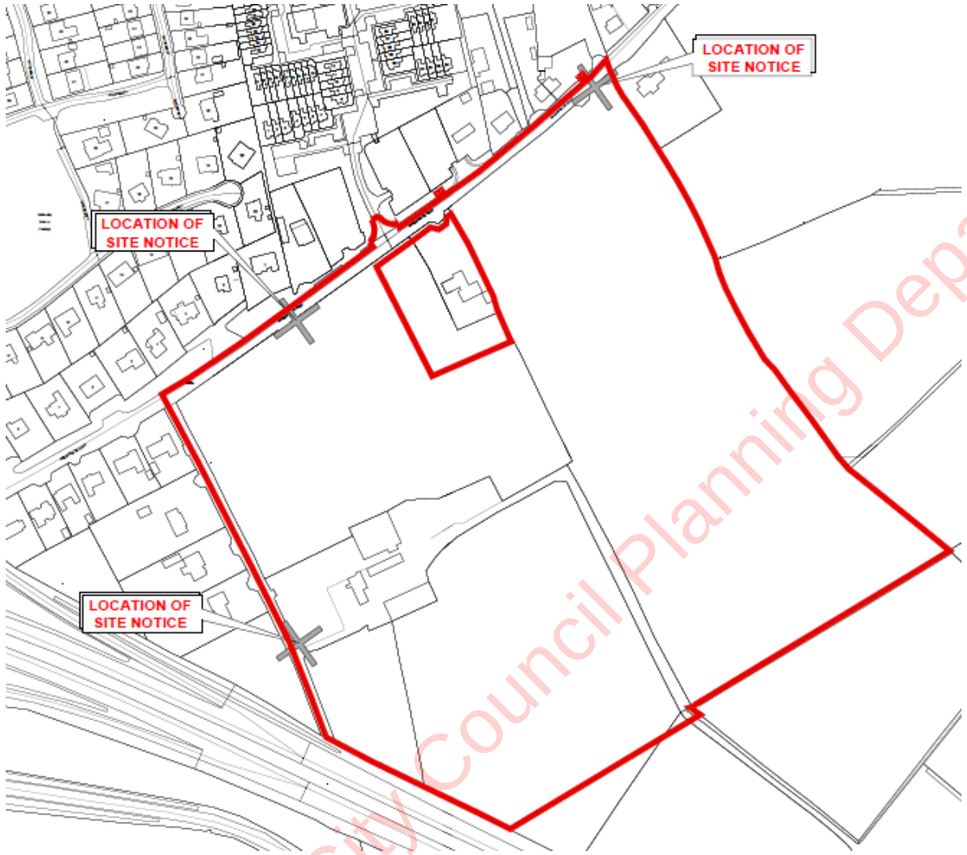

Figure 3.3 The site

Within the site, there is a mature hedgerow featuring several large trees between the eastern field and the two western fields. This hedgerow bisects the site into two parts (the eastern field and two western fields). The hedgerow is an important landscape feature locally. There are also sections of hedgerow with trees between the two western fields, either side of the farm cluster. The landform generally slopes down towards the south and east from a domed area in the north western field.

Figure 3.4 The site

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The three north-south aligned hedgerows on the site (on the east and west boundaries and bisecting the site internally) are valuable landscape features. They give structure to the landscape, provide visual amenity and (potentially) screening, and form part of the local green infrastructure network. These hedgerows should be considered sensitive and worthy of retention if possible in the site's development.

Figure 3.5 The hedgerow on the western site boundary (right)

Figure 3.6 The west boundary hedgerow and some of the trees, as seen from a house across the lane

Figure 3.7 The stone wall along part of the site frontage to Greenfields Road

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Figure 3.8 A view from Greenfields Road showing the roadside boundary wall, the sloping topography, an internal boundary hedgerow, and Ballincollig Castle in the distance

3.6.3 Surrounding Landscape Character and Key Potential Receptors of Change

The receiving environment can be divided into three main character areas. These are:

- The existing suburban landscape of Greenfields Road and Woodberry to the north and west of the site.
- The greenfield but zoned lands south of Greenfields Road, lying between the existing urban area and the N22. The site falls into this area. Ballincollig Castle is also located in this area (see Section 3.6.3.4 below)
- The peri-urban landscape south of the N22.

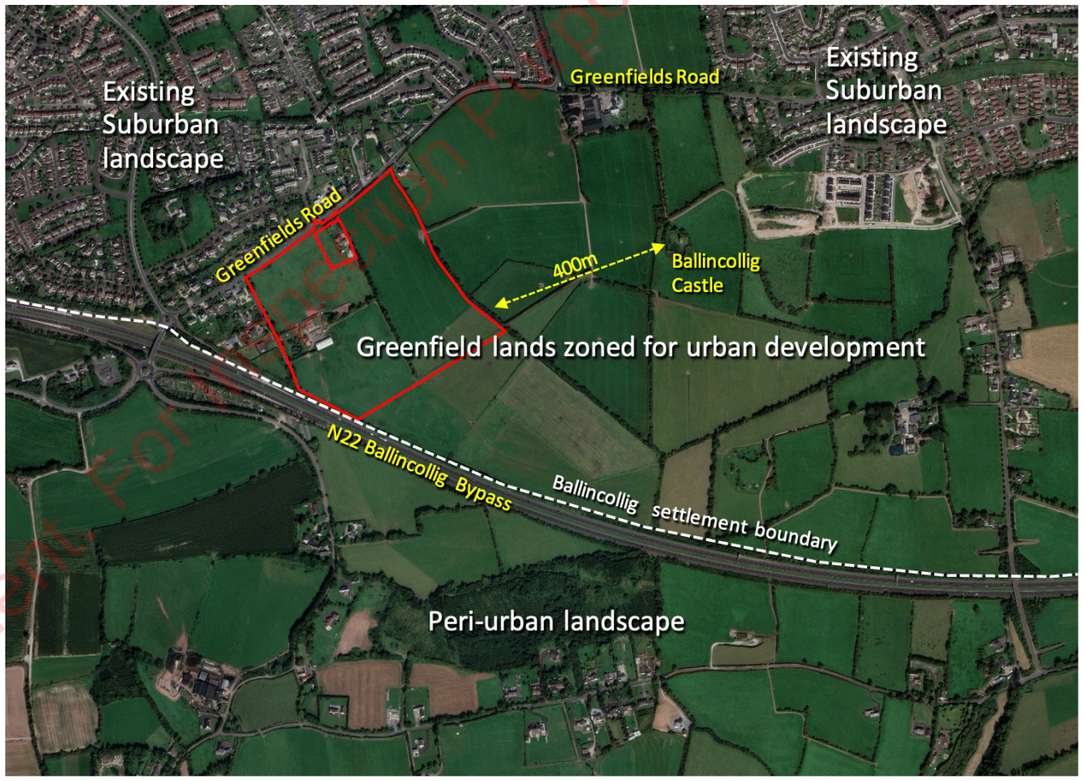

Figure 3.9 Macro level landscape character areas

3.6.3.1 Suburban Landscape of Greenfields Road and Woodberry to the North of Site

Greenfields Road passes along the site's northern boundary. It forms the southern edge of the western suburban area of Ballincollig. The road is lined on its north side by mostly large, detached houses. These houses are important potential receptors of change on the site. Most of the houses across Greenfields Road are set well back from the road behind green verges with trees, in large, well vegetated gardens. The combination of separation distance and vegetation screening will mitigate the impact of any development on the site for these houses across the road (see Figure 3.10).

Towards the eastern end of the site frontage to the road, there are a small number of houses positioned closer to the road - therefore closer to the site (c. 16m) and more visually exposed to any development on the site (see Figure 3.10).

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Figure 3.10 Separation distance of the houses across Greenfields Road from the site. Most are well removed from the site and benefit from vegetation screening. A small number of houses towards the eastern end of the site are closer to the road, with no vegetation screening

Figure 3.11 A view from the entrance to a house across Greenfields Road from the site. The road, the trees in the roadside verge and the houses' gardens will function as a landscape/visual buffer between the existing houses and the proposed development

Figure 3.12 Two cottages opposite the site at the eastern end of its frontage to Greenfields Road. These cottages are more exposed to any development on the site

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3.6.3.2 Lane to West of Site

There are four houses across the lane directly west of the site. The house at the corner of Greenfields Road is positioned close to the lane, while the other three houses along the lane are set back from the lane in large gardens. Like the houses across Greenfields Road, these houses across the lane are important receptors of change.

Figure 3.13 The four houses across the lane to the west of the site

eFigure 3.14 Two of the houses across the lane to the west of the site

3.6.3.3 Zoned Land to South and East of Site

The lands to the south and east of the site are of similar use and character to the site itself, i.e. farmland. Like the site, these lands are zoned for development in the CCDP (see Figure 3.14), including:

- Residential use. The residential zoning that covers the site extends to the east for a stretch alongside the N22. This indicates that an urban edge is intended to be created along the bypass.
- Public open space. A large area extending to the east from the site's south east corner is zoned public open space. The scale of this area suggests it will have a recreation amenity function of town-wide importance. This adds value to the site as a residential land use resource. A notable feature within the open space zoned land is Ballincollig Castle (see Section 2.3.4 below).
- City Hinterland/Long Term Strategic Development Land. The area directly to the east of the site along Greenfields Road is zoned City Hinterland with an additional designation of Long Term Strategic Development Land.
- Mixed use. Although somewhat removed from the site, there is a large area zoned for mixed use development north of Greenfields Road to the east of the site.

None of the land use zonings to the east and south of the site is sensitive to development of the type proposed on the site. The zonings do however require consideration in the design of the proposed development, to ensure that the site's development is complementary to any likely future development on the neighbouring zoned lands.

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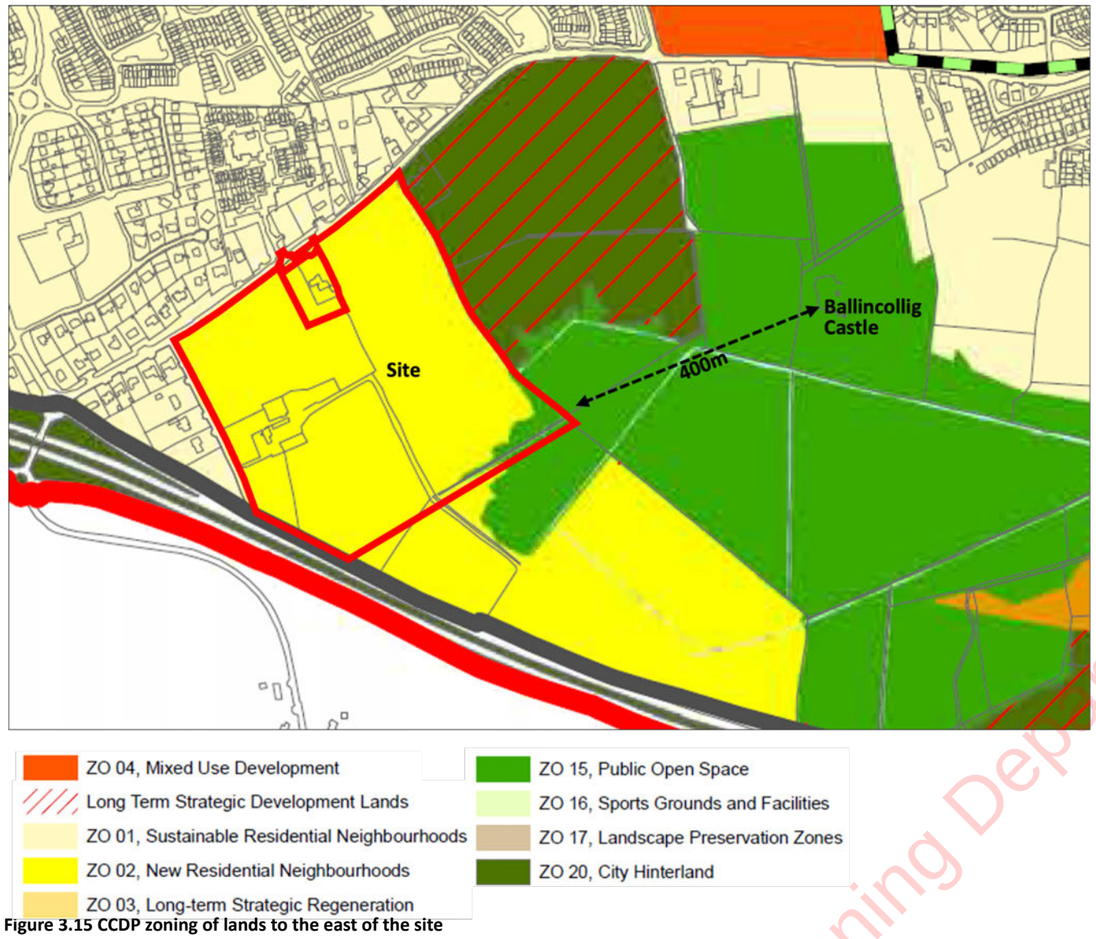

Figure 3.15 CCDP zoning of lands to the east of the site

3.6.3.4 Ballincollig Castle

Ballincollig Castle lies some 400m to the east of the site, surrounded by farmland. The Norman castle includes a tower built on an earth mound with a surrounding walled enclosure. The castle is in private ownership, but being located in the public open space zoned area, it has potential for development as a visitor site.

There is very limited visibility of the site from Ballincollig Castle environs. The enclosing wall on the west side of the tower blocks views of the lands to the west from the mounded area around the tower. Views west from outside the enclosing wall are blocked or heavily filtered by a hedgerow immediately to the west of the castle.

There is thus very limited potential for development on the subject site to cause significant visual impact on Ballincollig Castle. The development might just be discernible (in the distance, through the foreground hedgerow) from the fields around the castle, or visible in the wider environs on approach to the castle.

Importantly, as shown in the zoning map above, the area between the site and Ballincollig Castle is zoned public open space.

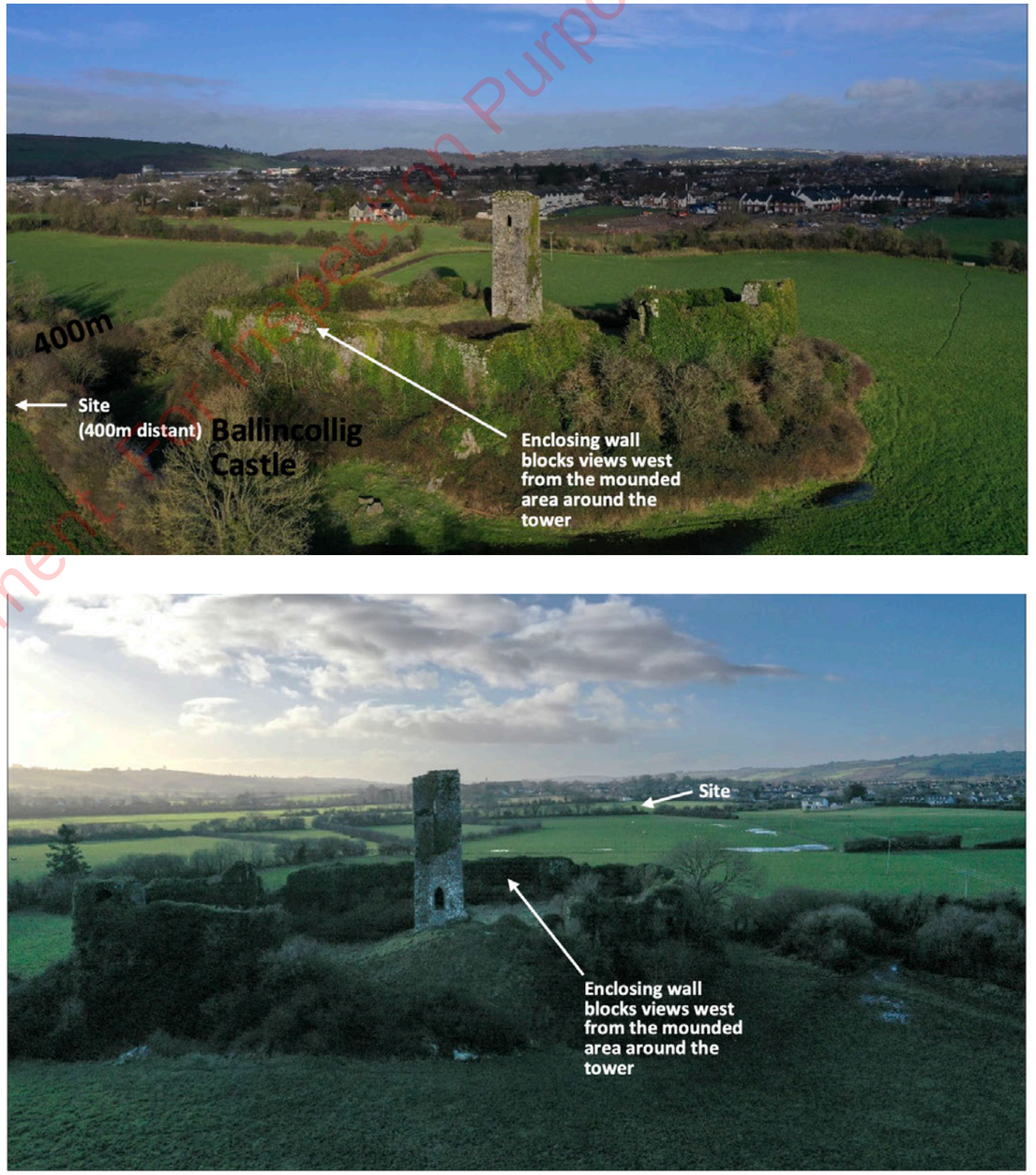

Figure 3.16 Bird's eye views of Ballincollig Castle

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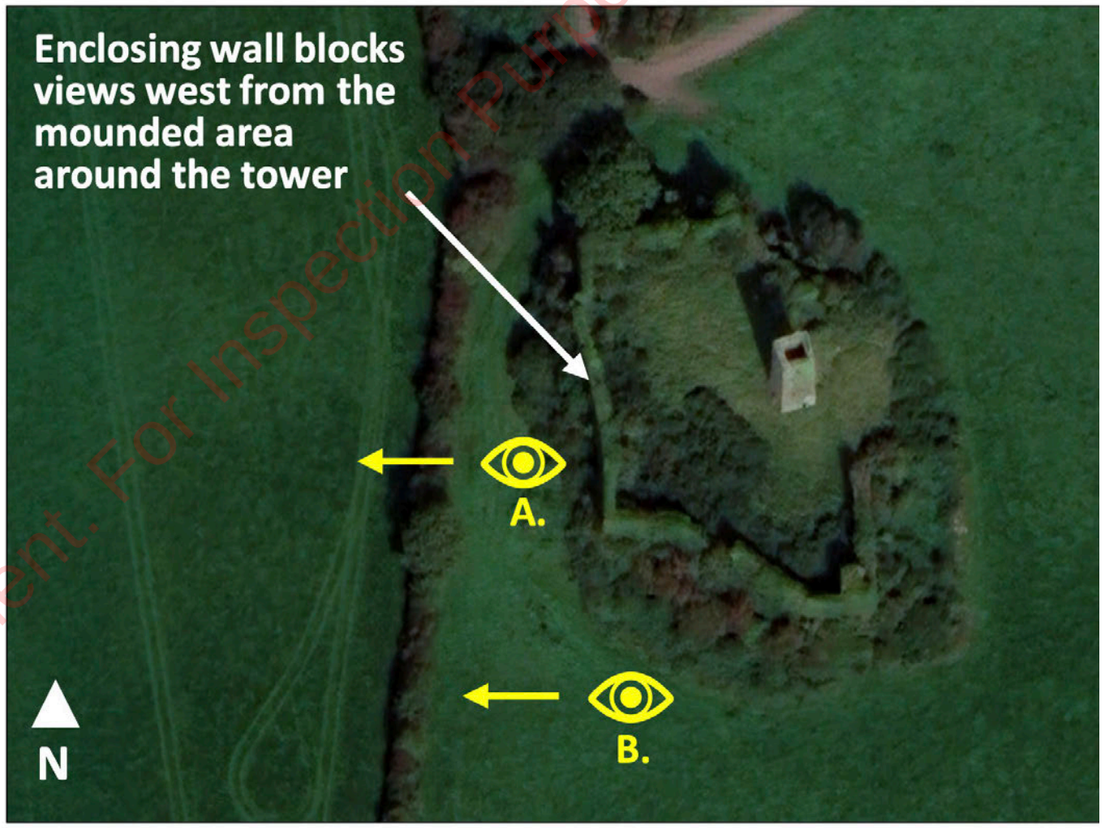

Figure 3.17 Views towards the site from the field around Ballincollig Castle

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3.6.3.5 N22 Ballincollig Bypass

The users of the N22 Ballincollig Bypass are a large cohort of potential visual receptors. Multi-storey development on the site could be visible over the roadside embankments and vegetation.

Similar to the users of Greenfields Road, N22 road users are not sensitive to change. Visibility of development from a road serving an urban area is not inappropriate; it can have benefits such as place-identification and improved legibility, improved delineation between the urban and rural areas, etc.

Figure 3.18 A view towards the site from the Ballincollig Baypass, which passes close to the site's southern boundary

3.6.3.6 Peri-Urban Area South of the N22

To the south of the N22 is an area not zoned for urban development, but in which urban elements and influences are present (refer to Figure 3.9 above which shows a relatively high density of rural housing in 'ribbon development' arrangement). The topography rises to the south of the N22. The L2222 (Kilnaglory/Maglin) road runs parallel to the N22 some 400m up the hillside and there is a concentration of houses along this road. In places, the road affords views north over the N22 towards the site and the urban area of Ballincolig. If the development were visible in these views, it would be seen against the backdrop of the wider urban area and would have no significant impact on the character or quality of the view. It would constitute a minor expansion of the town, in accordance with the development strategy for South Ballincollig.

Figure 3.19 A view north from the L2222 Kilnaglory/Maglin Road south of the N22. The bypass can be seen in the middle distance, with parts of Ballincollig visible behind it, against a backdrop of hills

3.7 Relevant Policy - Cork City Development Plan 2022-2028

The following policy in the CCDP is most relevant to this assessment.

3.7.1 Core Strategy and Land Use Zoning

In the Core Strategy (CCDP p.47) South Ballincollig (Maglin) is identified as one of seven 'strategic areas' within and adjoining Cork city, in which compact growth will be delivered through consolidation and expansion. The site falls into this area.

The site is zoned ZO 2 "New Residential Neighbourhoods". The CCDP states:

> *"This zone covers primarily greenfield, undeveloped lands for new sustainable residential areas. Development in this zone, while primarily residential, must provide an appropriate mix of housing types and tenures along with the amenity, social, community and physical infrastructure required to promote compact growth, balanced communities and sustainable, liveable communities".*

The site is thus designated for residential use. Residential development should include a mix of housing types in addition to the amenity, social, community and physical infrastructure required for a sustainable residential neighbourhood.

A small area in the south east corner of the site is zoned ZO 15 "Public Open Space".

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3.7.2 Residential Density and Building Height

The density strategy for Cork city is structured around four sub-areas (• City Centre and Docklands; • City Centre Fringe / key transport corridors / key urban centres; • Inner Urban Suburbs; • Outer Suburbs).

Although not specifically covered by any of the above designations (see figure below), the site - being within the Ballincollig settlement boundary and zoned for residential use - can be classified as 'outer suburbs' for the purpose of determining appropriate building height for new development. Table 11.1 of the CCDP specifies a lower and upper target height of 2-4 No. storeys for development in outer suburb areas.

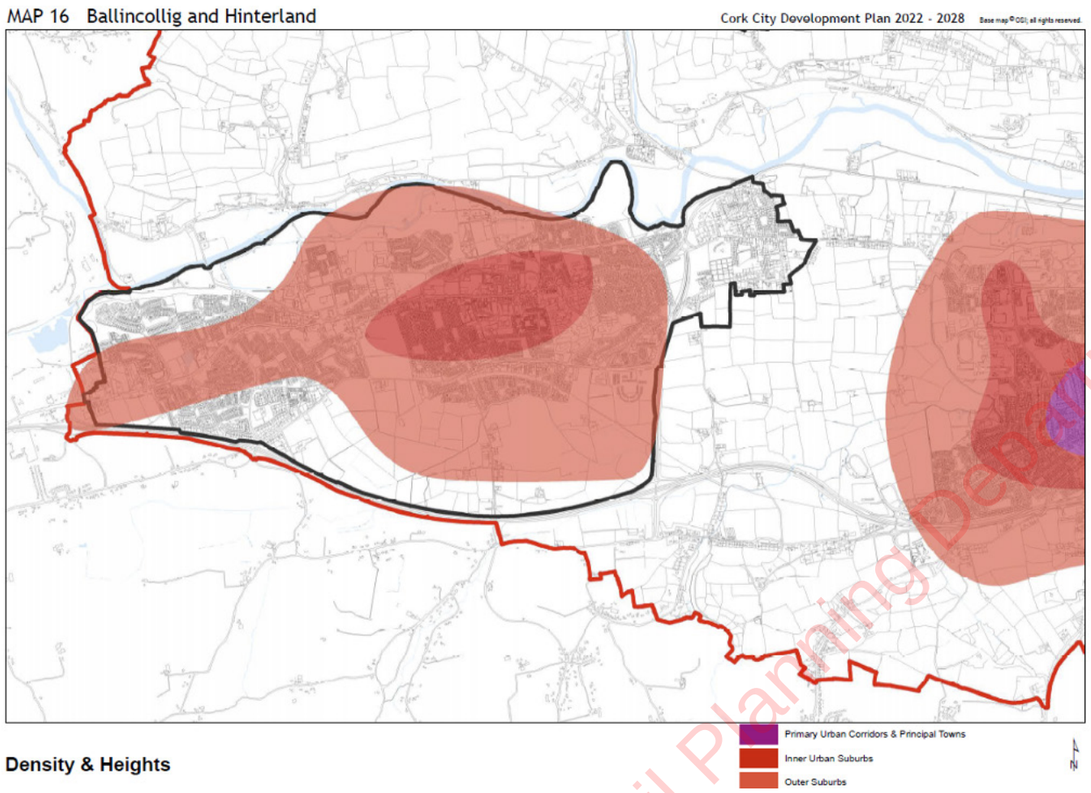

Figure 3.20 Cork City Development Plan 2022-2028 density and height strategy map for Ballincollig

Additionally, in paragraph 11.33, the CCDP states:

> *"The building height of development will respond directly to the proposed density of development, the character of an area, as well as block development typologies, site coverage and a range of other factors."*

3.7.3 Landscape and Development

The CCDP states (Paragraph 6.17):

Cork City Council seeks to protect and enhance the landscape character of the City by protecting the significant landscape elements that contribute to the general amenity of cork City. This is achieved through a number of land use mechanisms in this Plan, including the designation of Land Preservation Zones (LPZ) and Areas of High Landscape Value (AHLV).

The site does not fall into any LPZ or AHLV.

Objective 6.9 of the CCDP states:

> *a. To preserve and enhance Cork's landscape character, key landscape assets and views and prospects of special amenity value;*
>
> *b. Landscape will be an important factor in all development 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. To ensure that new development meets the highest standards of placemaking, siting and design;*
>
> *d. To protect those prominent open hilltops, valley sides and ridges that define the character of the Cork City Hinterland and those areas which form strategic, largely undeveloped gaps between the main Hinterland settlements from development;*
>
> *e. To discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments;*
>
> *f. To support, as appropriate, any relevant recommendations contained in the National Landscape Strategy for Ireland 2015-2025.*
>
> [emphasis added]

Regarding Item a, although currently in agricultural use, the site is contiguous with the Ballincollig urban area, located within the settlement boundary, and zoned for residential use. Residential development of the site can therefore be considered in keeping with the local landscape character.

The key consideration is whether the realisation of this land use objective – by the proposed development - would be achieved with 'respect for the environment and heritage' and preservation of the site's 'key landscape assets'. The site's key landscape assets are its hedgerows and trees – with the east boundary hedgerow of particular value as it marks a townland boundary. The layout of the proposed development preserves the majority of the site's east and west boundary hedgerows and large parts of the internal hedgerows, incorporating them into green corridors or open space. The proposal is thus compliant with Items b and e of CCDP Objective 6.9.

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Objective 6.11 of the CCDP states:

> *To ensure that the management of development throughout Cork City will have regard for the value of the landscape, its character, distinctiveness and sensitivity in order to minimize the visual and environmental impact of development, particularly in designated areas of high landscape value where higher development standards (layout, design, landscaping, materials) are required.*

While minimising visual impact is an appropriate objective in some situations/areas (e.g. LPZs and AHLVs), in other areas (e.g. designated urban expansion areas) visual impact can be positive.

Locally, the proposed development would have significant visual impact. This is unavoidable in the development of greenfield land. The key question for this assessment is whether the proposal' visual impact would be positive. This can be achieved by measures such as:

- Retention of existing hedgerows and trees in open space, and using these retained assets to give structure to the new development/neighbourhood;
- Built frontage to streets and open spaces, for a legible urban structure;
- Variations in building typology and height to give different status to streets, spaces and places;
- Consideration of topography in the location of building height (e.g. by locating taller buildings in the lower-lying parts of a site, unless a prominent landmark building is the objective);
- Variety in built form and architectural treatment to generate sub-areas of character within a neighbourhood.

3.7.4 Neighbourhood Design

Objective 2.17 of the CCDP states:

> *The design and siting of development shall create a sense of community and identity, enhance connectivity, incorporate creative approaches to urban design, enhance landscape character and green and blue infrastructure and respect the local context and character of the area.*

3.7.5 View Management Framework

The CCDP includes a View Management Framework to ensure that development does not detract from Cork's distinctive character or visual amenity. The Plan includes six View Management Framework maps in Volume 2 (Chapter C). The maps do not extend to Ballincollig (being mostly focussed on the city centre). Therefore, there are no Strategic Landmark Buildings, Local Landmark Buildings, Strategic Viewing Locations, Strategic Linear Views, or Viewing Locations identified in Ballincollig.

However, Ballincollig Castle can be considered a local landmark building. The site is approximately 400m to the west of the castle (see section 4.3.4 above). There are no 'strategic linear views' or 'viewing locations' to the west of the site that might be impacted by development on the site (e.g. by development blocking the view). However, it is likely that development on the site would block certain 'non-strategic' views of the castle - for example views of the Castle from Greenfields Road (see Figure 4.20 below).

Additionally, development on the site might be visible from Ballincollig Castle itself. The impacts on two views, from the base of the castle tower (Viewpoint 11) and from the 'castle environs' (Viewpoint 12) are assessed below.

Figure 3.21 A view across the eastern part of the site, from Greenfields Road, with Ballincollig Castle on the horizon

3.8 Proposed Development

The proposal is described in detail in the architectural and landscape design statements and Chapter 2 of the EIAR. The following aspects of the proposal are most relevant to the assessment of landscape and visual impacts.

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3.9 Layout

Being roughly square and of gently undulating topography, the site is relatively unconstrained as regards the potential layout of development. The key determinants of the proposed layout and arrangement of built form – including height – were therefore as follows:

- The objective to retain – as far as possible – the external and internal boundary hedgerows and trees on the site, and to use these to give both structure and maturity to the new neighbourhood;
- The objective to establish a rational/efficient, permeable, legible urban structure on the previously greenfield land;
- The requirement to respond to the surrounding urban grain – including roads of varying status (Greenfields Road to the north, 'Maglin Sustainable Access Corridor' to the east, a narrow cul-de-sac lane to the west, and the N22 Bypass to the south) - and associated development and variations in sensitivity on all sides;
- To objective to minimise – as far as possible - negative visual impacts as a result of the development. (This is inherently difficult in situations of urban expansion into greenfield areas. Existing houses and other receptors at the urban edge enjoy views of agricultural lands, and the replacement of green fields with built form is often considered to detract from visual amenity.)

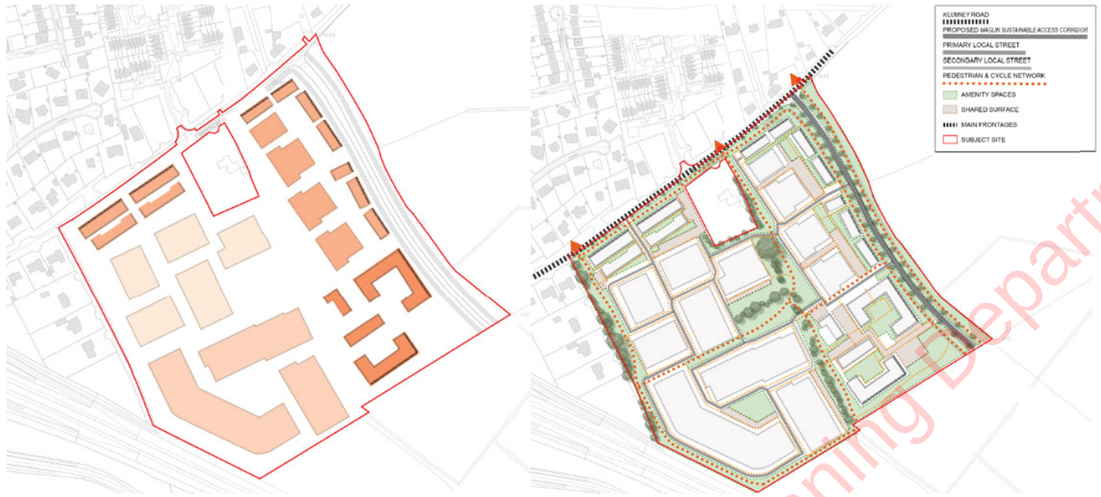

Figure 3.22 Key determinants of proposed layout: (a) response to surrounding roads/urban grain and development, and (b) retention of western and internal boundary hedgerows in open space network

The figures above show that the west boundary hedgerow and a large proportion of the internal hedgerows and would be retained in a framework of open space/green infrastructure. The townland boundary hedgerow to the east is outside of the site. It would not be affected by the development and would contain/enclose the development similar to the retained hedgerow on the west boundary.

The proposed layout is an orthogonal grid, with junctions offset (in line with DMURS) to slow vehicular traffic and create people-friendly streets. The grid layout is the most efficient use of space/land, and promotes navigability and legibility. The grid is also derived from, and therefore aligned with, the existing field pattern.

Figure 3.23 Proposed layout

3.10 Built Form and Height – Response to Context

The proposed development incorporates a variety of housing/building typologies. This is in accordance with the ZO 2 zoning (which requires a 'mix of housing types') and allows the development to address/respond to the surrounding landscape in different ways. The proposal's varying interface with the surroundings is discussed below.

Generally, there is an increase in density/intensity across the site from the west and south west to the north and east. This reflects that Ballincollig town centre is to the east, and the urban edge lies to the west and south.

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3.10.1 Lane to West of Site

Facing the lane to the west of the site (and the three houses across the lane) are two blocks of semi-detached two storey houses. The houses are set well back from the lane (c. 25m), behind a belt of vegetation up to 15m wide – incorporating the retained boundary hedgerow and trees. This is the most traditional, suburban typology proposed. It is intended to achieve a soft transition to the houses across the lane to the west.

Figure 3.24 A view from across the lane to the west of the site, showing the retained boundary hedgerow and trees, supplementary planting inside the boundary, and two storey terraced houses set well back from the lane

3.10.2 N22 Bypass to the South

A similar housing typology (semi-detached houses) is proposed in the south west portion of the site, but the built form is adapted to respond to the N22 bypass, which passes to the south. The houses are taller (three storeys) and the blocks in this area are larger/longer, resulting in longer rows of houses and giving the area a linear quality that responds to the bypass.

Importantly, the houses face the bypass (set back behind a greenway, an internal access road and their front gardens/parking) and do not present their rear facades and gardens to the road. The expanded urban area would not therefore turn its back on the bypass, and the houses' private amenity space would be sheltered from the bypass.

3.10.3 Greenfields Road to the North

Greenfields Road is an important thoroughfare, and an important element of Ballincollig's urban structure. It carries a large volume of traffic, including traffic between the N22 Bypass and the town centre. The status of the road (and its gateway function) warrants a built frontage of urban character. However, there are houses directly across the road, which are sensitive receptors of change.

It is proposed to introduce three storey duplex blocks along the site frontage to Greenfields Road. Duplex terraces are an urban typology, but at three storeys they are of modest height. The buildings are set well back from the road to allow for a segregated cycle lane and the possibility of a future road widening scheme. The combination of the buildings' typology and positioning would both generate urban character and avoid excessive built/visual enclosure.

At the end of each terrace is a unit turned perpendicular so that it presents its gable to the street (see Figure 3.25 and 3.26). These units form legible gateways at entrances to the neighbourhood. They also articulate the massing and add visual interest to the roofscape. The facades are further articulated by projecting porches of differing brick colour, and large windows. Street trees and hedges (as privacy strips) are proposed to soften the built frontage.

Figure 3.25 A view from across Greenfields Road, showing the duplex terraces set well back from the road but still generating urban-type street enclosure and character. Perpendicular units form legible gateways to the neighbourhood. Trees and hedges soften the built frontage.

3.10.4 Maglin Sustainable Access Corridor to the East

A new road is proposed inside the site's east boundary. This is an important piece of the circulation network (for cars, busses, cyclists and pedestrians) and the urban structure of the South Ballincollig/Maglin area. Like Greenfields Road, its status warrants built frontage of urban character.

The duplex terraces turn the corner from Greenfields Road onto the new road (see Figure 3.26). Further down the road towards the south east corner of the site (the lowest lying part of the site), four storey apartment buildings front the road – and provide enclosure (on two sides) to an open space in the south east corner (see Figure 3.27).

The high density typology (apartment buildings) identifies the neighbourhood core that includes facilities such as a creche, shop and the area of public open space which is contiguous with a large zoned open space extending to the east of the site.

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The apartment buildings and duplex blocks fronting the new road will all benefit from views east towards Ballincollig Castle, which lies some 450m to the east.

Figure 3.26 The duplex terraces turning the corner from Greenfields Road onto the new road inside the site's east boundary. The accented corner units mark the junction and articulate the built form.

Figure 3.27 The apartment buildings fronting the distributor road and providing enclosure to the open space in the south east corner of the site. The shop can be seen in the ground floor at the corner. The hedgerow to the right is the retained Greenfield townland boundary hedgerow.

3.11 Architecture and Materials

The varying design response to the context (described above) results in variations in architectural character across the scheme. This variety is reinforced by the detail design of the buildings, with the objective of creating sub-neighbourhoods of distinct identity.

Figure 3.28 Variations in architectural character across the scheme

The predominant façade material across the development is buff brick. This is used in the majority of the buildings and is one of the unifying materials, along with slate roof tiles. Accent elements in different coloured brick and render are used across different buildings to introduce variety and articulate the facades. The apartment buildings have panels of metal cladding on parts of the upper floors, helping to break down the larger elevations into smaller visual units. This adds texture and helps to integrate the buildings into the landscape.

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Figure 3.29 CGI view showing the variations in building typology and design, but with a unifying architectural language and materials palette

Figure 3.30 CGI view showing the variations in building typology and design, but with a unifying architectural language and materials palette

3.12 Landscape Proposals

The key elements of the landscape proposals are as follows:

- The west boundary hedgerow and trees would be retained. Inside this boundary, it is proposed to densely plant a linear space up to 15m wide to form a landscape/ecological corridor, with a parallel greenway (pedestrian and cycle path) that continues around the southern boundary of the site. This landscape corridor would function as a buffer between the development and the lane and houses to the west.
- The townland boundary hedgerow outside the east boundary of the site would be retained, unaffected by the proposed development. This hedgerow would enclose and form a soft green edge to the neighbourhood.
- The north-south aligned internal hedgerow would be largely retained, forming the axis of an open space corridor crossing the site. This linear green space is one of the main arranging elements of the layout, separating the eastern and western character areas (see Figure 3.28) and providing a dedicated pedestrian and cycle route off-road through the neighbourhood.

Figure 3.31 Landscape masterplan

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- Where the internal hedgerows meet at the centre of the site, a large rectangular open space is proposed, so that large sections of the two hedgerows, and their junction, can be retained.
- Another large open space is proposed in the south east corner of the site, part-enclosed and overlooked by the apartment buildings. This space is contiguous with the large area of zoned public open space extending to the east into the Maglin lands.
- A variety of SUDS features are proposed throughout the scheme, including rain gardens, infiltration basins, filter drains and green roofs on the apartment blocks.
- Many of the internal roads feature street trees on one or both sides, and numerous trees are proposed in the open spaces. Of 54 no. existing trees identified on the site (in the hedgerows), 37 no. would be retained and 17 no. removed. 778 no. new trees are proposed along the streets and greenways and in the open spaces of the new neighbourhood. There would therefore be a net increase of 761 no. trees on the site

Planting schemes designed to support native pollinators and promote year-round ecological health.

Figure 3.32 Proposed tree removal and new tree planting

3.13 Visual Impact Assessment

Based on the analysis of the receiving environment in Section 3.6, the key potential receptors of change are as follows:

- The users of Greenfields Road, approaching the site from the west and east, and passing along the site frontage.
- The residents of the existing houses along Greenfields Road.
- The residents of the four houses along the lane to the west of the site. (This lane is a cul-de-sac so there are no users of the road other than the residents.)
- The greenfield - but zoned – lands of South Ballincollig, including (a) the residential zoned area to the south of the site, and (b) the zoned public open space to the east, which includes Ballincollig Castle.
- The users of the N22 Ballincollig Bypass, which passes to the south of the site.

12 no. viewpoints were selected to assess the visual impacts on these receptors.

The viewpoints are individually assessed below. For the methodology, terms and criteria used in the assessment refer to Section 3.4 above.

Figure 3.33 Viewpoints for visual impact assessment

The assessments should be read in conjunction with the verified photomontages. These are included below, and also in A3 format at the end of this Chapter.

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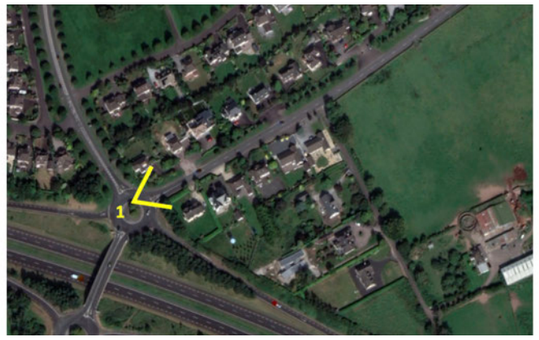
3.13.1 Viewpoint 1 – Roundabout at Western End of Greenfields Road

3.13.1.1 Existing View

The view is taken from the roundabout at the western end of Greenfields/ Woodberry Road. Traffic from the N22 Ballincollig Bypass is channeled into Ballincollig via this roundabout. It is thus a gateway to the town.

The road corridor in view is suburban in character, the road flanked by wide green verges and the houses set back behind boundary walls and well vegetated gardens.

The site is to the right at the end of the block. The absence of built form on the site allows a view of the distant urban area (including a church) and a hill beyond the town.



Viewpoint sensitivity: Medium. The vegetation in the view adds some visual amenity, but for a 'gateway view' to the urban area there is a lack of built form and legibility. There is capacity for change in the view.

3.13.1.2 Proposed View

Two terraces of three storey duplex units are visible along the road corridor to the east, in the middle distance. The buildings have an urban typology and their positioning close to the street creates urban-type streetscape enclosure.

The end units of the terraces are accented by their roofs being turned perpendicular. This marks nodes (junctions and entrances) along the street and adds visual interest to the roofscape.

Magnitude of change: Low-Medium. The buildings are a notable addition to the view and their deviation from the existing suburban development typology causes a slight change in character along the road.

3.13.1.3 Significance and Quality of Effect

Slight neutral. The shift in character along Greenfields Road – from suburban towards a more urban condition - is appropriate to the road's status in the urban structure.

While avoiding a pronounced transition in typology and scale, the development represents and indicates an intensification of use towards the east (towards the town centre). Three storeys can be considered modest for the location, and the measures taken to reduce the massing (steps in building line, roof design, variations in material) are successful.

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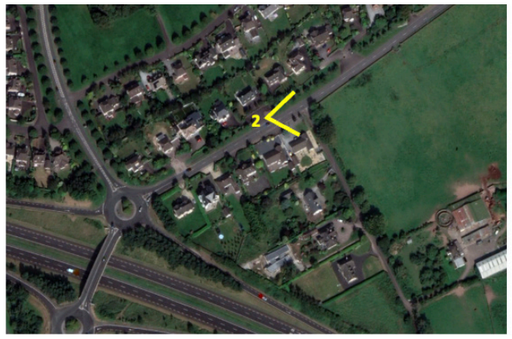
3.13.2 Viewpoint 2 – Greenfields Road Approaching Site from West

3.13.2.1 Existing View

This view was included to show (a) the proposed development's relationship to the nearest house across the lane to the west, and (b) the variation in design response to the two roads to north and west of the site.



The house to the right is set back from the road behind a spacious front garden.

The stone wall on the site boundary to Greenfields Road is prominent, as are the mature trees in the hedgerow along the western boundary.

There is a notable lack of built form in the view. This allows a view over the site of the distant hill beyond the town. The town centre itself is just discernible on lower lying land between the site and the distant hill.

Viewpoint sensitivity: Medium. The openness of the view from the unenclosed hilltop location is attractive, but for a road in an urban area the absence of built form/enclosure is unsustainable. It must be recognised that the area in view is zoned for urban development, and part an area designated for 'consolidation and expansion of Cork City' in the CCDP. There is capacity for change in the view.

3.13.2.2 Proposed View

The two duplex terraces are a prominent addition to the view. The three storey buildings address the street and create enclosure, but are sufficiently set back to avoid excessive enclosure of the street.

Steps in the building line, projecting porches of different brick and the perpendicular roofs of the end units articulate the built form. The floor and roof levels reflect the falling topography along the site frontage.

The view shows the wide separation distance between the western end of the terrace and the nearest house to the west. There would be no crowding of the smaller house by the larger building. The retention of the western boundary hedgerow and trees contributes to this, the trees functioning as an effective visual buffer even in winter.

Magnitude of change: Medium. The buildings are a prominent addition to the view and their deviation from the existing suburban development typology and architecture causes a change in character along the road.

3.13.2.3 Significance and Quality of Effect

Moderate positive. The shift in character in Greenfields Road – from suburban to a more urban condition - is appropriate for the location and the road's status in the urban structure, which would be strengthened. The view shows that the three storey buildings can be comfortably accommodated with no sense of excessive scale or enclosure, and no negative effect on the nearest house to the west (or the houses across the street to the north, which benefit from greater separation distance).

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3.13.3 Viewpoint 3 – Greenfields Road Opposite Site - A

3.13.3.1 Existing View

The view represents the residential properties on the north side of Greenfields Road, opposite the site. The houses have large, mature gardens, which provide separation and screening from the site, but the occupants of the houses experience this view when leaving their property.

On the near side of the road is a wide green verge with a double row of trees. On the far side is a stone wall on the site boundary. The wall hides the fields from view but the tall trees in the internal hedgerows protrude.

In the distance are the rural hills south of Ballincollig, forming an undulating, green horizon.

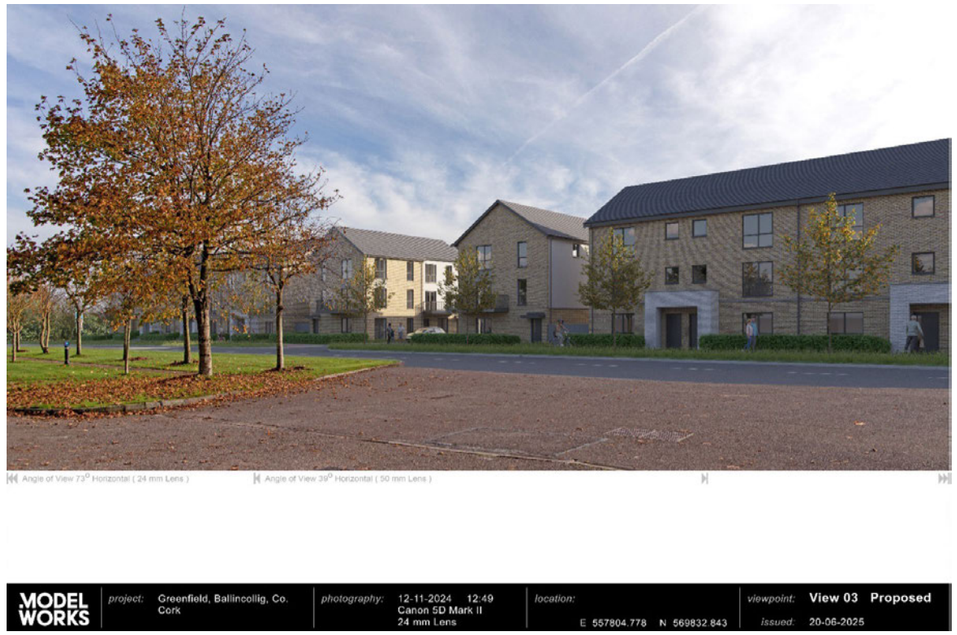
Viewpoint sensitivity: Medium. The view is of high amenity value due largely to the site's agricultural use. The absence of built form on the site provides a panoramic view of the distant hills. It must be recognised that the site is zoned for urban development, and forms part of a 'strategic area' designated for 'consolidation and expansion of Cork City'. In this urban context there is some tolerance for change in the view.

3.13.3.2 Proposed View

The open vista of agricultural land is replaced by a new residential neighbourhood comprised of three storey brick buildings with pitched roofs, enclosing the view.

Duplex terraces front the road, with similar blocks turned perpendicular to frame an entrance to the neighbourhood. This arrangement breaks down the massing and adds interest to the roofscape. The facades are articulated by large windows, projecting balconies and porches of different brick colour.

The buildings are set back sufficiently from the road to avoid excessive street enclosure. (The houses represented by the viewpoint are themselves set back from the camera position behind deep, well vegetated gardens. The development would be less prominent in views from the houses.)



Magnitude of change: High. The composition and character of the view would be fundamentally altered.

3.13.3.3 Significance and Quality of Effect

Moderate negative. The loss of an open vista of rolling, greenfield land, and its replacement with a residential estate enclosing the view, would have a negative effect on visual amenity. The existing Greenfields Road houses, which currently are at the urban edge, would be incorporated into the expanded urban area. While there would be a loss of visual amenity, (a) the change is not inappropriate given the land's zoning and 'strategic site' designation in the CCDP, and (b) the resulting view would not be unsightly. The buildings are modestly scaled and of high quality design and materials, creating an attractive new street elevation.

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3.13.4 Viewpoint 4 – Greenfields Road Opposite Site - B

3.13.4.1 Existing View

This view is taken from further east along Greenfields Road. The view is similar to that at Viewpoint 3.

On the far side of the road is the stone wall on the site boundary. The field can just be seen over the wall, with internal boundary hedgerows to both sides. A neighbouring house can be seen through the hedgerow to the right.

In the distance are the rural hills south of Ballincollig, forming an undulating, green horizon.

Viewpoint sensitivity: Medium. The view is of high amenity value due to the site's agricultural use. The absence of built form provides a panoramic view over the foreground fields towards the distant hills. It must be recognised that the site is zoned for urban development, and forms part of a 'strategic area' designated for 'consolidation and expansion of Cork City'. In this urban context there is some tolerance for change in the view.

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 12:29 Canon 5D Mark II 24 mm Lens | location: E 557987.138 N 569955.443 | viewpoint: View 04 Existing | issued: 20-06-2025

3.13.4.2 Proposed View

A three storey duplex terrace across the road partially closes the vista. The building is set well back, thus avoiding excessive enclosure or overbearance. The end of terrace unit is accented by its perpendicular roof, so that a peaked gable is presented to the road, marking an entrance to the neighbourhood (similar to View 3). The floor and roof levels are stepped to reflect the natural topography.

The facades are of yellow buff brick, articulated by projecting porches of different colour, and large windows. The articulated form and facades break down the massing into smaller visual units.

A landscape and circulation corridor traverses the site to the right of the terrace, with the boundary hedgerow retained. This space buffers the neighbouring house from the new buildings.

Magnitude of change: High. The composition and character of the view would be fundamentally altered.

3.13.4.3 Significance and Quality of Effect

Moderate negative. The replacement of an open vista of rolling pastoral land with buildings fronting the road would have a negative effect on visual amenity. The existing Greenfields Road houses, which currently are at the urban edge, would be incorporated into the expanded urban area. While there would be a loss of visual amenity, (a) the change is not inappropriate given the land's zoning and 'strategic site' designation in the CCDP, and (b) the resulting view would not be unsightly. The buildings are modestly scaled and of high quality design and materials, creating an attractive new street elevation.

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 12:29 Canon 5D Mark II 24 mm Lens | location: E 557987.138 N 569955.443 | viewpoint: View 04 Proposed | issued: 20-06-2025

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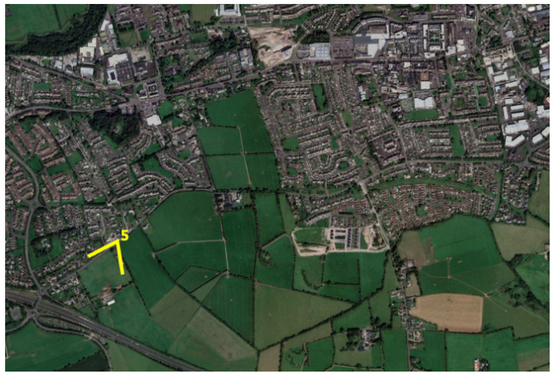
3.13.5 Viewpoint 5 – Greenfields Road Approaching Site from East

3.13.5.1 Existing View

The view is taken from Greenfields Road approaching the site from the east (from the town centre). The road currently forms the edge of the urban area locally, with mixed housing on the north side and mostly agricultural land (with dispersed one-off houses) south of the road. The lands south of the road, inside the bypass, are zoned for urban expansion.

To the right are houses of various types set back varying distance from the road. In the foreground to the left is a single house outside the site's east boundary. The site is hidden from view by hedgerows on the roadside and east boundaries.



Viewpoint sensitivity: Medium. Along this stretch the road corridor has a mix of suburban and rural character. However, the aerial photograph shows the urban context, and all the remaining greenfield lands inside the bypass are zoned for urban expansion. In this context there is capacity for change.

3.13.5.2 Proposed View

Three storey duplex terraces line the road along the site frontage and turn the corner into the new neighbourhood at a new junction in the road. The end of terrace units are accented by perpendicular roofs, so that peaked gables present to the road, marking the entrances to the neighbourhood.

The facades are of yellow buff brick, articulated by porches of different colour and large windows. The floor and roof levels are stepped, reflecting the natural topography. The stepped form and articulated facades break down the massing and give the development a fine texture, easing its integration into the landscape.

The view shows the wide separation distances between the new buildings and the nearest houses to the east and north. As a result the transition in typology and scale is not excessively pronounced. The retained hedgerow on the east boundary functions as a visual buffer for the house to the east.

Magnitude of change: Medium. The new buildings and adjusted streetscape cause a shift in character towards a more urban condition.

3.13.5.3 Significance and Quality of Effect

Moderate positive. Despite the difference in typology from the existing elements in the view, the development would take its place comfortably in the expanded and evolved urban landscape. The buildings are modestly scaled and of high quality design and materials, creating an attractive new street elevation.

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3.13.6 Viewpoint 6 – Greenfields Road Opposite NE Corner of Site

3.13.6.1 Existing View

The view is included to show the proposed new junction on Greenfields Road, where a new distributor road will enter and traverse the site to give access to the South Ballincollig/Maglin lands.

The view south from the road (and the houses on the north side) is partially blocked by an untidy hedgerow on the site boundary. The distant hills south of Ballincollig are visible to the right through the bare tree canopies of the site's internal hedgerows.

Viewpoint sensitivity: Medium. Similar to View 5, the road corridor has a mix of suburban and rural character. However, the aerial photograph (see View 5) shows the urban context. All the greenfield lands inside the Ballincollig Bypass are zoned for urban expansion. In this context there is capacity for change.

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 12:22 Canon 5D Mark II 24 mm Lens | location: E 558081.440 N 570029.585 | viewpoint: View 06 Existing | issued: 20-06-2025

3.13.6.2 Proposed View

In the foreground the road is widened and a new junction introduced, with the tree-lined distributor road (giving access to the South Ballincollig/Maglin lands) running inside site's east boundary. The east boundary hedgerow (marking the Greenfield townland boundary) is retained.

Both Greenfields Road and the new road are fronted by three storey duplex terraces. The end-of-terrace units are turned perpendicular so that the built form/frontage turns the corner, giving accent to the junction and avoiding any blank gables.

The perimeter block arrangement of built form establishes a legible urban structure on the previously greenfield site.

The building facades are of yellow buff brick, articulated by porches of different colour and large windows. The floor and roof levels are stepped to reflect the natural topography. The stepped form, accented corner units and articulated facades break down the massing and add visual interest to the composition.

Magnitude of change: High. The composition and character of the view would be fundamentally altered.

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 12:22 Canon 5D Mark II 24 mm Lens | location: E 558081.440 N 570029.585 | viewpoint: View 06 Proposed | issued: 02-07-2025

3.13.6.3 Significance and Quality of Effect

Moderate positive. The landscape would be transformed, with the seemingly rural road changed to an urban street fronted by residential buildings of urban typology and architecture. While the view would be thoroughly changed, (a) the change is planned and not inappropriate in the location, (b) certain valued landscape features (e.g. the townland boundary hedgerow) would be retained, and (c) there is a coherence to the composition and the buildings, landscape and streetscapes are of high design and material quality.

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3.13.7 Viewpoint 7 – Lane to West of Site - A

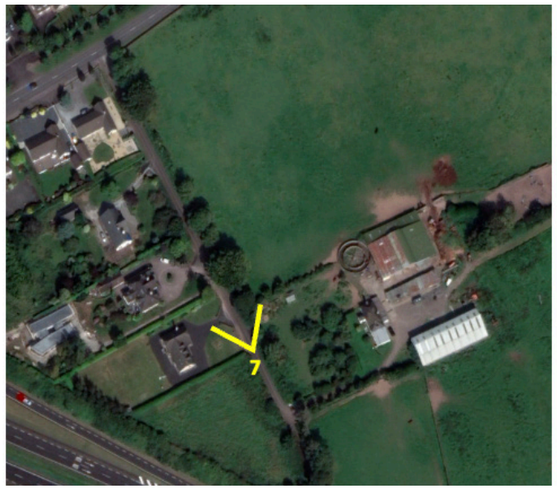
3.13.7.1 Existing View

The view is included to assess the impact on the existing houses across the lane to the west of the site. The lane ends in a cul-de-sac against the bypass to the south. Therefore it carries no traffic other than the occupants of the houses on the lane.

Three houses face the site across the lane. The houses are set well back from the lane in large gardens.

The site is to the right, with a hedgerow featuring several large trees on the boundary.

Viewpoint sensitivity: Medium. The lane has a mix of suburban and rural character, and the houses enjoy a high level of visual amenity due in part to the site's greenfield condition. However, the area falls within the Ballincollig settlement boundary and the site is zoned for residential development. In this context there is capacity for change.



MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 13:11 Canon 5D Mark II 24 mm Lens | location: E 557848.469 N 569637.684 | viewpoint: View 07 Existing | issued: 20-06-2025

3.13.7.2 Proposed View

The site boundary hedgerow is retained and supplemented with additional multi-layer planting inside the boundary, to form a landscape/biodiversity corridor up to 15m wide, with parallel pedestrian and cycleway. The nearest proposed houses inside the west boundary are set back 25m from the lane.

Magnitude of change: Low. The buildings in the western part of the site may be discernible (although heavily filtered by vegetation) for much of the length of the lane (and from the houses west of the lane).

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 13:11 Canon 5D Mark II 24 mm Lens | location: E 557848.469 N 569637.684 | viewpoint: View 07 Proposed | issued: 20-06-2025

3.13.7.3 Significance and Quality of Effect

Slight neutral. The site's residential land use objective would be realised with no negative effect on the lane or the houses to the west. The retained hedgerow and trees on the site boundary would be supplemented to form a wide landscape/ biodiversity corridor across the lane from the houses.

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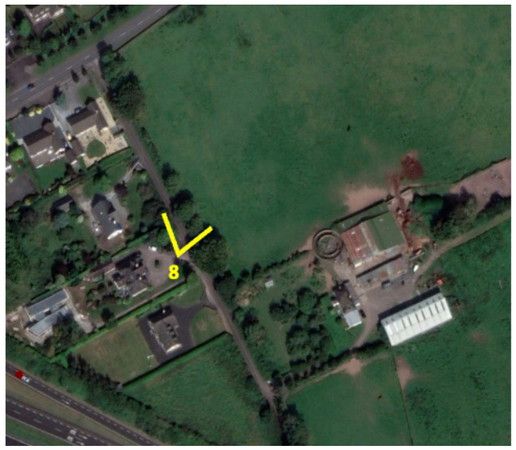
3.13.8 Viewpoint 8 – Lane to West of Site - B

3.13.8.1 Existing View

This view is taken from the driveway entrance of the middle of the three houses across the lane from the site. The site boundary hedgerow across the lane features several mature trees.

The existing houses on the north side of Greenfields Road are just visible to the left over the hedgerow.

Viewpoint sensitivity: Medium. The lane has a mix of suburban and rural character (the west side, from where the view is taken, being distinctly suburban). The houses enjoy a high level of visual amenity due in part to the site's greenfield condition. However, the area falls within the Ballincollig settlement boundary (the N22 is 100m to the south) and the site is zoned for residential development. In this context there is capacity for change.



MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 13:05 Canon 5D Mark II 24 mm Lens | location: E 557822.560 N 569677.601 | viewpoint: View 08 Existing | issued: 20-06-2025

3.13.8.2 Proposed View

The site boundary hedgerow is retained and supplemented by multi-layer planting inside the boundary, to form a landscape/biodiversity corridor up to 15m wide.

The nearest houses inside the west boundary are set back 25m from the lane. In winter (with the deciduous trees out of leaf), the houses are visible through the belt of vegetation, stepping down the slope (thus reflecting the natural topography). The houses have a traditional form and palette of materials.

Magnitude of change: Medium. Although not prominent (due to their setback and vegetation screening), the introduction of the houses to the view causes a shift in character towards a suburban condition.

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 13:05 Canon 5D Mark II 24 mm Lens | location: E 557822.560 N 569677.601 | viewpoint: View 08 Proposed | issued: 20-06-2025

3.13.8.3 Significance and Quality of Effect

Moderate positive. The site's residential land use objective would be realised with no negative effect on the houses to the west. The combination of the new houses set well back from the boundary/lane, the retained hedgerow and trees and the additional planting inside the boundary, would result in a particularly attractive composition.

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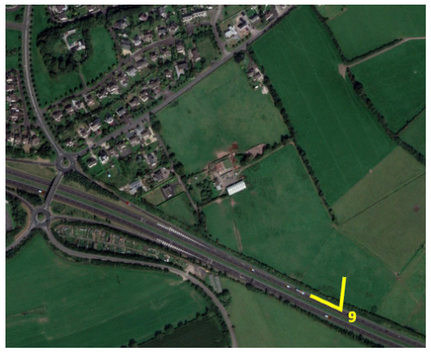
3.13.9 Viewpoint 9 – N22 Ballincollig Bypass

3.13.9.1 Existing View



The view is taken from the bypass as it passes to the south of the site, approaching the offramp that gives access to the western part of Ballincollig.

Belts of vegetation on the motorway embankments enclose the view, but in winter the urban area to the north can occasionally be glimpsed through the vegetation.

Viewpoint sensitivity: Low. Motorway users are of low sensitivity to change due to their speed of travel and the wide range of landscape and development types to which they are exposed, particularly passing urban areas such as this location.

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 14:09 Canon 5D Mark II 24 mm Lens | location: E 558151.308 N 569371.108 | viewpoint: View 09 Existing | issued: 20-06-2025

3.13.9.2 Proposed View

Magnitude of change: Negligible. In winter, the roofs of the houses and upper floors of the apartment blocks would just discernible through the roadside vegetation. In summer the development would not be visible.

3.13.9.3 Significance and Quality of Effect

Not significant neutral. There would be no significant change to the composition or character of the view, and no effect on the visual amenity of the motorway corridor.

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 12-11-2024 14:09 Canon 5D Mark II 24 mm Lens | location: E 558151.308 N 569371.108 | viewpoint: View 09 Proposed | issued: 20-06-2025

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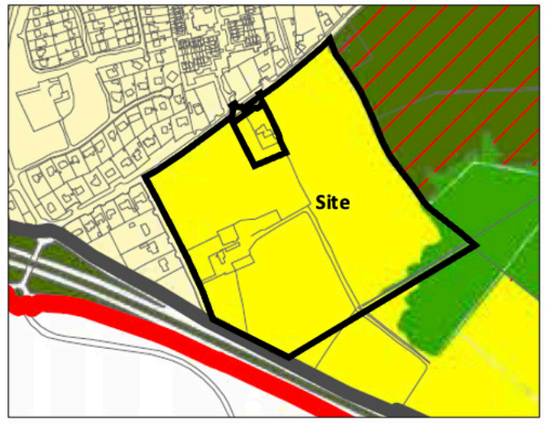
3.13.10 Viewpoint 10 – Southern Site Boundary

3.13.10.1 Existing View

This viewpoint represents the lands zoned for open space and residential development to the south and east of the site.

The hedgerow on the Greenfield townland boundary (and the site's east boundary) is to the right. The houses on the north side of Greenfields Road can be seen in the distance beyond the site, which rises up the hill.

Viewpoint sensitivity: Low. These lands are in private ownership and not accessible to the public, and are zoned for development as part of a 'strategic site for consolidation and expansion of Cork city' in the CCDP.



3.13.10.2 Proposed View

The boundary hedgerow to the right is retained, enclosing the new neighbourhood. A new road runs inside this boundary (giving access to the wider South Ballincollig/Maglin landbank). The road corridor is generously wide, with rows of trees in green verges and segregated pedestrian and cycle paths on both sides.

In the foreground to the left is an open space enclosed on two siders by four storey apartment buildings. Lower density housing and the creche can be seen in the gap between the two blocks. To the right the apartment building extends up the road before the built form steps down to duplex terraces as the road curves up towards Greenfields Road.

The proposed shop can be seen in the ground floor of the building fronting the road and the open space.

Magnitude of change: High.

3.13.10.3 Significance and Quality of Effect

Moderate positive. There view would be transformed by the introduction of a mixed density neighbourhood with a strong, legible urban structure and buildings and public realm of high quality design and materials. There would be no loss of any valued feature or characteristic of the view.

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3.13.11 Viewpoint 11 – Ballincollig Castle, Base of Tower

3.13.11.1 Existing View

Ballincollig Castle lies 400m to the east of the site, surrounded by farmland. The castle includes a tower built on an earth mound with a surrounding walled enclosure. The castle is in private ownership, but being located in an area zoned public open space, it has potential for development as a visitor site.

Views west towards the site from the mound around the tower are blocked by the enclosing wall. However, in pre-planning consultation Cork City Council requested that the view from the base of the castle tower be included in the LVIA. Hence the inclusion of this view.

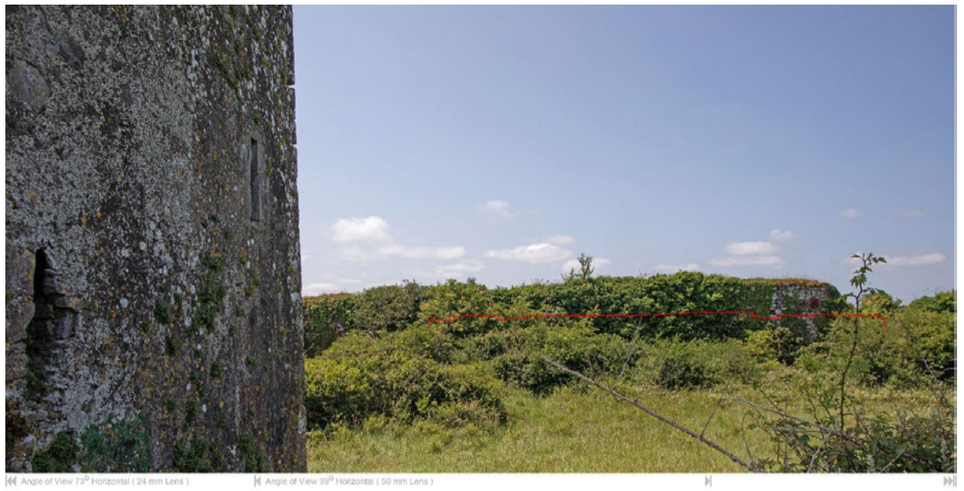
Viewpoint sensitivity: Medium-High. Ballincollig Castle is a valued cultural heritage site and potential visitor attraction. It is thus sensitive to inappropriate change in its environs. However, the castle is located within the settlement boundary of Ballingcollig, close to the existing urban area. It falls within the Ballincollig South/Maglin area designated as a 'strategic site' for consolidation and expansion of Cork city. This context requires a degree of tolerance for change in the castle's landscape context and views from the castle environs.

3.13.11.2 Proposed View

Magnitude of change: None. The development would be screened by the enclosing wall of the castle.

3.13.11.3 Significance and Quality of Effect

No effect.



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3.13.12 Viewpoint 12 – Ballincollig Castle Environs

3.13.12.1 Existing View

Ballincollig Castle lies 400m to the east of the site, surrounded by farmland. The castle includes a tower built on an earth mound with a surrounding walled enclosure. The castle is in private ownership, but being located in an area zoned public open space, it has potential for development as a visitor site.

Views west towards the site from the mound around the tower are blocked by the enclosing wall (see figure 14.15 and Viewpoint 11 above).

Views towards the site are afforded from outside the enclosing wall, although a hedgerow in the foreground filters the view. View 12 is one of these views.

Viewpoint sensitivity: Medium-High. Ballincollig Castle is a valued cultural heritage site and potential visitor attraction. It is thus sensitive to inappropriate change in its environs. However, the castle is located within the settlement boundary of Ballingcollig, close to the existing urban area. It falls within the Ballincollig South/Maglin area designated as a 'strategic site' for consolidation and expansion of Cork city. This context requires a degree of tolerance for change in the castle's landscape context and views from the castle environs.

3.13.12.2 Proposed View

In spring and summer the hedgerow in the foreground will block the view towards the site. In winter the roofs of the proposed development may just be discernible in the distance, protruding above the hedgerow on the site's east boundary, which will be retained.

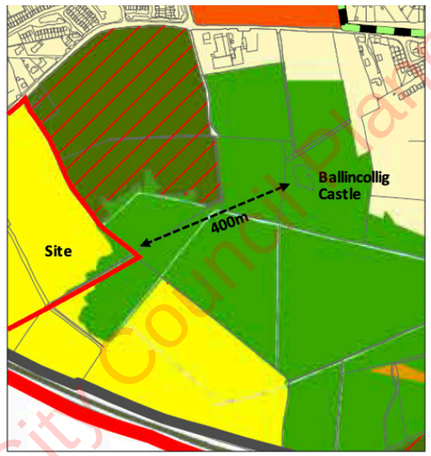
Magnitude of change: Negligible.

3.13.12.3 Significance and Quality of Effect

Not significant neutral. At a distance of 400m and screened/filtered by multiple hedgerows in the intervening landscape, the development would have no significant effect on the view.

There is already development closer to the castle in other directions (east). Its landscape context is already at least partially urban in character.

The open space zoning of the fields immediately surrounding the castle (including the field behind the hedgerow in View 12) will prevent excessive encroachment of the urban area on the castle.



MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 28-01-2025 15:06 Canon 5D Mark II 24 mm Lens | location: E 558672.264 N 569842.217 | viewpoint: View 12 Existing | issued: 20-06-2025

MODEL WORKS | project: Greenfield, Ballincollig, Co. Cork | photography: 28-01-2025 15:06 Canon 5D Mark II 24 mm Lens | location: E 558672.264 N 569842.217 | viewpoint: View 12 Proposed | issued: 20-06-2025

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3.14 Summary of Visual Impact Assessment

The potential visual impacts on the 12 no. representative viewpoints are summarised in the table below. The assessment includes both the construction and operation phases of the proposed development.

Table 3.7 Summary of Visual Impact Assessment

No.	Viewpoint Location	Viewpoint Sensitivity	Magnitude of Change		Significance of Visual Effects	
			Construction (temporary)	Operation (long term)	Construction (temporary)	Operation (long term)
1	Roundabout at western end of Greenfields Road	Medium	Low	Medium	Not significant negative	Slight neutral
2	Greenfields Road approaching site from west	Medium	Medium	Medium	Slight negative	Moderate positive
3	Greenfields Road opposite site - A	Medium	High	High	Slight negative	Moderate negative
4	Greenfields Road opposite site - B	Medium	High	High	Slight negative	Moderate negative
5	Greenfields Road approaching site from east	Medium	Medium	Medium	Slight negative	Moderate positive
6	Greenfields Road opposite NE corner of site	Medium	High	High	Slight negative	Moderate positive
7	Lane to west of site – A	Medium	Low	Low	Slight neutral	Slight neutral
8	Lane to west of site - B	Medium	Medium	Medium	Slight negative	Moderate positive
9	N22 Ballincollig Bypass	Low	Negligible	Negligible	Not significant neutral	Not significant neutral
10	Southern site boundary	Low	High	High	Slight negative	Moderate positive
11	Ballincollig Castle, base of tower	Medium-High	None	None	No effect	No effect
12	Ballincollig Castle environs	Medium-High	Negligible	Negligible	Not significant neutral	Not significant neutral

3.14.1 Landscape Impact Assessment

3.14.1.1 Landscape Sensitivity

The sensitivity of the landscape is a function of its character, which may be determined by its land use pattern, field pattern or urban grain, building typologies and architecture, cultural and natural heritage elements (including topography, vegetation and drainage features) and the quality of the public realm. These factors determine the value that is placed on the landscape. The policy pertaining to the area (e.g. the land use zoning), and any related trend of change, are also taken into account. Finally, the nature and scale of the proposed development are considered since a particular landscape can have varying sensitivity to different development types.

It is important to recognise that the classification of landscape sensitivity applies to the receiving environment, not just to the site itself.

Based on the analysis of the receiving environment and relevant policy, **the landscape sensitivity of the receiving environment can be classified 'medium'** (definition: *Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The landscape character is such that there is some capacity for change. These areas may be recognised in policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change*).

The medium sensitivity classification is based on the following factors:

- The site is currently in agricultural use but is located within the settlement boundary of Ballincollig, inside the N22 Bypass, adjacent to the existing urban area. There is an ongoing, plan-led southern expansion of the town into the South Ballincollig/Maglin lands, which are one of seven 'strategic areas for consolidation and expansion of Cork City' identified in the CCDP.
- The site (apart from a small are in the south east corner) is zoned ZO 2 'New Residential Neighbourhoods'. The CCDP objective for these areas is to *"provide an appropriate mix of housing types and tenures along with the amenity, social, community and physical infrastructure required to promote compact growth, balanced communities and sustainable, liveable communities"*.
- While the site itself is greenfield and its immediate landscape context is part-greenfield, part-urban, in terms of landscape character its receiving environment is the urban area of Ballincollig (see Figure 3.2).
- There are existing houses to the north of the site across Greenfields Road and to the west across the lane that `terminates in a cul-de-sac beside the N22. The development pattern in these adjacent areas is distinctly suburban, the landscape characterised by detached houses in large, mature gardens. Residential receptors such as these houses are sensitive to landscape and visual change – although the urban location/context must be recognised.
- The hedgerows on the site are valuable landscape features locally. They give structure to the landscape, provide visual amenity and (potentially) screening, and form part of the local ecological/green infrastructure network.
- Ballincollig Castle lies 400m to the east of the site. The Norman castle is of significant cultural heritage value, and it features prominently in views across the landscape of south Ballincollig. With the ongoing southward expansion of the town the castle's landscape context is increasingly urban. However, it is protected from being subsumed into the urban area by open space zoning to all sides. Being 400m from the castle (and outside of the castle's surrounding open space zone), the site's development has limited potential to cause significant impact on the castle.

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3.14.2 Magnitude of Lanscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape by a development, with reference to its key elements, features and characteristics.

The magnitude of landscape change that would result from the proposed development can be classified 'medium' (definition: *Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, 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.*).

The medium sensitivity classification is based on the following factors:

- With a site area of 15.4ha and comprising. 544 no. residential units, the proposed development is of substantial scale/ spatial extent. Considered at the 'local scale', it would constitute a significant expansion of the urban area – particularly as it would cross Greenfields Road (incorporating the road into the urban area) and extend to the N22 Bypass.
- However, at the 'landscape scale' (i.e. considered in the context of its wider receiving environment, the urban area of Ballincollig), the landscape change would be moderate and in keeping with an ongoing, plan-led urban expansion into the South Ballincollig/Maglin lands.

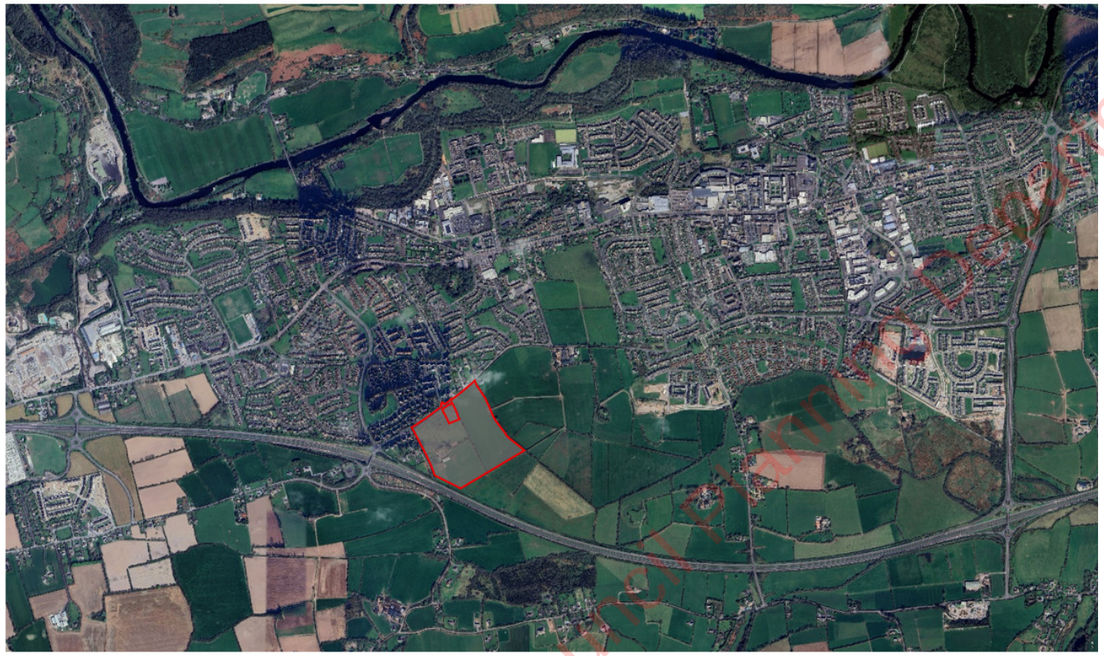

Figure 3.34 Spatial extent of the proposed development in the context of the Ballincollig urban area

- The proposal includes a range of residential building types, including semi-detached houses and townhouses, duplex terraces and four storey apartment buildings. This would diversify the housing/building typologies in the landscape locally – but is in keeping with the trend of urban consolidation and densification in Ballincollig and Cork City generally.
- The visual impact assessment reveals that the magnitude of visual (and landscape) change would be highest on Greenfields Road as it approaches and passes by the site. The road, which currently runs along the edge of the urban area (locally), would be incorporated into the urban area, and the character of the road corridor would shift from suburban/rural to urban.
- Outside of its immediate environs (the Greenfields Road corridor specifically), the development's visual and landscape impacts would be relatively minor. The lane and houses adjacent to the west would experience limited change due to the responsive design, which includes retention of the boundary hedgerow and trees. Importantly, the proposed development would have negligible impact on Ballincollig Castle.

3.14.3 Significance and Quality Landscape Impact

Measuring the magnitude of change against the sensitivity of the receiving environment, **the significance of the landscape impact would be 'moderate'** (EPA definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*).

This is a reasonable assessment outcome. The urban area would be expanded locally, and the housing/building typologies diversified with an associated increase in density. This would cause a shift in character towards a more urban condition, particularly along Greenfields Road, but this shift would be consistent with the existing, plan-led trend of change in south Ballincollig.

The key consideration is whether the effects would be positive, neutral or negative. In this regard:

- The key landscape assets of the site – the external and internal boundary hedgerows - would be largely retained and would form the framework of the open space network, circulation network and block structure of the new neighbourhood. The new urban grain would thus reflect the historic field pattern of the site.
- The ecological and visual functions (amenity and screening) of the hedgerows would be maintained and in places enhanced, most notably on the west boundary where the hedgerow and trees would be incorporated into a densely planted open space corridor up to 15 m wide.
- Of 54 no. existing trees identified on the site (in the hedgerows), 37 no. would be retained and 17 no. removed. 778 no. new trees are proposed along the streets and greenways and in the open spaces of the new neighbourhood. There would therefore be a net increase of 761 no. trees on the site.
- A variety of SUDS features are proposed as part of the development, including rain gardens, infiltration basins, filter drains and green roofs on the apartment blocks.
- The proposed built form (the building typologies, scale and architecture) demonstrably responds to the varying conditions and sensitivities around the site:
- In response to the lane and houses to the west, traditional two storey houses are proposed, set well back (25m) from the lane behind a wide, densely planted open space corridor and greenway. There would thus be a soft transition along this boundary.
- In contrast, along Greenfields Road, three storey duplex terraces are proposed. These are a distinctly urban housing/ building typology, but of modest height. They would generate urban character along the road – appropriate to its status and function in the urban structure – without causing excessive built/visual enclosure. Street trees and hedging to the front gardens are proposed to soften the built frontage.

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- Along the 'Maglin Sustainable Access Corridor' inside the east boundary, a mix of duplex terraces and four storey apartment blocks is proposed. The buildings would generate urban character and strengthen the new urban structure - with the apartments in the south east corner of the site identifying the mixed use core of the new neighbourhood. These buildings would enclose an open space that is contiguous with the large area of zoned open space extending to the east. The upper floors of the apartment and duplex buildings fronting the new road would benefit from views east, over the retained Greenfield townland boundary hedgerow towards Ballincollig Castle some 450m distant.
- The varying design response to the context results in variations in character across the scheme. This variety would be reinforced by the detail design of the buildings, creating sub-neighbourhoods/character areas of distinct identity – but with a unified design theme. The verified photomontages and CGIs illustrate that the high quality of design and the high quality materials proposed.

In conclusion, while the site would be transformed and the landscape character of the receiving environment altered (towards a consolidated, urban condition), the overall landscape impact can be classified positive. The land use objective for the site would be realised and the urban area expanded in accordance with the CCDP policy for the South Ballincollig/Maglin area. The proposed development would result in an attractive new neighbourhood that retains the historic field pattern in its urban structure, retains and enhances the site's main landscape assets (the hedgerows), and provides a mix of housing along with amenity, community and physical infrastructure.

3.14.4 Construction Phase Impacts

Over the course of the estimated 96 month construction period, the site and immediate environs would be disturbed by construction activities including the erection of site hoarding, site clearance and levelling, haulage and storage of materials, general construction activity and the incremental growth of buildings on site. The magnitude of landscape change would be greatest in the immediate environs (e.g. the adjacent roads and nearby houses), reducing with distance from the site.

Construction is inherently and unavoidably disturbing of the landscape, and unsightly. Therefore the landscaped and visual impacts during construction would be negative. However, the impacts would be temporary.

3.14.5 Do Nothing Impacts

The site would remain in agricultural use and the CCDP's residential land use objective for the land would be unrealised. The site would not contribute to the ongoing, plan-led change in the landscape character of the area, from previously suburban/rural to a contemporary urban, mixed residential neighbourhood.

3.15 Avoidance, Remedial and Mitigation Measures

3.15.1 Operation Phase

The potential overall landscape impact of the proposed development has been classified 'moderate positive'.

The potential visual impacts have mostly been classified neutral or positive (see Table 6.1 above) – apart from the impacts on two viewpoints representing the houses on the north side of Greenfields Road opposite the site (Viewpoints 3 and 4). The views from these properties are currently of a rolling pastoral landscape, with the hills south of Ballincollig forming the horizon. The new duplex buildings fronting Greenfields Road would block this view and change the character of the road to an urban street. The houses north of the road would thus experience a loss in visual amenity, but the change is not inappropriate and the new buildings and public realm would themselves be of high design and material quality.

Therefore, no mitigation measures for landscape or visual impacts are required.

3.15.2 Construction Phase

The negative landscape and visual impacts of construction are an unavoidable consequence of development and there is limited potential for mitigation. Site hoarding would screen ground level activity, (low) stockpiles, vehicles, etc. but once the buildings grow above ground floor level they would be visible above the hoarding, as would cranes, scaffolding and construction activity on the buildings themselves. No landscape or visual-specific mitigation is recommended other than standard best practice construction site management, which should include the erection and maintenance of hoarding on the site boundaries.

The above assumes that the hedgerow and tree protection measures recommended in the Tree Survey by County Tree Care Ltd (Appendix 3.1) would be fully implemented. The retention of the hedgerows and certain trees on the site is an important part of the proposed development, and any loss of this vegetation would constitute a negative landscape impact.

3.15.3 Monitoring

No monitoring of landscape or visual impacts is required.

3.15.4 Reinstatement

No reinstatement is required assuming the development would be carried out and completed in accordance with the plans.

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3.16 Interactions

Population and Human Health. The proposed development would deliver a large new residential neighbourhood providing a mix of housing along with amenity, community and physical infrastructure - as well as access to the facilities, services and amenities provided by the self-sustaining town of Ballincollig. The related change to landscape character, i.e. the planned expansion and consolidation of the urban area, would have significant positive population and human health benefits (by providing homes offering a high level of residential amenities).

Biodiversity. The proposed development would largely retain the site's key landscape elements/features, the hedgerows and hedgerow trees. As well as being of landscape and visual amenity value, these are important habitats, and their retention and protection, along with extensive new planting throughout the new neighbourhood, would have biodiversity benefits.

3.17 Difficulties Encountered in Compiling the LVIA Chapter

No difficulties were encountered in carrying out the assessment.

3.18 References

- Cork City Development Plan 2022-2028, Cork City Council.
- Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA), published by the Landscape Institute.
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022, published by the EPA.
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, 2018, published by the Department of Housing, Planning and Local Government.
- Townscape Character Assessment, Technical Information Note 05/2017, Landscape Institute.
- Tree Survey at Greenfield, Ballincollig, Co. Cork, County Tree Care Ltd, 2025.
- Urban Design Manual – A Best Practice Guide, Department of Environment, Heritage and Local Government, 2009.
- Urban Development and Building Height Guidelines for Planning Authorities, December 2018, Department of Housing, Planning and Local Government.

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Verified Photomontages

Proposed

Greenfield
Ballincollig
Co. Cork

Prepared by Model Works Ltd

June 2025

Cork City Council Planning Department. For Inspection Purposes Only!

VIEW 1

MODEL WORKS

Cork City Council Part 8 Inspection Purposes Only

MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

viewpoint: **View Location Map**

issued: 20-06-2025

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Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 13:39 Canon 5D Mark II 50 mm Lens	*location:*	E 557614.981 N 569703.157	*viewpoint:* **View 01 Existing** *issued:* 20-06-2025

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Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 13:39 Canon 5D Mark II 50 mm Lens	*location:*	E 557614.981 N 569703.157	*viewpoint:* **View 01 Proposed** *issued:* 20-06-2025

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 13:28 Canon 5D Mark II 24 mm Lens	*location:*	E 557744.369 N 569776.927	*viewpoint:* **View 02 Existing** *issued:* 20-06-2025

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Angle of View 73° Horizontal (24 mm Lens) | Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 13:28 Canon 5D Mark II 24 mm Lens	*location:*	E 557744.369 N 569776.927	*viewpoint:* **View 02 Proposed** *issued:* 20-06-2025

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

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.MODEL WORKS	*project:* Greenfield, Ballincollig, Co. Cork	*photography:* 12-11-2024 12:49 Canon 5D Mark II 24 mm Lens	*location:* E 557804.778 N 569832.843	*viewpoint:* **View 03 Existing** *issued:* 20-06-2025	

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

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MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

photography: 12-11-2024 12:49
Canon 5D Mark II
24 mm Lens

location:
E 557804.778 N 569832.843

viewpoint: **View 03 Proposed**

issued: 20-06-2025

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 12:29 Canon 5D Mark II 24 mm Lens	*location:*	E 557987.138 N 569955.443	*viewpoint:* **View 04 Existing** *issued:* 20-06-2025

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Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 12:29 Canon 5D Mark II 24 mm Lens	*location:*	E 557987.138 N 569955.443	*viewpoint:* **View 04 Proposed** *issued:* 20-06-2025

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Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 12:11 Canon 5D Mark II 24 mm Lens	*location:*	E 558103.916 N 570048.036	*viewpoint:* **View 05 Existing** *issued:* 20-06-2025

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Not For Inspection Purposes Only!

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

photography: 12-11-2024 12:11
Canon 5D Mark II
24 mm Lens

location:
E 558103.916 N 570048.036

viewpoint: **View 05 Proposed**

issued: 20-06-2025

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Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

.MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 12:22 Canon 5D Mark II 24 mm Lens	*location:*	E 558081.440 N 570029.585	*viewpoint:* **View 06 Existing** *issued:* 20-06-2025

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project: Greenfield, Ballincollig, Co. Cork

photography: 12-11-2024 12:22
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location:
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viewpoint: **View 06 Proposed**

issued: 02-07-2025

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.MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 13:11 Canon 5D Mark II 24 mm Lens	*location:*	E 557848.469 N 569637.684	*viewpoint:* **View 07 Existing** *issued:* 20-06-2025

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 13:11 Canon 5D Mark II 24 mm Lens	*location:*	E 557848.469 N 569637.684	*viewpoint:* **View 07 Proposed** *issued:* 20-06-2025

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MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

photography: 12-11-2024 13:05
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location:
E 557822.560 N 569677.601

viewpoint: **View 08 Existing**

issued: 20-06-2025

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MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

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viewpoint: **View 08 Proposed**

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 14:09 Canon 5D Mark II 24 mm Lens	*location:*	E 558151.308 N 569371.108	*viewpoint:* **View 09 Existing** *issued:* 20-06-2025

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	12-11-2024 14:09 Canon 5D Mark II 24 mm Lens	*location:*	E 558151.308 N 569371.108	*viewpoint:* **View 09 Proposed** *issued:* 20-06-2025

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MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

photography: 28-01-2025 16:41
Canon 5D Mark II
24 mm Lens

location:
E 558333.390 N 569659.727

viewpoint: **View 10 Existing**

issued: 20-06-2025

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	28-01-2025 16:41 Canon 5D Mark II 24 mm Lens	*location:*	E 558333.390 N 569659.727	*viewpoint:* **View 10 Proposed** *issued:* 08-07-2025

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

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MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

photography: 18-06-2025 13:30
Canon 5D Mark II
24 mm Lens

location:
E 558714.698 N 569859.821

viewpoint: **View 11 Existing**

issued: 20-06-2025

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Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: Greenfield, Ballincollig, Co. Cork

photography: 18-06-2025 13:30
Canon 5D Mark II
24 mm Lens

location:
E 558714.698 N 569859.821

viewpoint: **View 11 Proposed**

issued: 20-06-2025

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	28-01-2025 15:06 Canon 5D Mark II 24 mm Lens	*location:*	E 558672.264 N 569842.217	*viewpoint:* **View 12 Existing** *issued:* 20-06-2025

Angle of View 73° Horizontal (24 mm Lens)

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MODEL WORKS	*project:*	Greenfield, Ballincollig, Co. Cork	*photography:*	28-01-2025 15:06 Canon 5D Mark II 24 mm Lens	*location:*	E 558672.264 N 569842.217	*viewpoint:* **View 12 Proposed** *issued:* 20-06-2025

CHAPTER FOUR

MATERIAL ASSETS – TRAFFIC & TRANSPORTATION

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CHAPTER FOUR

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CHAPTER 4 | Material Assets – Traffic & Transportation

4.1 Introduction

4.1.1 Background

This chapter of the Environmental Impact Assessment Report (EIAR) provides an assessment of the existing environmental setting and the likely significant impacts on the surrounding transport network, associated with the proposed residential development (Greenfields) at lands in Ballincollig, Co. Cork as shown in Figure 4.1. The characteristics of the potential and predicted impacts during the Construction and Operational Phases of the proposed development are assessed and evaluated. Where an impact is identified, appropriate mitigation measures to avoid any identified significant effects to the surrounding transport network are recommended and the residual impacts of the proposed development post-mitigation are assessed. A detailed description of the proposed development is provided in Chapter 2: Project Description & Alternatives.

This assessment was prepared by Kwok Chuen Lam, Chartered Engineer who is a Senior Traffic Engineer with EGIS. Kwok Chuen Lam has 19 years' experience specialising in the field of Traffic and Transport Engineering. He has been engaged as team member on a variety of Transportation and Traffic projects. His experience includes the design and management of road improvement projects, preparation of mobility management plans and traffic impact assessments. This chapter has been reviewed by Tara O'Leary a chartered Transport Planning Professional with over 20 years' experience.

4.1.2 Permission Granted

At the time of writing, three other developments (refer to Figure 4.1) and one creche development in the vicinity of proposed development have obtained planning permission. This TTA assessment has considered those permitted developments, and the description of those permitted developments is listed as follows.

4.1.2.1 Permitted Stonecrest Phase 1 Development

Under planning application with ABP Case Number: ABP-308111-20, permission was granted for construction of 113 no. residential units (comprising of 59 no. houses and 54 no. apartment units) and a 60 pupil creche. As part of the development, the Applicant is carrying out road upgrade works to the adjacent Maglin Road to include dedicated walking and cycling facilities from the proposed entrance to the junction of Maglin Road/Castle Road/Sunningdale. At the time of traffic count surveys on 16th April 2024, 44 houses were occupied, and the remaining 15 houses have since been occupied. Construction has yet to commence on the permitted 59 no. apartments or the creche. The location of permitted Stonecrest Phase 1 development is illustrated in Figure 4.1.

4.1.2.2 Permitted Stonecrest Phase 2 Development

Under planning application with Reference: 23/42446, for which the applicant was Coleman New Homes (Blarney) Limited, permission was granted for construction of 162 no. residential units (comprising of 84 no. houses, and 78 no. apartment and duplex units) in August 2024. It is anticipated that the Stonecrest Phase 2 development will be completed in 2029. The location of permitted Stonecrest/Coleman New Homes (Blarney) Limited Phase 2 development is illustrated in Figure 4.1.

4.1.2.3 Permitted Stonecrest/Coleman New Homes (Blarney) Limited Creche Development

Under planning application Reference 24/43308 Coleman New Homes (Blarney) Limited were granted planning permission for the construction of a new two-storey creche within their overall development site and adjacent to Phase 1. Construction has yet to commence on the permitted creche and it is expected by be completed by 2027.

4.1.2.4 Permitted Heathfield Phase 4 Development

Under planning application with Reference: 2241611, permission was granted for construction of 99 no. residential units (comprising of 75 no. houses, and 24 no. apartment and duplex units) in January 2024. It is anticipated that the Heathfield Phase 4 development will be completed in 2025. The location of permitted Heathfield Phase 4 development is illustrated in Figure 4.1.

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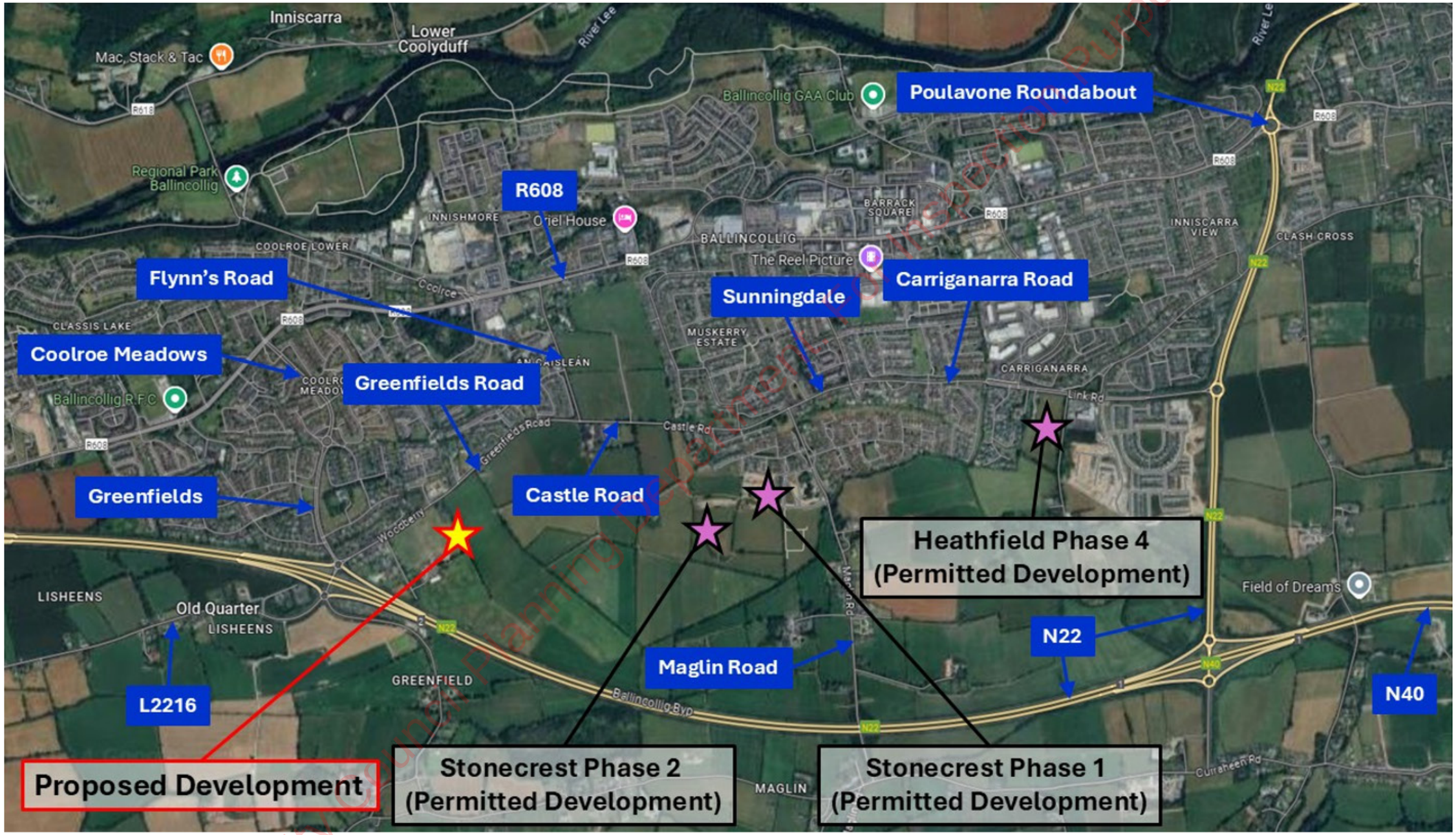

Figure 4.1 Location of the Proposed Development (Source: Google Maps, Annotation by EGIS)

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4.1.3 Consultation and Scoping Study

Initial scoping discussions were held with Mr. Tony Lynch, Senior Executive Transport Officer of Cork City Council to discuss and agree:

- Trip rates;
- Modal split;
- Parking rates;
- Methodology for the junction assessments focusing on the year of opening and including committed developments only; and
- Applying low level of background growth for future years due to including the details of the committed developments.

The proposed development is located on lands on the southwest side of Ballincollig town centre and east side of Greenfield Roads. Following analysis of the surrounding area, it was determined that the initial study area would include the following twelve junctions surrounding the development.

- Junction 1 – Northern Roundabout at Junction 2 of N22 Ballincollig Bypass;
- Junction 2 – Greenfields Road / Flynn's Road / Castle Road;
- Junction 3 – Sunningdale / Maglin Road / Castle Road;
- Junction 4 – Sunningdale / Station Road / Carriganarra Road;
- Junction 5 – Link Road / Limeworth / Carriganarra Road / Leo Murphy Link Road;
- Junction 6 – Link Road / Heathfield / Carriganarra Road;
- Junction 7 – Killumney Link East Roundabout;
- Junction 8 – Northern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass;
- Junction 9 – Southern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass;
- Junction 10 – Greenfields Road / New Link Road;
- Junction 11 – Secondary Site Access on Greenfields Road; and
- Junction 12 – Southern Roundabout at Junction 2 of N22 Ballincollig Bypass.

These junctions were selected as they are considered the junctions most likely to be affected by traffic associated with the proposed development. As a result, these twelve junctions will form the study area for this assessment. The locations of the twelve junctions are illustrated in Figure 4.2.

An assessment of the relevant surrounding link roads (i.e. Greenfields Road, Maglin Road, Castle Road, Sunningdale and Carriganarra Road) was also carried out to identify the capacity of these routes.

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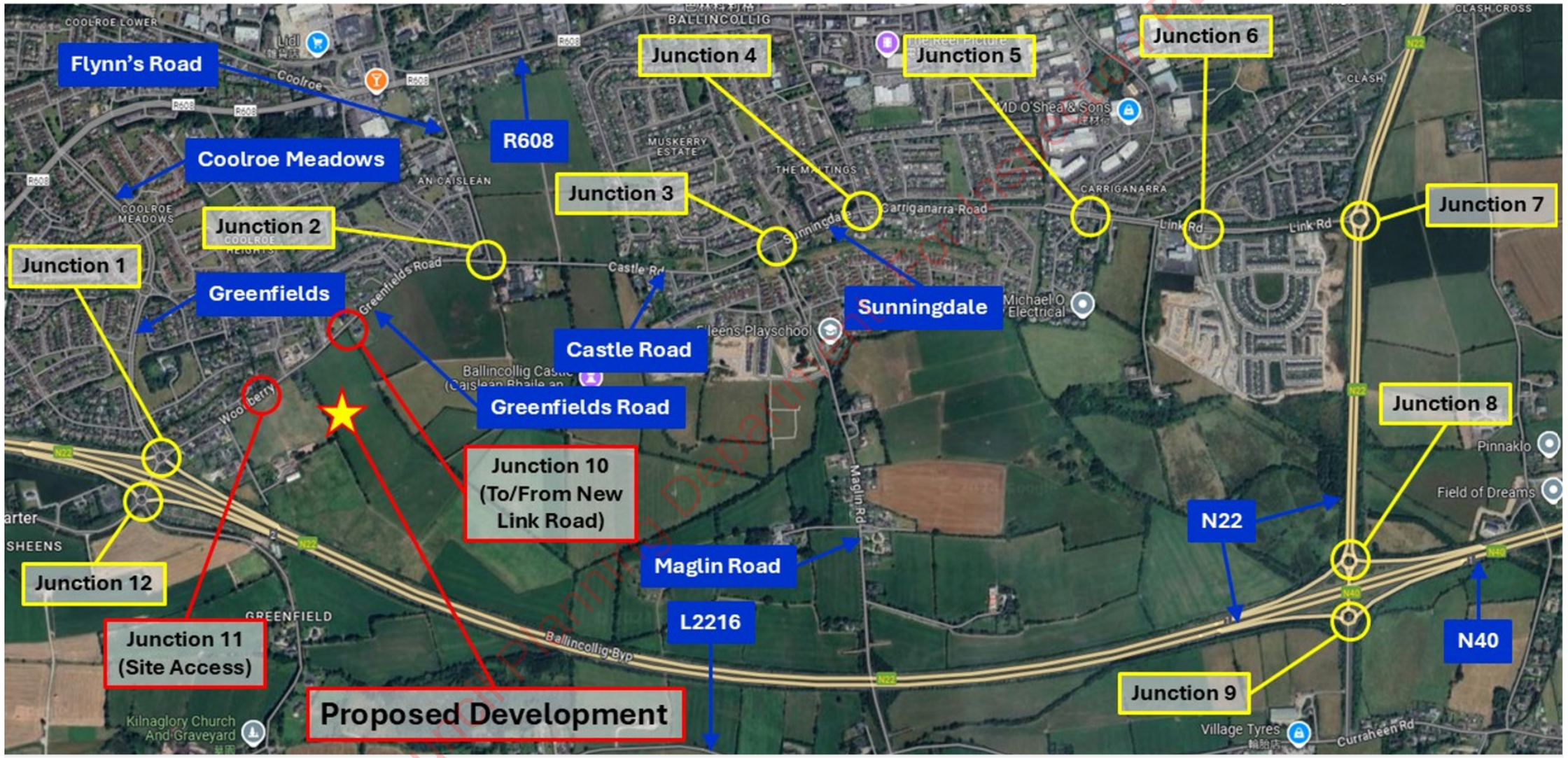

Figure 4.2 Concerned Junctions within the Study Area (Source: Google Maps, Annotation by EGIS)

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4.2 Assessment Methodology

4.2.1 Objectives

The assessment reviews the existing road network, including pedestrian/cycle and public transport provision in the vicinity of the site, estimates the traffic generated by the permitted developments and proposed development, and outlines the access strategy for the site. The predicted traffic impact on the local road network will be assessed and possible mitigation measures, where appropriate, will be discussed.

To summarise, this assessment includes the following tasks:

- Review of the existing infrastructure and traffic conditions;
- Review of the proposed development;
- Estimate the trips generated from the permitted developments and proposed development in the AM and PM peak hours and the distribution onto the local road network;
- Estimate the traffic growth rates and calculation of predicted future traffic volumes;
- Assess the impacted junctions and link roads surrounding the proposed development; and
- Propose mitigation measures (if required) to offset any impact the development may have.

The assessment is based on the findings of site visits, traffic observations, on-site traffic counts, architectural plans, and discussions with the Design Team.

4.2.2 Methodology

The transport assessment is prepared based on TII's 'Traffic and Transportation Assessment Guidelines' (2014) and is developed using data from commissioned traffic counts at concerned junctions, the 'Trip Rate Information Computer System' (TRICS) database and 2022 Census. Other relevant documents referenced include:

- TII Traffic and Transport Assessment Guidelines;
- TII PE-PAG-02017 - Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections (issued in October 2021);
- Design Manual for Urban Roads and Streets (DMURS);
- Cork City Development Plan 2022-2028;
- Cork Metropolitan Area Transport Strategy (CMATS);
- Cork Cycle Network Plan;
- Draft Cycle Design Manual (September 2023); and
- Smarter Travel – A New Transport Policy for Ireland 2009-2020.

To assess the operational traffic implications of the proposed development on the local road network, the following methodology is adopted, which incorporates a number of key inter-related stages. These following steps are used to identify and assess traffic and transport impacts:

- **Background Review**: This important exercise incorporates a number of tasks which include an examination of the local regulatory and development management documentation, namely the Cork City Development Plan 2022-2028, and CMATS, and an analysis of previous 'transport' related, strategic and site-specific studies of development and transport infrastructure in the Cork area.
- **Site Layout**: Reference was made to site layout drawings issued by the design team and the proposed plans for the site.
- **Site Audit**: A site audit was undertaken to quantify any existing road network issues and identify local infrastructure characteristics, in addition to establishing the level of accessibility to the site in terms of walking, cycling and public transport.
- **Traffic Counts**: Traffic counts were completed for the 'affected junctions' with the objective of establishing local traffic characteristics in the immediate area of the proposed residential development.
- **Trip Generation**: A trip generation exercise was carried out to establish the potential level of vehicle trips generated by the proposed residential development.
- **Trip Distribution**: Based on both existing and future (following development completion) network characteristics, a distribution exercise was undertaken to assign site generated vehicle trips across the local road network.
- **Network Analysis**: Further to quantifying the predicted impact of vehicle movements across the local road network and the proposed site accesses, traffic modelling is undertaken to assess the operational performance of the key junctions in the post-development years.

4.3 Receiving Environment

4.3.1 Site Location and Land Use

The proposed site is located at Ballincollig, situated approximately 1.5km southwest of the town centre. It is currently characterised as a greenfield site. This is currently zoned as ZO 02, New Residential Neighbourhoods in the Cork City Development Plan 2022-2028 (See Figure 4.3) and forms part of the Maglin Urban Expansion Area. See Section 4.4.2 below for further details of the development access and road network.

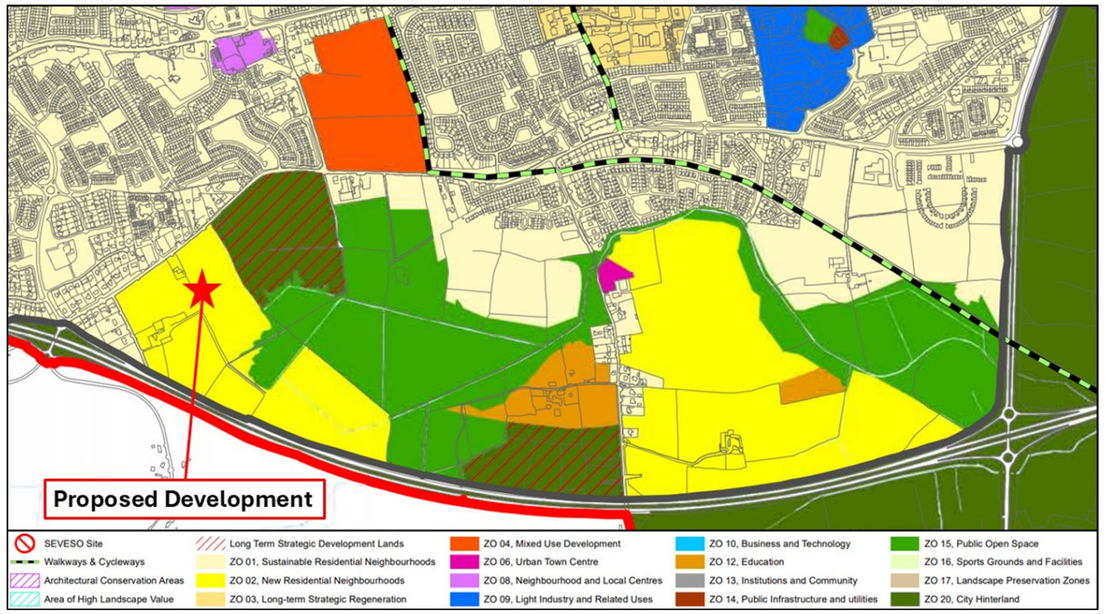

Figure 4.3 Ballincollig and Hinterland Zoning Map from Cork City Development Plan (Source: Map 16 from Cork City Development Plan 2022-2028, Annotation by EGIS)

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4.3.2 Road Network

The local road network in the vicinity of the subject site is illustrated graphically in Figure 4.1. The nature of the area/road network towards the town centre is semi-urban, with roads comprising mainly of local residential streets. The streetscape changes from residential to commercial/retail closer to the town centre. To the south and east of the site, the landscape is more rural, bounded by the N22 and N40. Four accesses will be provided for the proposed development. Three accesses to the site will be gained on the New Link Road which connects between the Greenfields Road and the proposed development (refer to Figure 4.2). The remaining access to the site will be gained on the Greenfields Road directly. It should be also noted that the proposed development is adjacent to the Greenfields Road, which provides access to the N22. The details of development access arrangement can be referred to the Section 4.4.2.

Figure 4.1 illustrates the principal vehicular access routes surrounding the proposed development site. The routes can be categorised into national, regional and local access routes as listed below.

4.3.2.1 N22

This is a national route connecting Tralee, Co. Kerry to Cork City. Locally, it is a dual carriageway between the Poulavone Roundabout and the interchange on the western side of Ballincollig (known as the Ballincollig by-pass) (refer to Figure 4.4). The N22 then merges to a bi-directional single carriageway route westbound after this interchange and forms a bi-directional single carriageway eastbound, with some cycle facilities along the route, towards the city after the Poulavone Roundabout as shown in Figure 4.5. Additionally, a pedestrian footpath is present along north side of road.

Figure 4.4 N22 Dual Carriageway Section (Source: Google Maps)

Figure 4.5 N22 Single Carriageway Section (Source: Google Maps)

4.3.2.2 R608

The R608 is a bi-directional single carriageway regional route linking Ballincollig to Cork city centre as shown in Figure 4.6. It serves the Model Farm Road, Dennehy's Cross, Magazine Road and Barrack Street. Due to the length of the route and the different areas served, the carriageway varies in width over the length of the route. Some pedestrian and cycle facilities are provided along the route, particularly in Ballincollig town centre and in the vicinity of Cork Institute of Technology. The route generally has a speed limit of 50km/h due to the urban areas it services.

Figure 4.6 R608 (Source: Google Maps)

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4.3.2.3 Kilumney Link Road

It should be known that Greenfields Road (refer to Figure 4.7), Castle Road and Sunningdale (refer to Figure 4.8) are jointly known locally as Killumney Link Road. This route runs east-west, parallel to Ballincollig Main Street (R608) and with some pedestrian footpaths. It ties in with the N22 at the 'Killumney Link East Roundabout' and at the Ballincollig west interchange. The route serves numerous residential developments. It is a bi-directional single carriageway road with a speed limit of 50km/h. There are numerous bus stops located along the route with good walking and cycling facilities, particularly on the northside of the route.

Figure 4.7 Greenfields Road (Source: Google Maps)

Figure 4.8 Castle Road and Sunningdale (Source: Google Maps)

4.3.2.4 Greenfields and Coolroe

Both Greenfields (refer to Figure 4.9) and Coolroe Meadows (refer to Figure 4.10) are located to the west of the proposed development. Both roads are bi-directional single carriageway road with turning inbound flares and runs south-north between the Junction 1 - Northern Roundabout at Junction 2 of N22 Ballincollig Bypass and R608. Additionally, a pedestrian footpath is present along both sides of the roads. The route serves numerous residential developments. Both roads have a speed limit of 50km/h.

Figure 4.9 Greenfields (Source: Google Maps)

Figure 4.10 Coolroe Meadows (Source: Google Maps)

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4.3.2.5 Flynn's Road

The Flynn's Road is located to the northeast of the proposed development. It is a bi-directional single carriageway running south-north between the Killumney Link Road and R608. Additionally, a pedestrian footpath is present along west side of the road as shown in Figure 4.11. This road has a speed limit of 50km/h.

Figure 4.11 Flynn's Road (Source: Google Maps)

4.3.3 Existing Pedestrian and Cycling Facilities

4.3.3.1 Existing Pedestrian Facilities

The site is connected to the surrounding public footpath network via the footpaths on Greenfields Road. Generally, from the proposed site towards the town centre, the pedestrian facilities are good, However, they lack appropriate crossing points and associated accessibility features in some areas. Figure 4.12 illustrates the varied pedestrian facilities outside the proposed development looking north on Greenfields Road.

Figure 4.12 Greenfields Road adjacent to the Proposed Development (Source: Google Maps)

4.3.3.2 Existing Cycling Facilities

There are no existing dedicated cycle tracks/lanes from the proposed development to the town centre, however, cyclists are expected to share the carriageway with motorists along Killumney Link Road, Greenfields, Coolroe Meadows, Flynn's Road and Ballincollig Main Street (R608). It should be also noted that the accessibility to the proposed development will improve significantly after completion of the proposed and planned road upgrading works as mentioned in Section 4.3.5.4 to Section 4.3.5.7.

4.3.4 Existing Public Transport

The existing public transport facilities in the area surrounding the proposed development are detailed following.

4.3.4.1 Bus Services

There are a number of bus stops located on Ballincollig Main Street (R608), which are within 1.9 kilometres walking distance (approximately 23-minute walk to 10-minute cycle) from the proposed development (refer to Figure 4.13). Figure 4.13 also presents the potential walking routes between the proposed development and bus stops on R608. Bus Eireann provides three services linking Ballincollig to Cork City and the surrounding areas daily. The bus routes servicing the area are listed in Table 4.1.

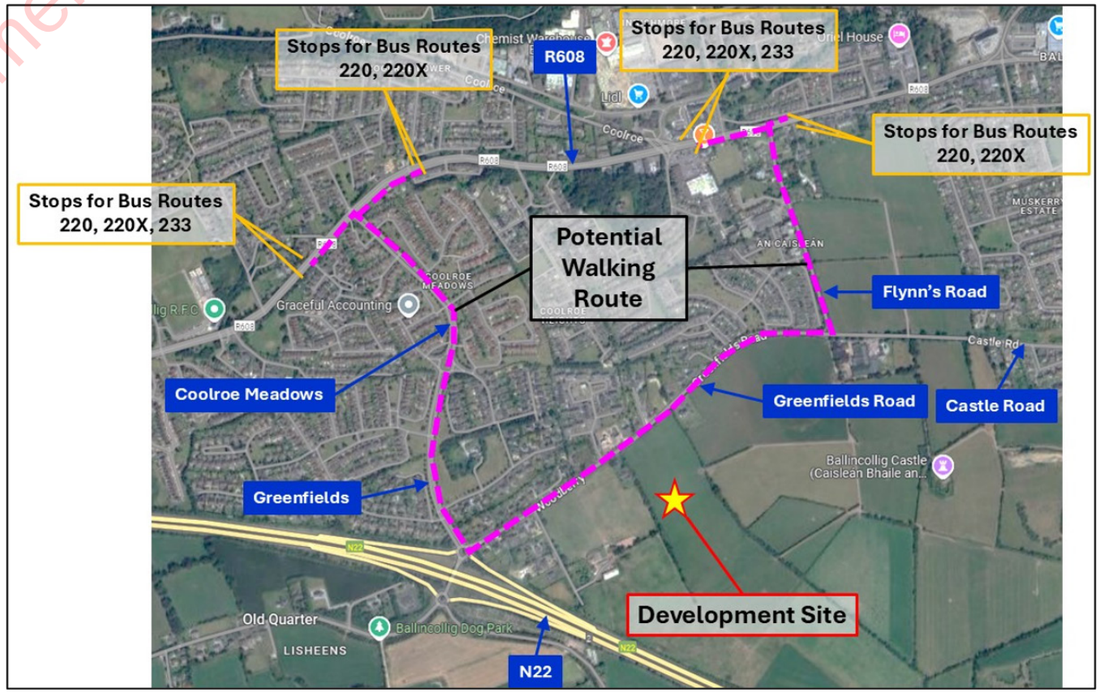

Figure 4.13 Bus Stop Locations and Potential Walking Routes (Source: Google Maps, Annotation by EGIS)

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Table 4.1 Bus Routes Serving the Area

Route No.	Route Direction	Frequency of Services			Bus Stops
		Mon – Fri	Sat	Sun	
220	Ovens to Crosshaven via Carrigaline	78 services (05:30 – 04:30)	73 services (05:30 – 04:30)	70 services (05:30 – 04:30)	R608 near Flynn's Road and Coolroe Meadows
	Crosshaven to Ovens via Carrigaline	79 services (05:25 – 04:30)	74 services (05:25 – 04:30)	71 services (05:30 – 04:30)	R608 near Flynn's Road and Coolroe Meadows
220X	Ovens to Crosshaven via South Mall	14 services (07:00 – 19:20)	13 services (07:10 – 19:20)	No service	R608 near Flynn's Road and Coolroe Meadows
	Crosshaven to Ovens via and Grand Parade	13 services (06:30 – 17:55)	12 services (07:35 – 17:45)	No service	R608 near Flynn's Road and Coolroe Meadows
233	Cork – Macroom	9 services (07:25 – 22:30	No service	No service	R608 near Flynn's Road and Coolroe Meadows
	Macroom – Cork	10 services (06:15 – 18:45)	No service	No service	R608 near Flynn's Road and Coolroe Meadows

Note: 1) The bus time can be referenced here: https://www.buseireann.ie/routes-and-timetables.

4.3.4.2 Car Clubs and Car Sharing

Car clubs or car sharing (i.e. "Yuko" and "GoCar") is a model of car rental where people rent cars for short periods of time, often by the hour. It differs from traditional car rental in that as noted above rental periods are shorter, the owners of the cars are sometimes private individuals themselves, and the carsharing facilitator is generally distinct from the car owners. Carsharing is part of a larger trend of shared mobility. Benefits include cost saving, convenience (no responsibility for insurance, tax, fuel, maintenance), less traffic congestion and less parking pressure. At the time of writing, two GoCar (GoBase) are available at the Lidl Ballincollig (refer to Figure 4.14) which is approximately 1.3 kilometres walking distance (approximately 16-minute walk and 7-minute cycle) from the proposed development.

Figure 4.14 Location of GoCar (Source: https://www.gocar.ie/locations, Annotation by EGIS)

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4.3.4.3 Taxi Services

Taxi is also a common form of transport in Ireland. Currently, passengers can order / book taxi services in advance via online / phone / apps (i.e. Free Now, Lynk, Taxy, etc.). By using these software, the passengers can order their nearest taxi so as to reduce the waiting time.

4.3.5 Emerging Transport Developments

4.3.5.1 Introduction

To accommodate the target population growth in Ballincollig and the wider Cork City area, the Maglin Valley has been designated an urban expansion area, including provision for a new residential neighbourhood. As outlined in the Cork City Development Plan 2022-2028, future housing and population growth in Ballincollig will be concentrated in the Maglin Area to the south of the town.

Future transport and connectivity in Ballincollig will be guided by the Cork Metropolitan Area Transport Study (CMATS). The National Transport Authority (NTA) published CMATS in 2020. The proposals for Ballincollig include a new light rail service, high frequency and local feeder bus services and enhanced walking and cycling infrastructure.

4.3.5.2 Vehicular Infrastructure

The roads infrastructure and parking facilities in Ballincollig are good with good access to the National Road network. The town also has a relatively good internal road network however as the town grows it is important that other roads are improved to keep pace with the additional traffic volumes particularly from new development areas to the south. Ballincollig will form the western terminus of the proposed N40 Cork Northern Relief Road and the preferred route corridor will be protected from inappropriate development once the route has been finalised.

Ballincollig area is linked on the design of a distributor road. Some of this road has been built from the north through the Heathfield development (to the east). The route cross section incorporates active travel and opportunities for bus lanes and would tie into the proposed development access road in the future. The proposed development allows for the construction of an additional 420m of this distributor road. The timeline for delivery of the remainder of the route is currently unknown.

It is necessary to acknowledge the proposed infrastructural upgrades as part of the Cork City Development Plan 2022-2028, as such to identify the proposed flows at the existing junctions taking account of the future link roads and Maglin by-pass. After completion of those elements of vehicular infrastructure, it is anticipated that traffic along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.) will reduce.

4.3.5.3 Proposed Public Transport

a) BusConnects

Prior to the publishing of the Cork City Development Plan (2022-2028), CMATS outlined details for both BusConnects and Light Rail in the Ballincollig area. The Cork City Development Plan (2022-2028) makes reference to a proposed BusConnects' Route 6 (see Figure 4.15) connects West of Ballincollig to City Centre via Mardyke. The route of such a system is yet to be determined and will require a detailed feasibility study, however, tying in with the key principles outlined in Section 4.3.5.1, a quality bus corridor could be provided on Killumney Link Road.

The current Bus Route 220 route (referred to Section 4.3.4.1) is earmarked for further improvement as Sustainable Transport Corridor E in the National Transport Authority's Draft BusConnects Plan, with frequency of service rising to every 10 minutes. Furthermore, Bus Route 233 which currently serves Main Street, Ballincollig providing connectivity to Killumney, Ovens, Macroom, Farran and Coachford, is to be re-routed along the Killumney Road (Castle Road, Sunningdale) just to the north of the site with an increased service of every 30 minutes. Refer to Figure 4.16.

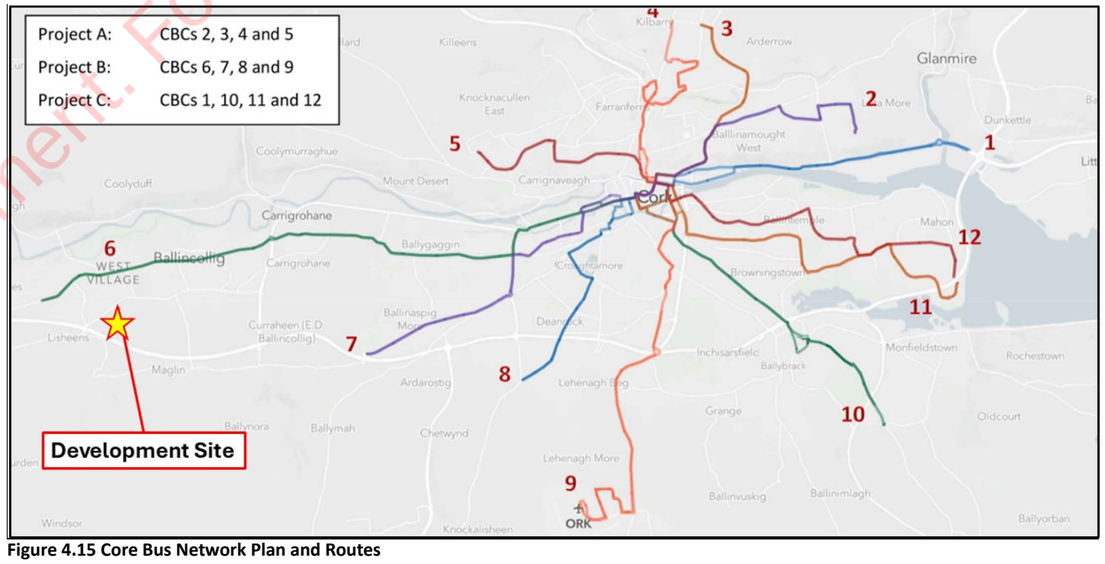

Figure 4.15 Core Bus Network Plan and Routes
(Source: Figure 4.4 of Cork City Development Plan 2022-2028, Annotation by EGIS)

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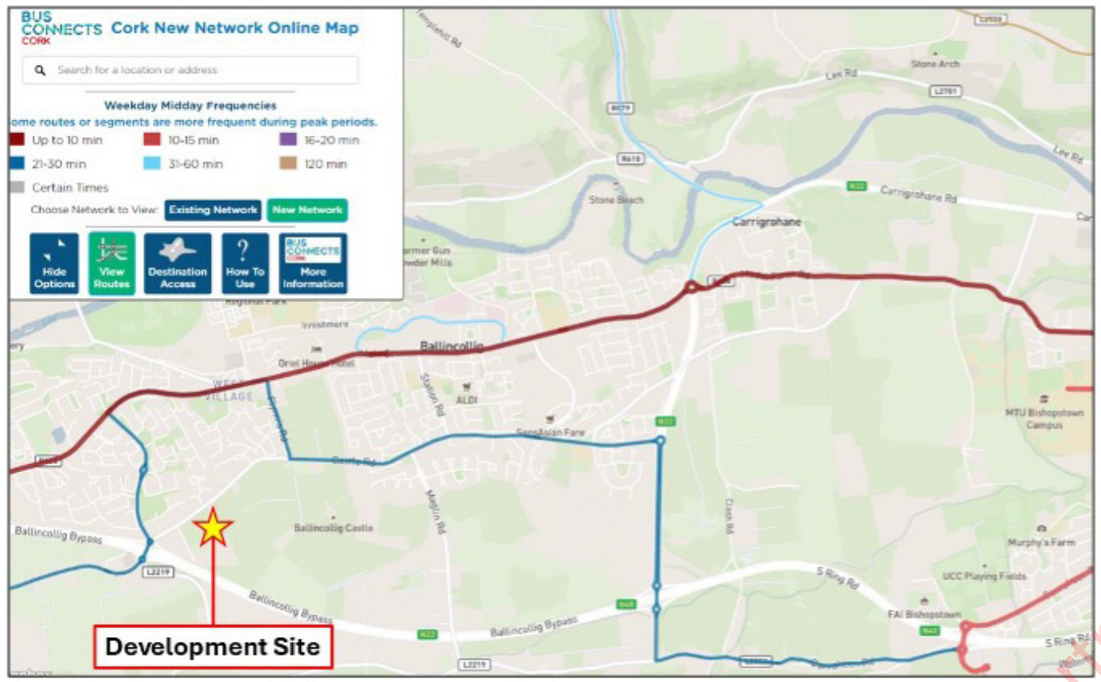

Figure 4.16 BusConnects Network Online Map – Bus Route and Service Frequency Improvements
(Source: https://corknewnetwork.s3.amazonaws.com/index.html, Annotation by EGIS)

According to the new design for the Cork Metropolitan Bus Network in June 2022 launched by NTA, the new network, part of BusConnects Cork, is intended to transform the public transport network across the Cork Metropolitan Area by involving the creation of new bus routes and improving bus frequencies to help transform the public transport network to meet anticipated growth and future demand in the region. As part of the BusConnects Scheme, it is proposed to introduce two new bus routes in close proximity to the proposed development. Figure 4.17 taken from the latest BusConnects proposal, illustrates these new routes in the vicinity of the proposed development. It is proposed to introduce bus route 1, which operates between Ovens/Dell EMC and Mahon Point, and will pass via R608. Additionally, it is proposed to introduce bus route 2B, which operates between Grange Manor and Ashmount. and will pass via the Junction 1 - Northern Roundabout at Junction 2 of N22 Ballincollig Bypass, Greenfields, Coolroe Meadows, R608, Flynn's Road and Castle Road.

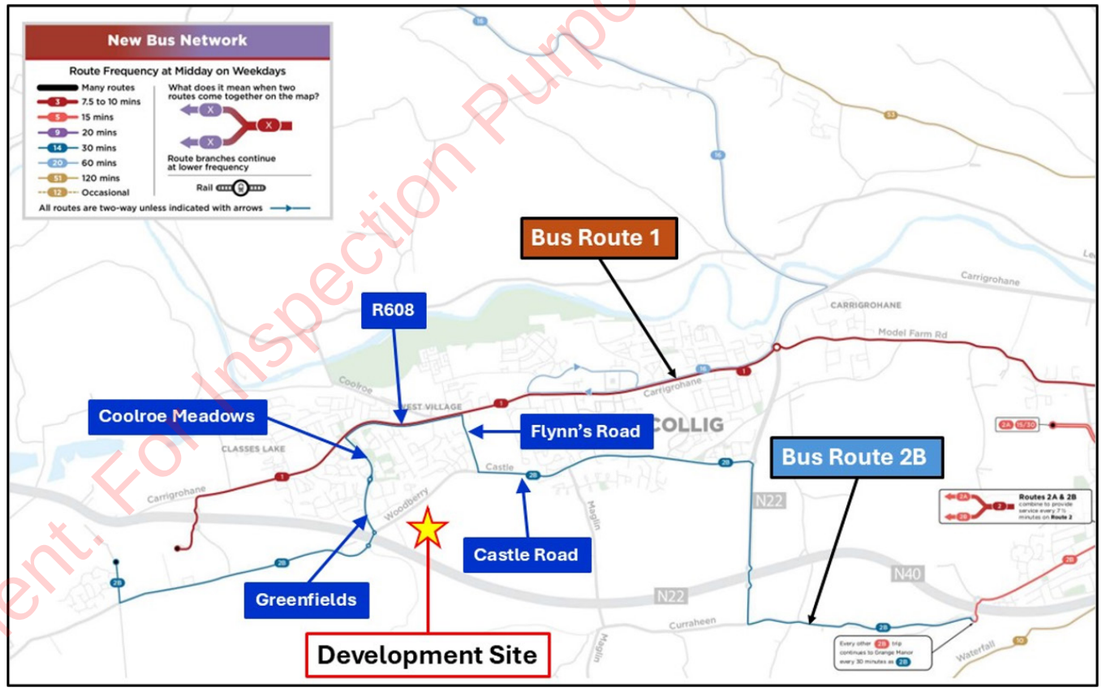

Figure 4.17 Proposed Bus Connects Routes in the vicinity of the Proposed Development
(Source: Network Map – Cork Outer West from the New Bus Network Report, Annotation by EGIS)

b) Light Rail Transit / Luas Cork

The Cork City Development Plan (2022-2028) also makes specific references to a proposed Light Rail Transit (LRT) to connect Ballincollig to Mahon via Cork City Centre. Although the route outlined in CMATS, which indicatively identifies Killumney Road as the route for light rail, consultants have been appointed to determine a more specific route. It nonetheless highlights that the location for this proposed development is close to proposed public transport infrastructure and associated public transport nodes. CMATS also indicates a proposed Light Rail stop (with park & ride facilities) near the Junction 1 - Northern Roundabout at Junction 2 of N22 Ballincollig Bypass. (See Figure 4.18).

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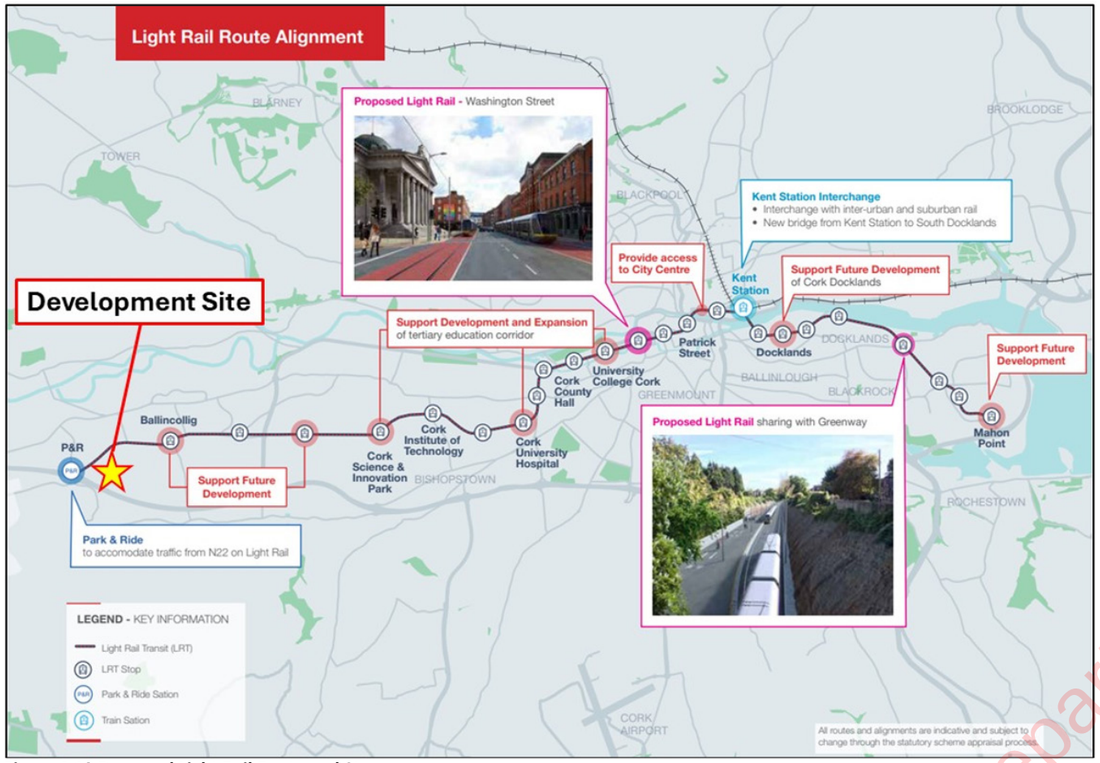

Figure 4.18 Proposed Light Rail Route and Stops
(Source: Figure 4.7 of Cork City Development Plan 2022-2028, Annotation by EGIS)

To increase the viability of the light rail system, it is necessary to develop lands along the route corridor. This has recently been outlined by the National Transport Authority (NTA) to Cork City Council. The proposed development is ideally situated to promote the need for light rail in Cork. This type of development, close to existing and proposed future sustainable transport links, will assist in creating the modal shift required from private vehicle to public transport, walking and cycling.

Given that Light Rail is a medium-long term objective in CMATS, a BusConnects service along the same route could be a precursor to light rail.

After analysing a range of options, Transport Infrastructure Ireland (TII) published the Emerging Preferred Route for Luas Cork in April 2025 and an 8 week public consultation period was open until June 2025. The Emerging Preferred Route extends from the west of the city to the east – from Ballincollig to Mahon Point. The proposed Luas Cork Emerging Preferred Route (EPR) begins in Ballincollig and a single-track loop through Ballincollig connects Leo Murphy Road to Station Road to Main Street and back to Leo Murphy Road, at which point the arrangement changes to a more typical double-track configuration and continues eastwards towards the city centre.

The location of the site in the context of the BusConnects corridor and Emerging Preferred Route for Luas Cork is illustrated on Figure 4.19 prepared by HW Planning.

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Sustainable & Compact Settlement Guidelines
Settlement, Place & Density

HWP

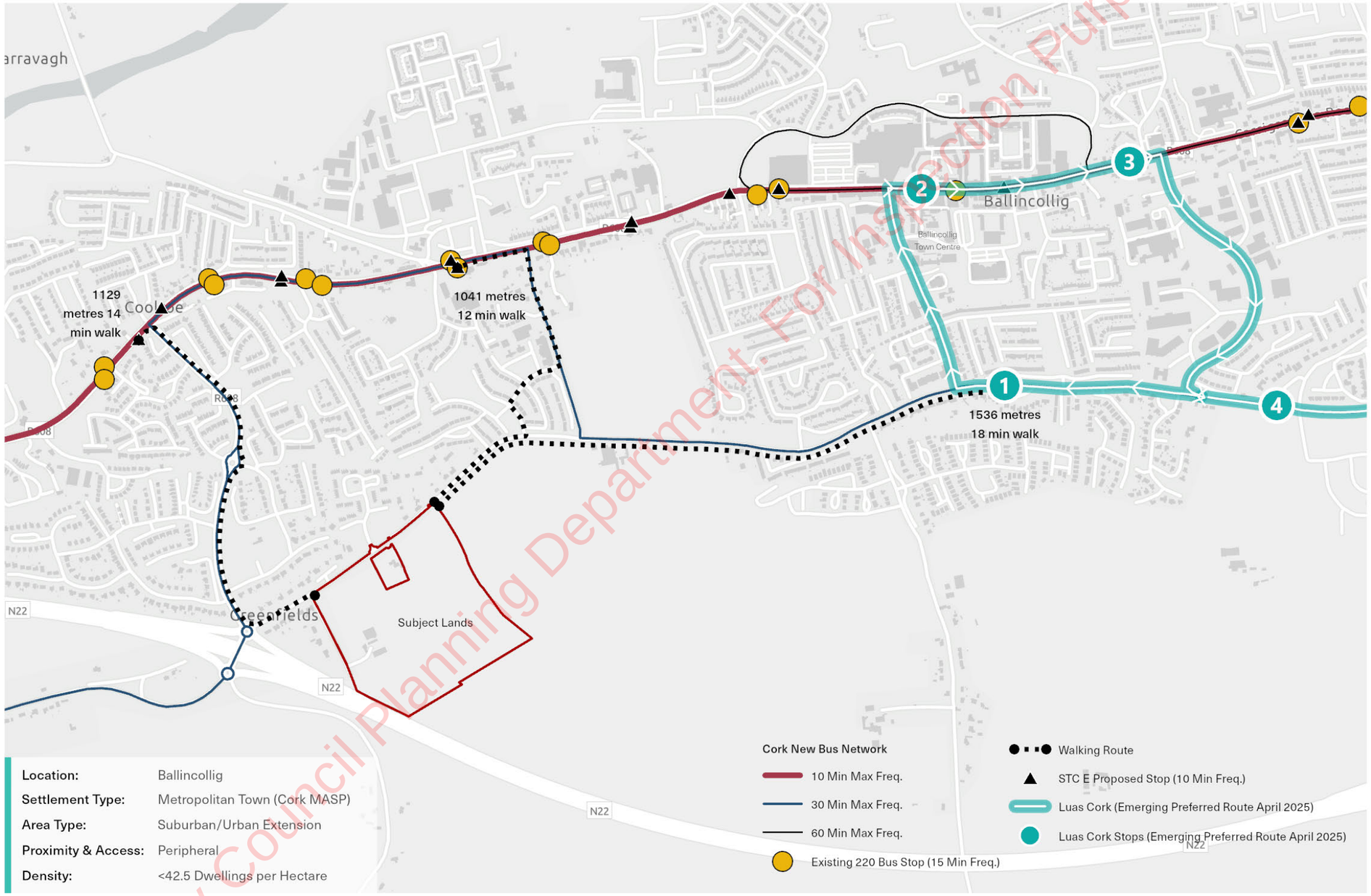

Figure 4.19 BusConnects Corridor and Emerging Preferred Route for Luas Cork

4.3.5.4 Proposed Cycle Network

The Cycling Network Plan for the Cork City Metropolitan Area and surrounding towns was finalised and published in 2020. CMATS takes cognisance of the 2017 cycle network plan and for the Ballincollig area, the plan envisages a network of primary, secondary and greenway cycle routes. The cycling proposals for the site environs are illustrated in Figure 4.20.

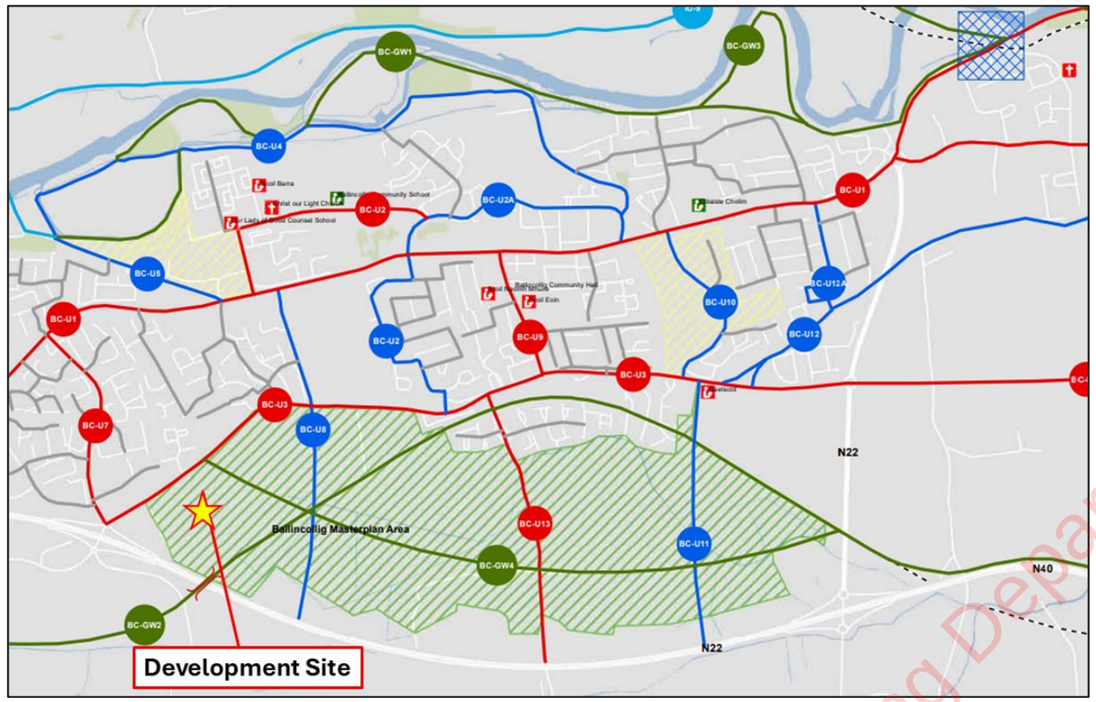

Figure 4.20 Cycling Proposal for the Site Environs
(Source: Ballincollig Area from Cork Cycle Network Plan, Annotation by EGIS)

As outlined in the Plan, primary cycle corridors (shown in red) are proposed along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, Carriganarra Road) (BC-U3), Greenfields and Coolroe Meadows (BC-U7), the Main Street-R608 (BC-U1) and Maglin Road (BU-U13). Although dedicated cycle facilities partially exist on Killumney Road and the R608, improvements to both are proposed. The primary routes inter link with the secondary routes (outlined in blue) which provide a collector function from surrounding residential areas, schools and employment centres.

Two proposed greenway routes are envisaged in close proximity to the proposed site - one will travel close to the site (BC-GW2) along the abandoned rail line linking the area directly to the Curraheen Science Park. The other proposed route (BC-GW4) comprises a two-way cycle track along the proposed Western and Eastern Link roads to the north of the proposed site. Approximate 400 metres of the proposed greenway route (BC-GW4) from the new priority junction with Greenfields Road and the New Link Road to the proposed development will be constructed as part of the proposed development.

Cork City Council have included the BC-GW2 (part of) Greenway and BC-U9 Primary Cycle Route in the Cork City Development Plan 2022-2028 as shown in Figure 4.21.

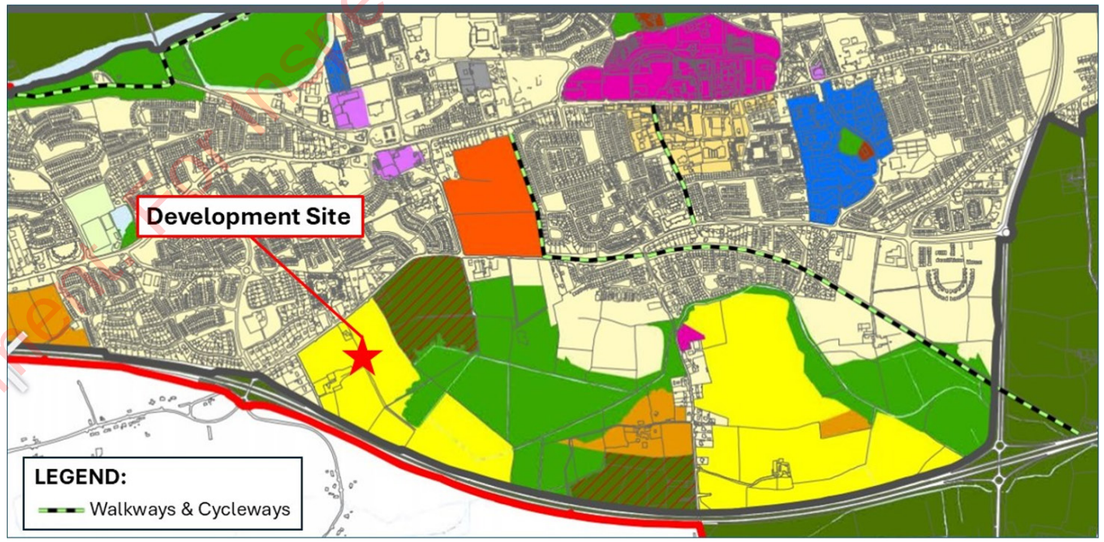

Figure 4.21 Cycling Proposal in Cork City Development Plan 2022-2028

4.3.5.5 Infrastructure Proposed by Stonecrest Phase 1 Development at Maglin

As part of the permitted Stonecrest Phase 1 development, a footpath/cycle track is proposed to be constructed on both sides of Maglin Road as far as the junction with Castle Road/Sunningdale (Killumney Link Road). This improves connectivity on both sides of the carriageway and connect with the existing footpath at the junction. It is also proposed to include a crossing on Sunningdale to provide a safe crossing point for pedestrians and cyclists from the existing estates and Stonecrest developments. The road upgrade works on the Maglin Road under Stonecrest Phase 1 development (refer to Appendix 4A) was completed.

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4.3.5.6 Proposed Infrastructure with Proposed Residential Development

The Applicant is proposed to carry out the following works as part of the proposed development:

- Construction of approximately 400 metres New Link Road (with 2m wide one-way cycle track and 2m wide pedestrian footpath on both sides of the road) connecting between the proposed development and Greenfields Road;
- Construction of a new priority junction with Greenfields Road and the New Link Road to the proposed development;
- Construction of three priority junctions providing direct pedestrian and vehicular access to/from the New Link Road;
- Construction of another priority junction providing direct pedestrian and vehicular access to/from Greenfields Road;
- Construction of 3m wide two-way cycle track and 2m wide pedestrian footpath on the southeast side of Greenfields Road (adjacent to the site);
- Construction of a 4m wide signalised crossing on Greenfields Road;
- Provision of two uncontrolled crossings across Greenfields Road and two uncontrolled crossings across the New Link Road; and
- Construction of a greenway and shared spaces for pedestrians/cyclists within the proposed development.

It should be also noted that the proposed New Link Road with cycle tracks and pedestrian footpaths is part of the proposed greenway route (BC-GW4) as mentioned in Section 4.3.5.4. The proposed road works is illustrated in Appendix 4B.

4.3.5.7 Active Travel Infrastructure

As discussed in Section 4.3.5.4, two proposed greenway routes as shown in Figure 4.20, BC-GW2 along the abandoned rail line linking the area directly to the Curraheen Science Park and BC-GW4 comprising comprises a two-way cycle track along the proposed Western and Eastern Link roads to the north of the proposed site, are envisaged in close proximity to the proposed site.

Apart from the aforementioned greenways, two planned active travel schemes as listed below will be constructed in the vicinity of the proposed site. The location of these active travel schemes is illustrated in Figure 4.22.

- **Woodberry Active Travel Scheme**: Greenfields Road between Flynn's Road and Junction 1 - Northern Roundabout at Junction 2 of N22 Ballincollig Bypass; and
- **Coolroe Meadow Active Travel Scheme**: Greenfields and Coolroe Meadow between the Greenfields Road and R608.

Figure 4.22 Proposed Active Travel Schemes in the vicinity of the Proposed Development
(Source: Google Maps, Annotation by EGIS)

4.3.5.8 Car Clubs and Car Sharing

There are 3 no. GoCar spaces proposed to be provided within the proposed development (adjacent to the proposed creche) and will be available on completion of the proposed development.

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4.4 Characteristics of the Proposed Development

4.4.1 Schedule of Accommodation

The proposed residential development includes 544 units. The 544 residential units are a mix of apartments, duplex blocks, townhouses, semi-detached and detached dwellings. Table 4.2 for a breakdown of these units. Appendix 4B contains a drawing showing the proposed site layout.

Table 4.2 Breakdown of Proposed Development of Residential Units

No. of Bedrooms per Unit	Housing	Apartments	Duplex (Including G/F Apartment)	Total
1-bed	-	15	65	**80**
2-bed	8	133	38	**179**
3-bed	124	-	61	**185**
4-bed	100	-	-	**100**
Total	232	148	164	544

It should be also noted that the proposed development also includes one 2-storey creche and one retail/commercial unit (the specific use of which is yet to be determined) at the ground floor of Block 3 of apartments.

4.4.2 Access Arrangements

The proposed development will be served by four pedestrian and vehicular accesses as shown in Figure 4.23. As part of the proposed development, approximately 400 metres New Link Road (with 2m wide one-way cycle track and 2m wide pedestrian footpath on both sides of the road) connecting between the proposed development and Greenfields Road will be constructed to the northeast of site. Additionally, a new priority junction with Greenfields Road and the New Link Road to the proposed development will be constructed. Three new priority-controlled junctions will be constructed on the New Link Road and provide direct pedestrian and vehicular access to/from the New Link Road as shown in Figure 4.23. According to the Design Manual for Urban Roads and Street, a forward visibility on bus routes of 49 metres shall be provided for a 50km/h speed limit. Assuming 50km/h speed limit for the New Link Road, adequate sightlines (at least 49 metres) are available commensurate to the 50km/h speed limit on New Link Road.

Another new priority-controlled junction will be constructed on Greenfields Road and provide direct pedestrian and vehicular access to/from Greenfields Road as shown in Figure 4.23. According to the Design Manual for Urban Roads and Street, a forward visibility on bus routes of 49 metres shall be provided for a 50km/h speed limit. After checking, adequate sightlines (at least 49 metres) are available commensurate to the 50km/h speed limit on Greenfields Road.

Another pedestrian access to Greenfields Road will be provided as shown in Figure 4.23. Additionally, a greenway linking between Greenfields Road and the proposed development will be provided at the southwest and southeast sides of site (refer to Figure 4.23) to facilitate the pedestrian/cyclist movements. Moreover, one future cycle/pedestrian connection located to the south of the site will be reserved for future connection to other developments as shown in Figure 4.23.

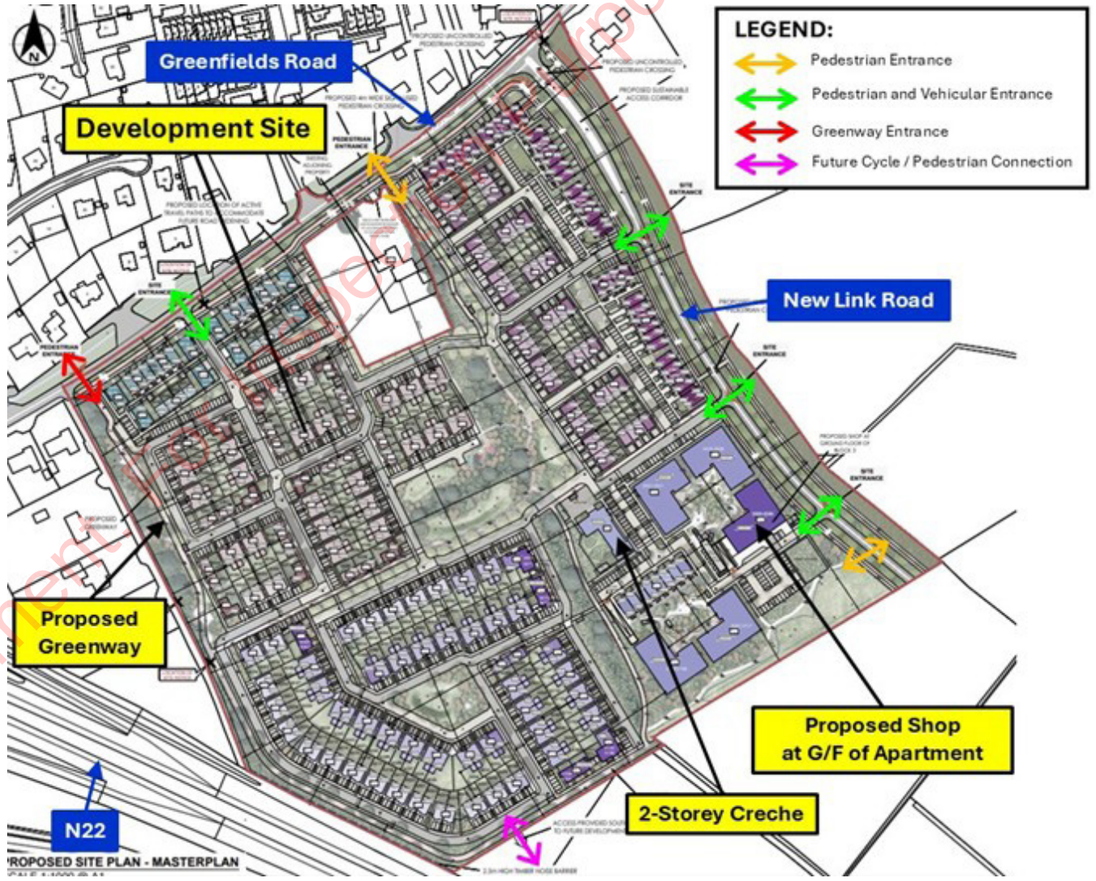

Figure 4.23 Access Arrangements for the Proposed Development

4.4.3 Proposed Internal Site Access Roads

All main pedestrian crossing points will be raised by either a table-top junction or by a flat-top ramp. Tight corner radii and chicanes have been introduced with only short straight sections of access road proposed in order to introduce traffic calming by design within the development. Corner radii have been reduced to a minimum in accordance with DMURS. A strong sense of enclosure is also provided by minimal distances between building blocks, road-side trees and road-side parking.

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4.4.4 Parking Provision

4.4.4.1 Proposed Car Parking

As the site is located at urban towns of Ballincollig (excluding the Town Centre), it will be classified as Zone 3 in accordance with the Table 4.6 of Cork City Development Plan 2022-2028. With reference to Table 11.13 of the Cork City Development Plan 2022-2028, a summary of the car parking required is presented in Table 4.3.

Table 4.3 Car Parking Compliance

Proposed Development	Cork City Development Plan 2022-2028		Factor	Max. Car Parking Required	Proposed Car Parking
	Land Use Category	Max. Car Parking Required			
For Residential Development					
2 bedrooms House	Residential (1-2 bedrooms)	1.25 space per unit	8 units	10	8
3-4 bedrooms House	Residential (3 or above bedrooms)	2.25 space per unit	224 units	504	420
Sub-total Max. Car Parking Spaces Required for Houses:				**514**	**428**
1-2 bedrooms Apartment Unit	Residential (1-2 bedrooms)	1.25 space per unit	148 units	185	148
Sub-total Max. Car Parking Spaces Required for Apartment Unit:				**185**	**148**
1-2 bedrooms Duplex Unit (including G/F Apartment Unit)	Residential (1-2 bedrooms)	1.25 space per unit	103 units	129	103
3 bedrooms Duplex Unit (including G/F Apartment Unit	Residential (3 or above bedrooms)	2.25 space per unit	61 units	137	61
Sub-total Max. Car Parking Spaces Required for Duplex Units (including G/F Apartment Unit):				**266**	**164**
Total Car Parking Spaces for the Proposed Residential Development:				**965**	**740**
For Non-Residential Development					
Creche	Creches	1 space per 6 pupils	128 pupils	21	9
Shop	Convenience Retail	1 space per 20m^2 GFA	517.2 m^2 GFA	26	6
Total Car Parking Spaces for the Proposed Non-Residential Development:				**47**	**15**

Note: 1) No motorcycle parking space is required for houses as stated in the Cork City Development Plan 2022-2028.

For residential development, it is proposed to provide 767 car parking spaces, of which 428 car parking spaces for houses, 148 car parking spaces for apartment units, 164 car parking spaces for duplex units (including G/F apartment units), 24 car parking spaces for visitor and 3 car parking spaces for GoCar. This is less than the maximum car parking spaces (i.e. 965 car parking spaces) for residential development as required in the Cork City Development Plan 2022-2028 and as shown in Table 4.3. Included in the 320 car parking spaces provided for residential units with not in-curtilage parking, 19 accessible parking spaces will be provided in order to meet the requirements of Cork City Development Plan 2022-2028 (i.e. 5% of car parking spaces provided should be set aside for disabled car parking).

For non-residential development, it is proposed to provide 15 car parking spaces for non-residential development, of which nine car parking spaces for creche and six car parking spaces for the shop. This is also less than the maximum car parking spaces (i.e. 47 car parking spaces) for non-residential development as required in the Cork City Development Plan 2022-2028 and as shown in Table 4.3. Included in the 15 car parking spaces provided for non-residential development, one accessible parking space for creche and two accessible parking spaces for the shop will be provided in order to meet the requirements of Cork City Development Plan 2022-2028 (i.e. 5% of car parking spaces provided should be set aside for disabled car parking).

Additionally, it is proposed to provide 34 motorcycle parking spaces, of which 32 motorcycle parking spaces for the residential units with not in-curtilage parking, one motorcycle parking space for creche and one motorcycle parking space for the shop, as required in the Cork City Development Plan 2022-2028 (i.e. one motorcycle parking bay per 10 car parking spaces provided).

4.4.4.2 Electric Vehicle (EV) Charging

Provision of appropriate infrastructure (i.e. ducting) will be made for the fitting of car charging points to all proposed car parking spaces for the houses with in-curtilage parking to facilitate non-disruptive retro fitting of EV charging points. Additionally, the Developer will provide 67 parking spaces with functioning EV charging points from completion of the residential units with not in-curtilage parking (i.e. 8 no. townhouses, 148 no. apartment units and 164 no. duplex units including G/F apartment), which can meet the recommended EV charging points as required in the Section 11.245 of Cork City Development Plan 2022-2028 (i.e. a minimum of one EV equipped parking spaces per five car parking for multi-unit residential development). An additional 1 space is provided for creche and 1 space provided for the shop – total 69 EV parking spaces on site.

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4.4.4.3 Proposed Bicycle Parking

According to Table 11.14 in the Cork City Development Plan 2022-2028, a summary of the bicycle parking required is presented in Table 4.4.

Table 4.4 Bicycle Parking Compliance

Proposed Development	Cork City Development Plan 2022-2028		Factor	Min. Bicycle Parking Required	Proposed Bicycle Parking
	Land Use	Min. Bicycle Parking Required			
For Residential Development					
Houses*	-	-	232 units	-	-
Apartment / Duplex Unit	Standard Apartments	0.5 per unit	312 units	156	485
Total Bicycle Parking Spaces for the Proposed Residential Development:				**156**	**485**
For Non-Residential Development					
Creche	Creches	1 space per 25 pupils	128 pupils	5	28
Shop	Convenience (Food) Store	1 space per 100m^2 GFA	517.2 m^2 GFA	5	16
Greenway	-	-	-	-	48
Total Bicycle Parking Spaces for the Proposed Non-Residential Development:				**10**	**92**

Note: * No bicycle parking space is required for houses as stated in the Cork City Development Plan 2022-2028.

For the residential development, it is proposed to provide 485 bicycle parking spaces, of which 357 bicycle parking spaces for the apartment/duplex units and 128 bicycle parking spaces for visitors. This exceeds the minimum bicycle parking requirement of 156 bicycle parking spaces as required in the Cork City Development Plan 2022-2028 and as shown in Table 4.4. Additionally, it is assumed that bicycle parking for houses will be accommodated in each rear garden space.

For the non-residential development, it is proposed to provide 28 bicycle parking spaces, inclusive of 16 bicycle parking spaces for visitor, for the proposed creche. Additionally, it is proposed to provide 16 bicycle parking spaces for the proposed shop. These exceeds the minimum bicycle parking requirements of 5 bicycle parking spaces for the proposed creche and 5 bicycle parking spaces for the proposed shop as required in the Cork City Development Plan 2022-2028 and as shown in Table 4.4.

Moreover, the proposed development will provide 48 bicycle parking spaces for cyclists using the proposed greenway. In total, the proposed development will provide 577 bicycle parking spaces.

4.5 Potential Impacts

4.5.1 Construction Phase for the Proposed Development

4.5.1.1 Trip Generation – Construction Phase

The construction phase of the development is expected to generate lower vehicle movements than the operational phase. However, a greater number of Heavy Goods Vehicles (HGVs) are expected during the construction phase. The Applicants have extensive experience of construction in this area and construction will be carried out in accordance with the Construction and Environmental Management Plan (CEMP) developed for the site (Appendix 2-1).

The proposed residential development will initially involve some earthworks, the site is relatively level thus there will be limited cut and fill balance required. All parking associated with site works will be provided within the curtilage of the site as outlined in the CEMP.

To reach the operational phase of the new development, the following works will be required to be carried out:

- Provision of a temporary construction access, a safe and secure site compound and the erection of temporary boundary fencing;
- Trenching for underground services including foul sewer, surface water drains, water mains, gas, telecommunications, electricity and lighting;
- Connection of underground services to existing underground services where available;
- Construction of houses throughout the site;
- Construction of the access roads, footpaths, and paved areas in the car parking areas; and
- Erection of permanent boundary fencing, landscaping, signage, and lighting.

Each of the activities outlined above will generate a level of vehicle movement to and from the site as well as internally within the subject site. The developer will concentrate on sections of the site at a time to limit HGV movements on the road network.

The typical plant used on site, including but not limit to, will be as follows:

- Excavator (with a rock breaker if required);
- JCB site master;
- (40T) dumper trucks;
- (<6T) dumper trucks;
- 20T roller;
- Small roller or/and heavy compaction plate;
- Road Sprayer/Scraper/Sweeper;
- Cement Mixer; and
- Water Pump.

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The start and finishing times are based on the winter period as this is more concentrated than during the summer period, between 8.00a.m. and 6.00p.m., five days per week, with some working on Saturday mornings, subject to any conditions set down by the Local Authority. It is expected that most workers will be on-site prior to the AM peak hour of 08:00-09:00. On average we would expect approximately 100 staff on site, this will vary over the life of the construction phase.

The construction workers are expected to arrive to the site mainly by private vehicle or there may be opportunities to car share. The level of traffic generation is expected to be less than the operational phase. Therefore, the analysis in the following sections focuses on the operational phase.

4.5.1.2 Traffic Impact During the Construction Phase

Normal working hours will typically be between 7.30 am to 6.00 pm, Monday to Friday, 7.30 am to 12.00 noon on Saturdays and 8.00 am to 12.00 noon periodically and if required on Sundays and Bank Holidays, subject to any conditions set down by the Local Authority. It is expected that most workers will be on-site prior to the AM peak hour of 08:00-09:00. It should be also noted that generally, construction traffic generated during the construction phase tends to be outside of AM and PM peak hours. Therefore, it is considered that construction traffic generated during the construction phase would not cause a significant traffic impacts on the surrounding roads.

4.5.2 Operational Phase for the Proposed Development

4.5.2.1 Traffic Survey

To determine current traffic behaviour in the vicinity of the subject site, a vehicle turning movement survey for the following nine junctions (location can be referred to Figure 4.2) was carried out on Tuesday, 16th April 2024. These junctions included:

- Junction 1 – Northern Roundabout at Junction 2 of N22 Ballincollig Bypass;
- Junction 2 – Greenfields Road / Flynn's Road / Castle Road;
- Junction 3 – Sunningdale / Maglin Road / Castle Road;
- Junction 4 – Sunningdale / Station Road / Carriganarra Road;
- Junction 5 – Link Road / Limeworth / Carriganarra Road / Leo Murphy Link Road;
- Junction 6 – Link Road / Heathfield / Carriganarra Road;
- Junction 7 – Killumney Link East Roundabout;
- Junction 8 – Northern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass; and
- Junction 9 – Southern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass.

It should be also noted that the future traffic flows at new junctions, including Junction 10 and Junction 11, would be estimated based on the aforementioned traffic counts and trips generated from the proposed development.

A classified traffic count was undertaken on Tuesday, 16th April 2024. The count was carried out over 12-hour period from 07:00 hours to 19:00 hours, and included both the morning and evening peak periods. The date was chosen while schools were open to ensure that realistic and valid volumes of traffic were included. The count was designed to identify the critical peak hour periods of traffic flow through the adjacent junctions. Data was collected in 15-minute intervals and the following count classifications were employed.

- Pedal Cycles (P/C);
- Motorcycles (M/C);
- Cars;
- Light Goods Vehicles (LGV);
- Oversize Goods Vehicles 1 (OGV 1);
- Oversize Goods Vehicles 2 (OGV 2);
- Public Service Vehicles (PSV); and
- Caravan.

The morning peak hour was identified as 08:00-09:00 for Junction 1 to Junction 9. The evening peak hour was identified as 16:00-17:00 at Junction 2 to Junction 5 and Junction 7 to Junction 9 inclusive, and 17:00-18:00 at Junction 1 and Junction 6.

Another classified traffic count was undertaken at Junction 12 – Southern Roundabout at Junction 2 of N22 Ballincollig Bypass on Thursday, 16th January 2025. The count was also carried out over 12-hour period from 07:00 hours to 19:00 hours. The morning and evening peak hours for Junction 12 were identified as 08:00-09:00 and 16:00-17:00 respectively.

A summary of the 2024 vehicle turning movement surveys for Junction 1 to Junction 9 in the morning and evening peak hours is shown in Figure 4.24 and Figure 4.25. Additionally, a summary of the 2025 vehicle turning movement surveys for Junction 12 in the morning and evening peak hours is shown in Figure 4.26.

A full transcription of the turning movement survey for Junction 1 to Junction 9 and Junction 12 is included in Appendix 4C herein.

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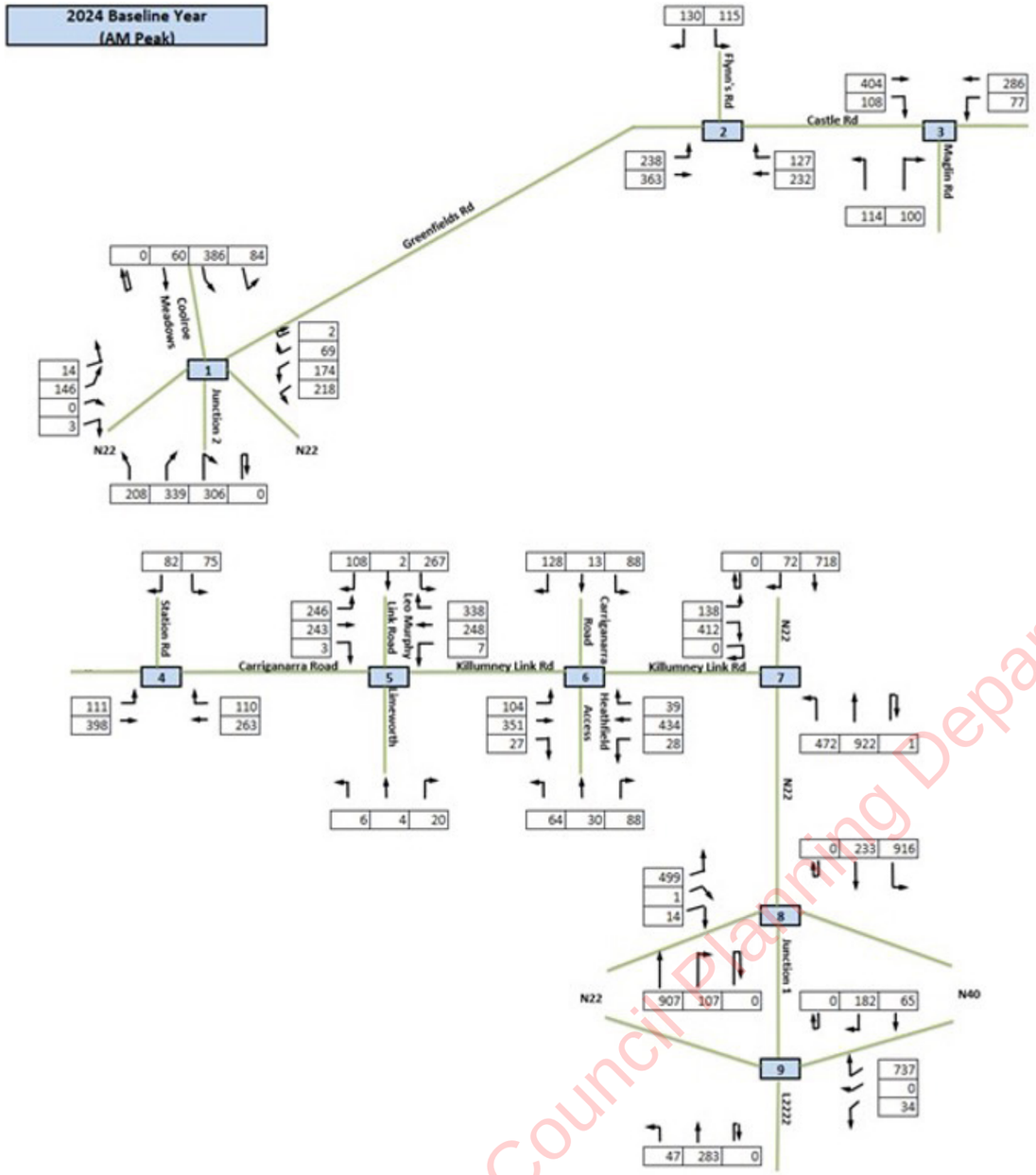

Figure 4.24 2024 Baseline Year Traffic Flow for Junction 1 to Junction 9 in the Morning Peak Hour

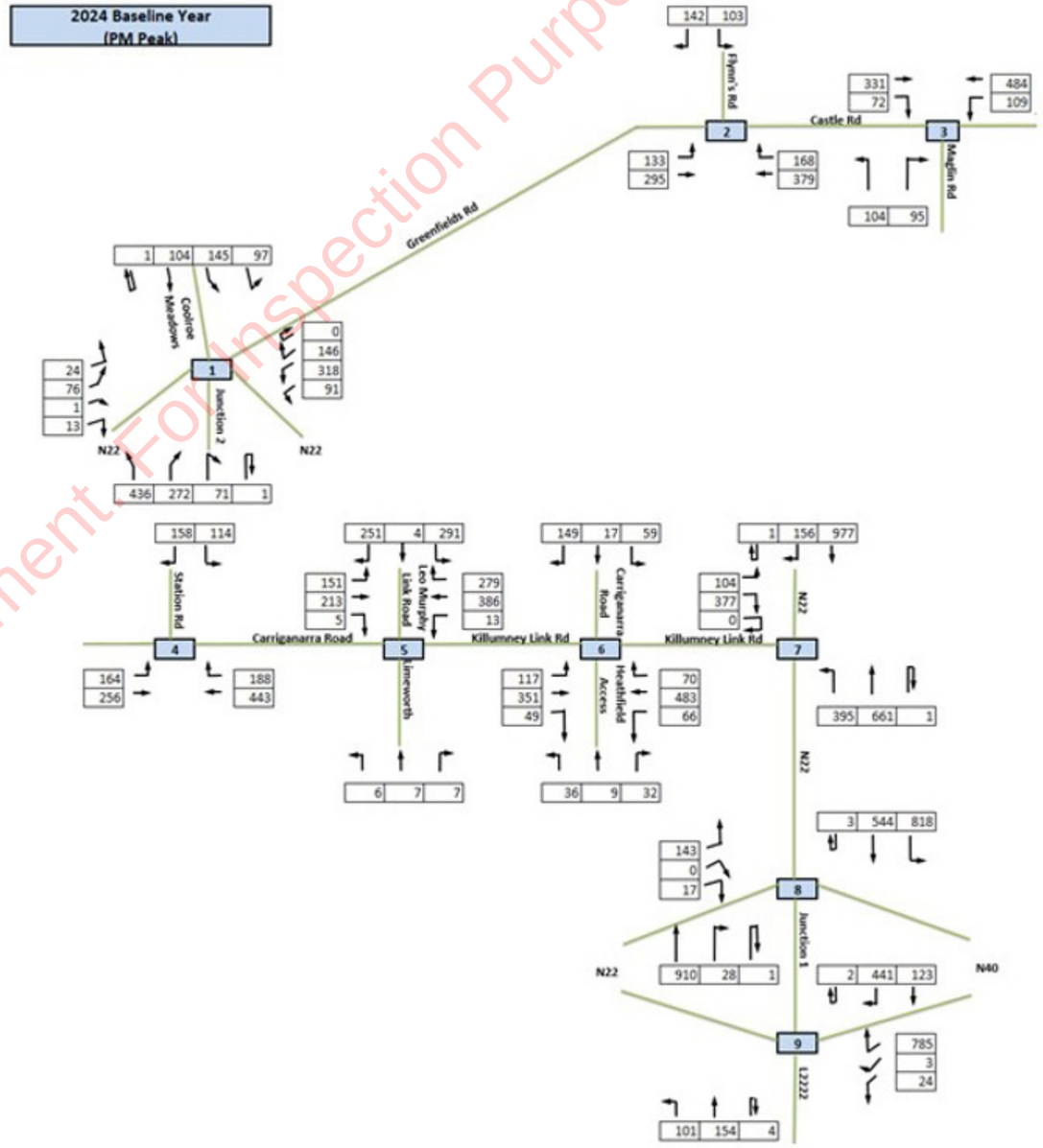

Figure 4.25 2024 Baseline Year Traffic Flow for Junction 1 to Junction 9 in the Evening Peak Hour

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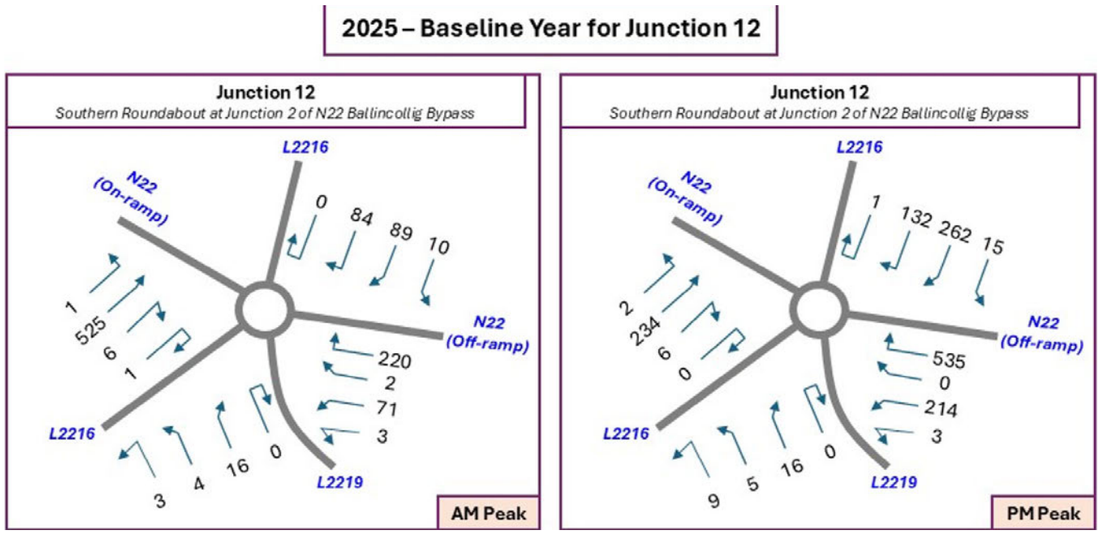

Figure 4.26 2025 Baseline Year Traffic Flow for Junction 12 in the Morning and Evening Peak Hours

4.5.2.2 Trip Generation for the Permitted Developments

At the time of writing, three other developments (including Stonecrest Phase 1 development, Stonecrest Phase 2 development and Heathfield Phase 4 development) in the vicinity of proposed development have obtained planning permission. Those permitted developments shall be considered for this study in both the "without" and "with" development scenarios. This is because whether or not the proposed development is built, the trips generated by those permitted developments will still apply.

a) Permitted Stonecrest Phase 1 Development

With reference to the planning application with ABP Case Number: ABP-308111-20, Table 4.5 below details the estimated trip generation for the permitted Stonecrest Phase 1 development during the morning and evening peak hours. At the time of traffic count surveys on 16th April 2024, 44 dwellings were occupied for the captioned development. Therefore, the outstanding portions of the permitted development (i.e. 69 dwellings and creche) as shown in Table 4.5 has been considered for this study.

Table 4.5 Trip Generation for Permitted Stonecrest Phase 1 Development

	Time	Factor	Arrival Rate*	Departure Rate*	Adopted Hourly Trips for Assessment	
					Trips In	Trips Out
Stonecrest Phase 1 Development (Residential)	AM Peak Hour	69 units**	0.310 (per unit)	0.905 (per unit)	21	62
	PM Peak Hour		0.560 (per unit)	0.500 (per unit)	39	35
Stonecrest Phase 1 Development (Creche)	AM Peak Hour	60 pupils	0.404 (per pupil)	0.250 (per pupil)	24	15
	PM Peak Hour		0.261 (per pupil)	0.314 (per pupil)	16	19
Total	AM Peak Hour	-	-	-	45	77
	PM Peak Hour	-	-	-	55	54

Note: * The arrival and departure rates *for Stonecrest Phase 1 development were extracted from the planning application with ABP Case Number: ABP-308111-20.*

** *At the time of traffic count surveys on 16th April 2024, 44 dwellings were occupied, and 69 dwellings of the captioned residential development were still not completed. Therefore, only 69 dwellings and creche have been considered for this study.*

b) Permitted Stonecrest Phase 2 Development

With reference to the planning application with Reference: 23/42446, Table 4.6 below details the estimated trip generation for the permitted Stonecrest Phase 2 development during the morning and evening peak hours being considered for this study.

Table 4.6 Trip Generation for Permitted Stonecrest Phase 2 Development

	Time	Factor	Arrival Rate*	Departure Rate*	Hourly Trips	
					Trips In	Trips Out
Stonecrest Phase 2 Development	AM Peak Hour	162 units	0.381 *(per unit)*	0.952 *(per unit)*	61	153
	PM Peak Hour		0.571 *(per unit)*	0.262 *(per unit)*	92	42

Note: * *The arrival and departure rates for Stonecrest Phase 2 development were extracted from the planning application with Reference: 23/42446.*

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c) Permitted Stonecrest/Coleman New Homes (Blarney) Limited Creche Development

With reference to the planning application with Reference 24/43308, the permitted creche development is mainly served the residents from the permitted Stonecrest Phase 1 Development and permitted Stonecrest Phase 2 Development. It is likely that many residents of the aforementioned developments will use the permitted creche facilities which can be used without the need to drive to the facility or is a by-pass trips (i.e. a large proportion of creche drop-offs will be by traffic already accounted for in the residential rates, on their way to work). In view of above reasons. It was assumed that the trip generation for the permitted creche will not cause an impact on the surrounding road networks and have not been considered for the assessment.

d) Permitted Heathfield Phase 4 Development

With reference to the planning application with Reference: 2241611, Table 4.7 below details the estimated trip generation for the permitted Heathfield Phase 4 development during the morning and evening peak hours being considered for this study.

Table 4.7 Trip Generation for Permitted Heathfield Phase 4 Development

	Time	Factor	Arrival Rate*	Departure Rate*	Hourly Trips (For Whole Development)		Adopted Hourly Trips** (Modal Shift Increase from 19% to 40%)	
					Trips In	Trips Out	Trips In	Trips Out
Heathfield Phase 4 Development	AM Peak Hour	98 units	0.137 *(per unit)*	0.482 *(per unit)*	13	47	10	35
	PM Peak Hour		0.480 *(per unit)*	0.274 *(per unit)*	47	27	35	20

Note: * *The arrival and departure rates for Heathfield Phase 4 development were extracted from the planning application with Reference: 2241611.*

** *0.74 factor was applied for increase to 40% modal split in accordance with the planning application with Reference: 2241611.*

4.5.2.3 Trip Generation for the Proposed Development

In order to establish the level of traffic likely to be generated by the proposed developments, trip rates from the Trip Rate Information Computer System (TRICS) database were used. TRICS is the system of trip generation analysis for the UK and Ireland and consists of an online repository of survey data collected for various land uses and provides information on trip rates seen.

a) Proposed Residential Development

As agreed with the Cork City Council, people trip rates from TRICS and modal split for the Electoral Division of Ballincollig from 2022 Census has been used to estimate the trip generation for the proposed residential development.

People trip rates for the land use classified as "Residential Mixed Private Flats and Houses" have been used and 21 sites across Ireland and the UK, excluding Greater Dublin and Greater London, were included from the TRICS database (7.11.4) to determine the people trip rates for the proposed residential development. The detail is set out in Appendix 4D.

As agreed with the Cork City Council, the following assumptions were adopted to estimate the modal split:

- In order to avoid some double counting, car passenger's number have been reduced by 20% in our assessment;
- The modal split (in total) should exclude both "Work mainly at or from home" and "Not Stated" to provide a more correct calculation;
- The modal split (by car driver) should include the reduced "Car Passenger" + "Car Driver" + "Van"; and

To reflect the delivery of the proposed active and sustainable transport measures included for in CMATS, additional 12% reduction in modal share (by car drive) was applied to calculate trip rate.

Table 4.8 presents the modal split for the Electoral Division of Ballincollig, as obtained from the 2022 Census and the calculation of vehicle mode share adopted in this study.

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Table 4.8 Mean of Travel in Ballincollig from 2022 Census and Calculation of Vehicle Mode Share

Mean of Travel	Number			
	Work	School or College	Sub-total (Work, School or College)	%
On Foot	493	950	1,443	10%
Bicycle	115	75	190	1%
Bus, Minibus or Coach	441	529	970	7%
Train, DART or LUAS	10	5	15	0%
Motorcycle or Scooter	25	3	28	0%
Car Driver	5,631	240	5,871	42%
Car Passenger	370	2,969	3,339	24%
Van	373	8	381	3%
Other (incl. lorry)	20	5	25	0%
Work mainly at or from home	1,174	26	1,200	9%
Not stated	295	227	522	4%
Total	8,947	5,037	13,984	-
Modal Split (in Total) excluding the "Work mainly at or from home" and "Not stated":			**12,262**	-
Modal Split (By Car Drive) including the 20% reduction on "Car Passenger" + "Car Driver" + "Van":			**8,923**	-
Vehicle Mode Share:			**73%**	-
Adopted Vehicle Mode Share (with additional 12% reduction):			**64%**	-

Table 4.8 indicates that about 64% of people for the year of opening in this area are using vehicles as agreed with Cork City Council. Therefore, this vehicle mode share of 64% has been applied to the people trip rates obtained from the TRICS database (7.11.4). Table 4.9 and details the estimated trip generation for the proposed residential development during the morning and evening peak hours being considered for this study.

Table 4.9 Trip Generation for the Proposed Residential Development

Proposed Development	Time	Factor	TRICS People Trip Rate		Adopted Vehicle Trip Rate (With Vehicle Mode Share of 64%)		Hourly Trips	
			Arrival	Departure	Arrival	Departure	Arrival	Departure
Residential Development	AM Peak Hour*	548** units	0.216 *(per unit)*	0.608 *(per unit)*	0.138 *(per unit)*	0.389 *(per unit)*	76	213
	PM Peak Hour*		0.464 *(per unit)*	0.245 *(per unit)*	0.297 *(per unit)*	0.157 *(per unit)*	163	86

Note: * *The TRICS database (08:00-09:00) were adopted for estimation of the AM peak trip rates for the proposed residential development.*

\# *The TRICS database (17:00-18:00) were adopted for estimation of the PM peak trip rates for the proposed residential development.*

** *548 units, which is greater than the proposed residential units (i.e. 544 units), was adopted for analysis and it represents the worst-case scenario.*

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b) Proposed Non-Residential Development

The expected trip generation for the proposed non-residential development (i.e. creche and café) was estimated utilising the vehicle trip rates from TRICS database (7.11.4) only, excluding Greater Dublin and Greater London. Table 4.10 details the estimated trip generation for the non-residential development (i.e. creche and café) during the morning and evening peak hours being considered for this study. The full TRICS output files for the proposed creche and café is also contained in Appendix 4D. It is likely that the trip rates utilised for creche and café land uses are higher than what will occur once proposed development is complete. Much of the trips to these land uses will be generated internally as people attending these facilities will also live within the proposed development. Additionally, large proportion of "Pass-by" trips (i.e. a large proportion of creche drop-offs or café trips will be by traffic already accounted for in the residential rates, on their way to work) and "Multi-Use" trips (i.e. visitors to the café may also visit the creche) will be expected for the proposed creche and café. In view of above reasons, it was assumed that 20% of trip generation for the creche and café will cause an impact on the surrounding road networks and have been considered for the assessment.

Table 4.10 Trip Generation for the Proposed Non-Residential Development

Proposed Development	Time	Factor	TRICS Arrival Rate*	TRICS Departure Rate*	Hourly Trips		Adopted Hourly Trips due to Trip Reduction**	
					Trips In	Trips Out	Trips In	Trips Out
Creche	AM Peak Hour*	128 pupils	0.224 *(per pupil)*	0.195 *(per pupil)*	29	25	6	5
	PM Peak Hour#		0.180 *(per pupil)*	0.228 *(per pupil)*	23	29	5	6
Café	AM Peak Hour*	517.2 m^2 GFA	3.548 *(per 100m^2)*	3.075 *(per 100m^2)*	18	16	4	3
	PM Peak Hour##		2.718 *(per 100m^2)*	3.573 *(per 100m^2)*	14	18	3	4

Note: * *The TRICS database (08:00-09:00) were adopted for estimation of the AM peak trip rates for the proposed creche and café.*

\# *The TRICS database (17:00-18:00) were adopted for estimation of the PM peak trip rates for the proposed creche.*

\## *The TRICS database (16:00-17:00) were adopted for estimation of the PM peak trip rates for the proposed café.*

** *80% trip reduction was applied as by-pass trips.*

c) Total Trip Generation for the Proposed Development

Table 4.11 details the estimated total trip generation for the proposed development (including residential units, creche and café) during the morning and evening peak hours being considered for this study.

Table 4.11 Vehicle Trip Generation for the Proposed Development

Proposed Development	Time	Factor	Arrival Rate	Departure Rate	Hourly Trips		Adopted Hourly Trips*	
					Trips In	Trips Out	Trips In	Trips Out
Residential Development	AM Peak	548** units	0.138 *(per unit)*	0.389 *(per unit)*	76	213	76	213
	PM Peak		0.297 *(per unit)*	0.157 *(per unit)*	163	86	163	86
Creche	AM Peak	128 pupils	0.224 *(per pupil)*	0.195 *(per pupil)*	29	25	6	5
	PM Peak		0.180 *(per pupil)*	0.228 *(per pupil)*	23	29	5	6
Café	AM Peak	517.2 m^2 GFA	3.548 *(per 100m^2)*	3.075 *(per 100m^2)*	18	16	4	3
	PM Peak		2.718 *(per 100m^2)*	3.573 *(per 100m^2)*	14	18	3	4
Total	AM Peak	-	-	-	123	254	86	221
	PM Peak	-	-	-	200	133	171	96

Note: * *80% trip reduction was applied for the proposed creche and café.*

** *548 units, which is greater than the proposed residential units (i.e. 544 units), was adopted for analysis and it represents the worst-case scenario*

Based on Table 4.11, expected trip generation for the proposed development was estimated utilising the TRICS database and was revealed to be in total 86 trips inbound and 221 trips outbound in the morning peak hour, and 171 trips inbound and 96 trips outbound in the evening peak hour.

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4.5.2.4 Modal Choice

In order to produce a conservative and robust assessment of the traffic impact of the proposed development, this study assumes that 64% of the people trip rates generated by the development will be by private car as set out in Table 4.8.

4.5.2.5 Trip Distribution and Assessment Years

a) Permitted Developments – Trip Distribution

The permitted developments, including Stonecrest Phase 1 development, Stonecrest Phase 2 development and Heathfield Phase 4 development, will be completed prior to completion of the proposed development. Therefore, those permitted developments shall be considered for this study in both the "without" and "with" development scenarios.

The trip distribution for those permitted developments to the concerned junctions will be extracted from their respective TTA report, if any. Otherwise, existing traffic patterns (i.e. development generated flows will be split through the junction proportionally to existing flows) will be adopted for traffic distribution of those permitted developments. Appendix 4E and Appendix 4F illustrate the trip distribution and trip generation of those permitted developments.

b) Proposed Development – Trip Distribution and Assessment Years

The future development traffic distribution is likely to mirror existing traffic patterns (i.e. development generated flows will be split through the junction proportionally to existing flows).

On the assumption that planning permission is granted for the proposed development in 2025, and the construction will commence in 2026, then it is estimated that the proposed development will be fully operational by the year 2032.

For the purpose of this study, we will take 2032 as the Opening Year. Consequently, traffic analysis associated with this study will focus on the following future development operational scenarios:

- 2024 Baseline Year (for Junction 1 to Junction 9) and 2025 Baseline Year (for Junction 12);
- 2032 Opening Year ("without" and "with" development scenarios); and
- 2047 Design Year Horizon (Opening Year + 15 Years) ("without" and "with" development scenarios).

c) Future Traffic Flows for the "Without" and "With" Development Scenarios

The projected 2032 and 2047 background traffic flows have been calculated by factoring up the 2024/2025 recorded traffic flows in accordance with the TII Publications Project Appraisal Guidelines for National Roads document 'Unit 5.3 Travel Demand Projections, Table 6.1: Link-Based Growth Rates: Metropolitan Area Annual Growth Rates'. The majority of lands located at Maglin Valley are zoned as "New Residential Neighbourhoods" in the Cork City Development Plan 2022-2028 and it is expected that the majority of traffic growth in this area will be generated by these residential developments. For this reason, low sensitivity traffic growth rates, which was agreed with the Cork City Council, were assigned to the 2024/2025 base traffic for the future scenarios. Table 4.12 illustrates the low sensitivity growth rates adopted in this study.

Table 4.12 Low Sensitivity Growth Rates

Metropolitan Area	Vehicle Category	Low Sensitivity Growth Rates		
		2016-2030	2030-2040	2040-2050
Cork	Light Vehicle (LV)	1.0153	1.0072	1.0065
	Heavy Vehicle (HV)	1.0279	1.0128	1.0164

The 2032 Opening Year and 2047 Design Year traffic flows are equal to the sum of their respective year background traffic flows (as derived above) and the trips generated from those permitted developments to create the "without" development scenario. Additional traffic flows due to the proposed development is then applied to these respective year flows to create the "with" development scenario. Table 4.13 presents the traffic flows included for each scenario.

Table 4.13 Scenarios Modelled

Scenario	Traffic Flows Included				
	Background Traffic (+growth)	Stonecrest Phase 1 Development	Stonecrest Phase 2 Development	Heathfield Phase 4 Development	Proposed Development
2024/2025 Baseline Year	√	Partially*	X	X	X
2032 Opening Year (Without Development)	√	√	√	√	X
2032 Opening Year (With Development)	√	√	√	√	√
2047 Design Year (Without Development)	√	√	√	√	X
2047 Design Year (With Development)	√	√	√	√	√

Note: * *2024 Traffic Counts included 44 occupied units for Stonecrest Phase 1 development.*

The generated traffic has been distributed onto the surrounding road network based on the current directional splits of traffic associated with the local road network (based on the Junction Turn Counts undertaken as part of the traffic survey). Appendix 4G and Appendix 4H illustrate the trip distribution and trip generation respectively, arriving and departing the proposed developments during the morning and evening peak periods.

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4.5.2.6 Trip Generation as a Percentage of Existing Traffic

In order to assess the future traffic impact of the proposed development the NRA Traffic and Transport Assessment Guidelines were assessed to determine the threshold requirements for a traffic impact assessment.

Expected trip generation for the proposed development was estimated utilising the TRICS database and was revealed to be in total 86 trips inbound and 221 trips outbound in the morning peak hour, and 171 trips inbound and 96 trips outbound in the evening peak hour. An exercise was carried out to quantify the expected development trip generation as a proportion of existing traffic flows on the surrounding road network to determine if a detailed traffic impact assessment is required for all of the junctions included within the scoping study.

It is anticipated that the future background traffic flows shall be factored up in accordance with 'Unit 5.3 Travel Demand Projections, Table 6.1: Link-Based Growth Rates: Metropolitan Area Annual Growth Rates' under low sensitivity growth rates. In view of above reasons, the existing traffic flows will be used instead of future traffic flows in order to provide a robust analysis and a "worst-case" scenario.

Utilising trip distributions proportionally to the existing flows, 43.6% and 56.4% of vehicles currently turn westward (towards Junction 1) and eastward (towards Junction 2) respectively from the proposed development to Greenfields Road, while 56.4% and 43.6% of the vehicles currently turn right (i.e. arriving from Junction 1) and left (i.e. arriving from Junction 2) respectively from Greenfields Road into the proposed development in the morning peak period. In the evening peak hour, 56.5% and 43.5% of the vehicles currently turn westward (i.e. towards Junction 1) and eastward (i.e. towards Junction 2) respectively from the proposed development to Greenfields Road, while 43.5% and 56.5% of the vehicles currently turn right (i.e. arriving from Junction 1) and left (i.e. arriving from Junction 2) respectively from Greenfields Road into the proposed development.

As Junction 10 is the main access to the proposed development, it was assumed that 60% of trips generated from the proposed development will travel to/from Greenfields Road via Junction 10 while 40% of trips generated from the proposed development will travel to/from Greenfields Road via Junction 11.

The result of this trip distribution and assignment exercise is presented in Table 4.14 and Table 4.15.

Table 4.14 Development Morning Peak Hour Trip Generation as a Percentage of Existing Road Network Traffic Flow

Junction	Junction AM Peak Traffic	Proposed Development Generated Traffic	Percentage Change
Junction 1 – Northern Roundabout at Junction 2 of N22 Ballincollig Bypass	2,010	145	7.2%
Junction 2 – Greenfields Road / Flynn's Road / Castle Road	1,205	162	13.4%
Junction 3 – Sunningdale / Maglin Road / Castle Road	1,088	100	9.2%
Junction 4 – Sunningdale / Station Road / Carriganarra Road	1,039	77	7.4%
Junction 5 – Link Road / Limeworth / Carriganarra Road / Leo Murphy Link Road	1,493	61	4.1%
Junction 6 – Link Road / Heathfield / Carriganarra Road	1,392	34	2.4%
Junction 7 – Killumney Link East Roundabout	2,735	25	0.9%
Junction 8 – Northern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass	2,677	19	0.7%
Junction 9 – Southern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass	1,348	7	0.5%
Junction 12 – Southern Roundabout at Junction 2 of N22 Ballincollig Bypass	1,035	66	6.4%

As demonstrated by Table 4.14, the estimated trips associated with the proposed development to the existing traffic flows in 2024/2025 is less than 5% for Junction 5 to Junction 9 inclusive in the morning peak hour.

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Table 4.15 Development Evening Peak Hour Trip Generation as a Percentage of Existing Road Network Traffic Flow

Junction	Junction PM Peak Traffic	Proposed Development Generated Traffic	Percentage Change
Junction 1 – Northern Roundabout at Junction 2 of N22 Ballincollig Bypass	1,796	128	7.1%
Junction 2 – Greenfields Road / Flynn's Road / Castle Road	1,220	139	11.4%
Junction 3 – Sunningdale / Maglin Road / Castle Road	1,195	100	8.4%
Junction 4 – Sunningdale / Station Road / Carriganarra Road	1,322	82	6.2%
Junction 5 – Link Road / Limeworth / Carriganarra Road / Leo Murphy Link Road	1,613	58	3.6%
Junction 6 – Link Road / Heathfield / Carriganarra Road	1,438	35	2.4%
Junction 7 – Killumney Link East Roundabout	2,672	25	0.9%
Junction 8 – Northern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass	2,463	19	0.8%
Junction 9 – Southern Roundabout at Junction 1 of Cork South Ring Road / Ballincollig Bypass	1,637	14	0.9%
Junction 12 – Southern Roundabout at Junction 2 of N22 Ballincollig Bypass	1,433	76	5.3%

As demonstrated by Table 4.15, the estimated trips associated with the proposed development to the existing traffic flows in 2024/2025 is less than 5% for Junction 5 to Junction 9 inclusive in the evening peak hour.

In view of above robust analysis for Junction 5 to Junction 9, the estimated trips associated with the proposed development represent a small proportion of existing traffic flows on the surrounding road network and less than the thresholds for traffic impact assessment as stated in the Table 2.1 of TII Traffic and Transport Assessment Guidelines (i.e. 10% of the traffic flow on the existing road network and 5% in sensitive environments or where congestion exists) during the morning and evening peak hours.

As a result of this negligible increase in traffic volumes on the surrounding road network, it is not required to undertake any traffic capacity assessments for Junction 5 to Junction 9 in this study. It is reasonable to assume that the number of net trips generated by the proposed development will remain close to a constant number in future years while background traffic levels will show a steady increase. This will result in the traffic impact of the proposed development decreasing even further in future years.

However, it is acknowledged that Junction 1 to Junction 4 and Junction 12 are greater than the 5% of the traffic flow on the existing road network where congestion exists or the location is sensitive. Therefore, a capacity assessment on Junction 1 to Junction 4 and Junction 12 were undertaken by using the Transport Research Laboratory's (TRL) analysis software; Assessment of Roundabout Capacity and Delay (ARCADY) for roundabout junction, Priority Intersection Capacity and Delay (PICADY) for priority junction and Optimised Signal Capacity and Delay (OSCADY) for signalized junction. Additionally, a capacity assessment on Junction 10 and Junction 11 were undertaken as they are the access junctions on Greenfields Road.

Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 were modelled for the 2024 Baseline Year (Junction 1 to Junction 4, Junction 10 and Junction 11), 2025 Baseline Year (Junction 12), 2032 Opening Year and 2047 Design Year (Opening Year plus 15 years) in the morning and evening peak hours.

4.5.2.7 Network Traffic Flows – Operational Stage

Refer to Figure 4.27 to Figure 4.30 inclusive for the estimated future traffic flows in the morning and evening peak hours for Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12.

a) 2032 Opening Year Traffic Flows

Figure 4.27 and Figure 4.28, demonstrate the 2032 Opening Year traffic flows Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 in the morning and evening peak hours for the "without" development and "with" development scenarios.

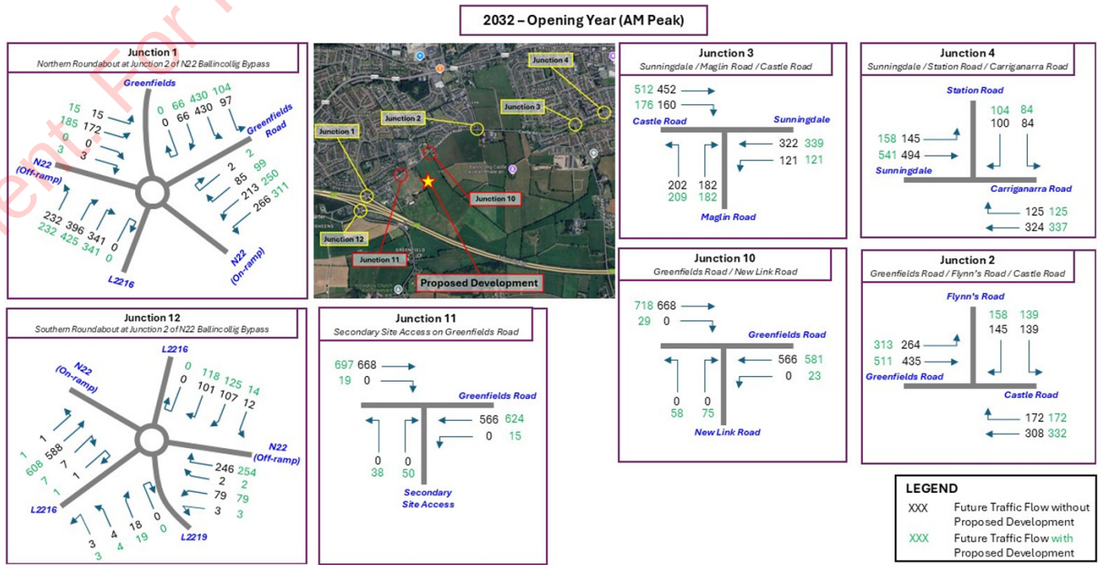

Figure 4.27 2032 Opening Year Traffic Flows for Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 in the Morning Peak Hour

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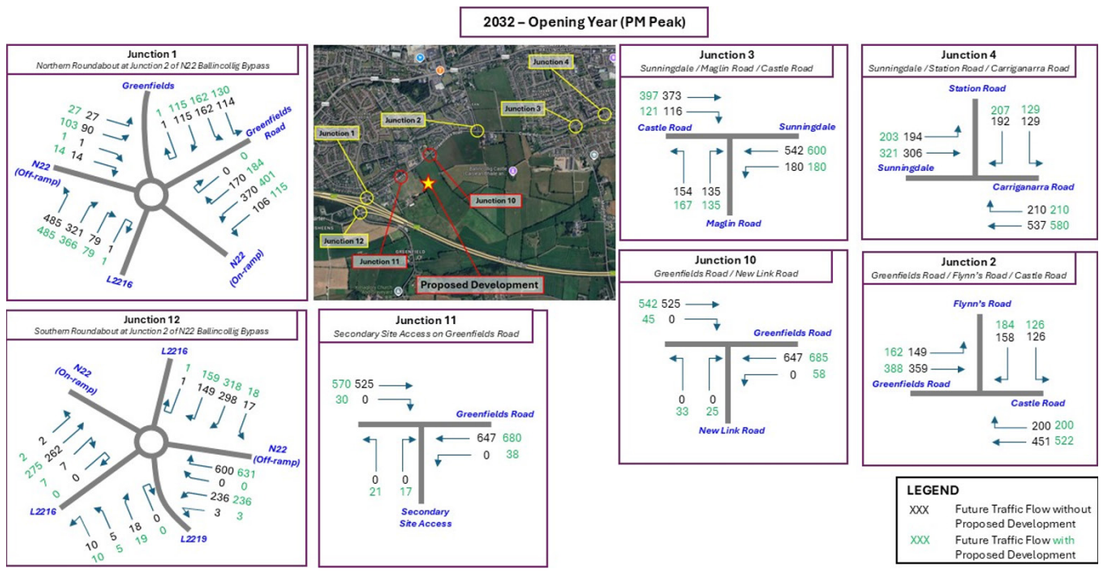

Figure 4.28 2032 Opening Year Traffic Flows for Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 in the Evening Peak Hour

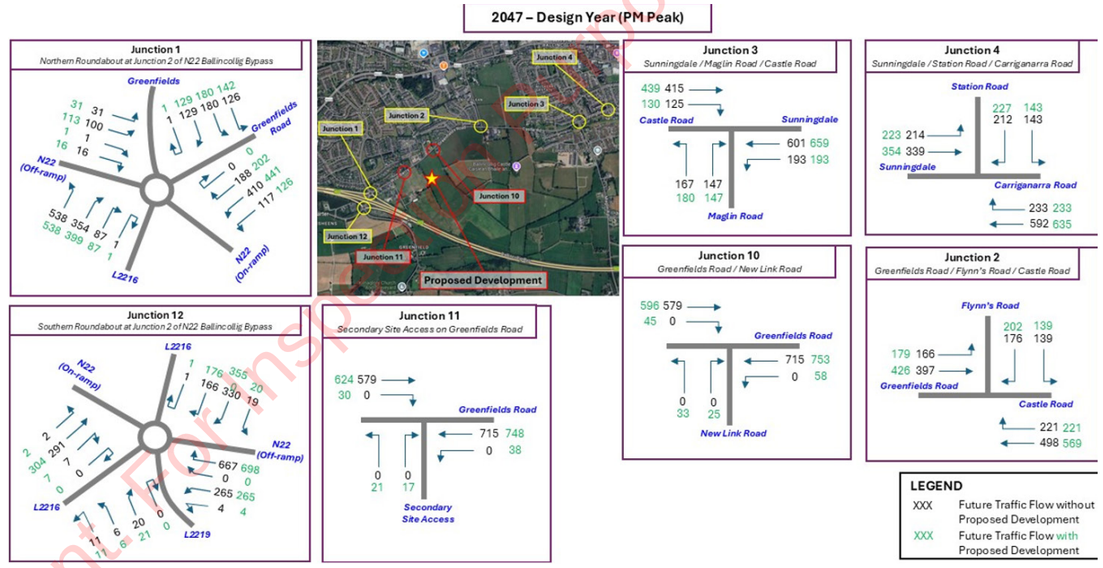

Figure 4.30 2047 Design Year Traffic Flows for Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 in the Evening Peak Hour

b) 2047 Design Year Traffic Flows

Figure 4.29 and Figure 4.30, illustrate the 2047 Design Year Horizon traffic flows for Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 in the morning and evening peak hours for the "without" development and "with" development scenarios.

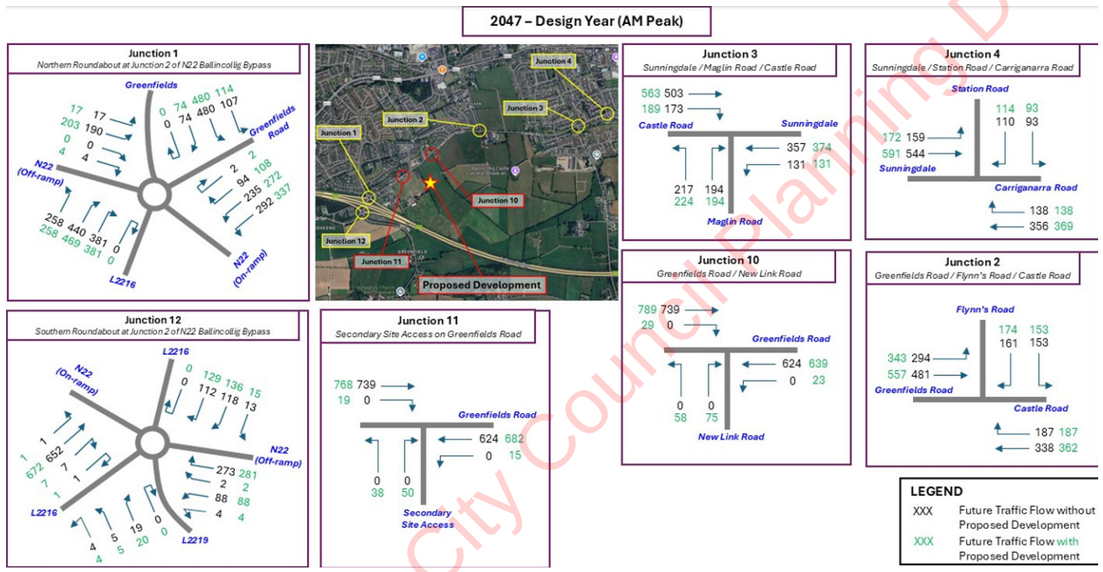

Figure 4.29 2047 Design Year Traffic Flows for Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 in the Morning Peak Hour

4.5.2.8 Traffic Impact During the Operational Stage

The capacity of existing and proposed junctions in the vicinity of the development is the key determinant of the transport network operation. Traffic assessments therefore focus on the influence of traffic generated by the proposed development on junctions in the surrounding road network. As mentioned in Section 4.5.2.6, a capacity assessment on Junction 1 to Junction 4 and Junction 12 are required due to the estimated trips associated with the proposed development to the existing traffic flows on Junction 1 to Junction 4 and Junction 12 greater than 5%. Additionally, a capacity assessment on Junction 10 and Junction 11 were undertaken as they are the access junctions on Greenfields Road. ARCADY, PICADY and OSCADY software has been used to analyse the roundabout, priority and signalised junctions respectively. These programs determine the capacity of the junctions based on a variety of geometric parameters and assess the extent to which the flow of traffic through that junction approaches capacity. The traffic capacity assessments have been carried out for the following junctions:

- Junction 1 – Northern Roundabout at Junction 2 of N22 Ballincollig Bypass;
- Junction 2 – Greenfields Road / Flynn's Road / Castle Road;
- Junction 3 – Sunningdale / Maglin Road / Castle Road;
- Junction 4 – Sunningdale / Station Road / Carriganarra Road;
- Junction 10 – Greenfields Road / New Link Road;
- Junction 11 – Secondary Site Access on Greenfields Road; and
- Junction 12 – Southern Roundabout at Junction 2 of N22 Ballincollig Bypass.

The criteria utilised for the assessment of roundabout and priority junction capacity is Ratio of Flow to Capacity (RFC) while the criteria utilised for the assessment of signalised junction capacity is Degree of Saturation (DOS). The RFC and DOS provide a basis for judging the acceptability of junction designs. Typically, a RFC of less than 0.85 normal design threshold for priority junction/roundabout junction and a DOS of less than 0.9 normal design threshold for signalised junction are considered

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to indicate satisfactory performance (i.e. operating in an efficient and stable condition). A RFC of between 0.85 and 1 for priority junction/roundabout junction and a DOS of between 0.9 and 1 for signalised junction represent variable operation, and may be said to be operating adequately, if the queue and delay are deemed acceptable. RFC and DOS values in excess of 1 represent an oversaturated condition.

The junctions were modelled for the 2024/2025 Baseline Year, 2032 Opening Year and 2047 Design Year Horizon for the morning and evening peak hours using the flow diagrams as shown in Figure 4.24, Figure 4.25, Figure 4.26 and Figure 4.27 to Figure 4.30 in the previous section herein.

To demonstrate the direct traffic impact associated with the proposed development, the traffic modelling exercise was carried out for the "without" development and "with" development scenarios.

a) Junction Capacity Assessment for 2024/2025 Baseline Year

A traffic capacity assessment of the Junction 1 to Junction 4 and Junction 12 were undertaken utilising the flows illustrated in Figure 4.24, Figure 4.25 and Figure 4.26, and the TRL's ARCADY, PICADY and OSCADY traffic modelling software for roundabout, priority and signalized junctions respectively. As summary of the results of the analysis for the 2024/2025 Baseline Year, during the morning and evening peak hours is shown below in Table 4.16 to Table 4.20 inclusive.

Junction 1 - Northern Roundabout at Junction 2 of N22 Ballincollig Bypass

Table 4.16 2024 Baseline Year Junction Capacity Analysis for Junction 1

Approach Arm	Max. RFC		Max. Queue (PCU[1])		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Greenfields Road	0.60	0.55	2	1	12	8
N22 Eastbound (On-ramp)	-	-	-	-	-	-
L-2216	0.70	0.67	3	2	10	9
N22 Eastbound (Off-ramp)	0.16	0.11	0	0	4	4
Greenfields	0.56	0.30	1	1	9	4

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 4.16 demonstrate that Junction 1 is currently operating within the normal design threshold in the morning and evening peak hours in 2024 baseline scenario.

Junction 2 - Greenfields Road / Flynn's Road / Castle Road

Table 4.17 2024 Baseline Year Junction Capacity Analysis for Junction 2

Approach Arm	Max. RFC		Max. Queue (PCU[2])		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Greenfields Road	-	-	-	-	-	-
Flynn's Road	0.42	0.47	1	1	20	22
Castle Road	0.35	0.48	1	2	9	9

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 4.17 demonstrate that Junction 2 is currently operating within the normal design threshold in the morning and evening peak hours in 2024 baseline scenario.

Junction 3 - Sunningdale / Maglin Road / Castle Road

Table 4.18 2024 Baseline Year Junction Capacity Analysis for Junction 3

Approach Arm	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Sunningdale	0.22	0.31	0	1	3	3
Maglin Road	0.32	0.33	1	1	17	18
Castle Road	0.28	0.20	1	1	6	6

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 4.18 demonstrate that Junction 3 is currently operating within the normal design threshold in the morning and evening peak hours in 2024 baseline scenario.

1 PCU means Passenger Car Unit. A passenger car equivalent is essentially the impact that a mode of transport has on traffic variables (such as headway, speed, density) compared to a single car. For example, 1 private car is equal to 1 pcu and 1 HGV is equal to 2.3 pcu.

2 PCU means Passenger Car Unit. A passenger car equivalent is essentially the impact that a mode of transport has on traffic variables (such as headway, speed, density) compared to a single car. For example, 1 private car is equal to 1 pcu and 1 HGV is equal to 2.3 pcu.

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Junction 4 - Sunningdale / Station Road / Carriganarra Road

Table 4.19 2024 Baseline Year Junction Capacity Analysis for Junction 4

Approach Arm	Max. DOS		Max. Queue (PCU)	
	AM	PM	AM	PM
Sunningdale	0.63	0.74	10	11
Station Road	0.65	0.75	6	9
Carriganarra Road	0.68	0.79	8	16

The normal design threshold for the degree of saturation (DOS) is 0.9 for a signalized junction. The results shown in Table 4.19 demonstrate that Junction 4 is currently operating within the normal design threshold in the morning and evening peak hours in 2024 baseline scenario.

Junction 12 - Southern Roundabout at Junction 2 of N22 Ballincollig Bypass

Table 4.20 2024 Baseline Year Junction Capacity Analysis for Junction 12

Approach Arm	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
L-2216 North	0.18	0.39	0	1	4	6
N22 Westbound (Off-ramp)	0.25	0.73	0	3	4	13
L-2219	0.03	0.06	0	0	4	8
L-2216 South	0.57	0.33	2	1	9	7
N22 Westbound (On-ramp)	-	-	-	-	-	-

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 4.20 demonstrate that Junction 12 is currently operating within the normal design threshold in the morning and evening peak hours in 2025 baseline scenario.

b) Link Capacity Assessment for 2024 Baseline Year

It is also necessary to assess the capacity of the most relevant link roads (Greenfields Road; Maglin Road; Castle Road; Sunningdale; and Carriganarra Road). The 'UK DMRB Advice Note TA 79/99 – Traffic Capacity of Urban Roads' was used to estimate the maximum one-way hourly capacity these streets. From Table 1– "Types of Urban roads and the features that distinguish them" of the above Advice Note, the following categorisation has been assigned to each road:

- Greenfields Road – UAP3;
- Maglin Road – UAP3;
- Castle Rd – UAP3;
- Sunningdale – UAP2; and
- Carriganarra Rd – UAP2.

All roads can be attributed an 'Urban All-purpose 2' (UAP2) or 'Urban All-purpose 3' (UAP3) type road. A UAP2 road type is categorised as one with 'Good standard single/dual carriageway road with frontage access and more than two side roads per km'. UAP3 road types generally are a variable standard road with a speed limit of between 30mph to 40mph with frontage access and unrestricted parking.

Table 3 of the Advice Note provides 'Capacities of Urban Roads - One-way hourly flows in each direction' for each road type. This table assumes a 60:40 directional split and the max capacity provided is for the busiest flow (i.e. 60% of the AADT).

In accordance with the Advice Note, Table 4.21 outlines the maximum road capacity (vehicle/hour) in the one direction for UAP2 and UAP3 type roads for 2024 Baseline Year Flow. It also includes the one-way peak flow of the existing traffic based on the traffic surveys. For example, the maximum capacity of Carriganarra Road in one direction is 1,470 vehicles per hour based on the Advice Note, and the morning peak hour traffic on Carriganarra Road are 473 vehicles/hr (eastbound) and 373 vehicles/hr (westbound). Therefore, the highest current traffic volume of 473 vehicles/hr eastbound is below the capacity of Carriganarra Road at 1,470 vehicles/hr in the busiest direction. A summary of the results of the analysis of relevant link roads for the 2024 Baseline Year during the morning and evening peak hours is shown in Table 4.21.

Table 4.21 2024 Baseline Year Link Capacity Analysis

Link Road	Road Type	No. of Lanes	Road Width	Max. Capacity (Veh/hr)	AM Peak Flow	PM Peak Flow	Outcome
Greenfields Road	UAP3	2	6.75m	1,110	571 (NB)	555 (SB)	Within Capacity
Maglin Road	UAP3	2	6.75m	1,110	214 (NB)	199 (NB)	Within Capacity
Castle Road	UAP3	2	7.3m	1,300	478 (EB)	547 (WB)	Within Capacity
Sunningdale	UAP2	2	9.0m	1,550	508 (EB)	600 (WB)	Within Capacity
Carriganarra Road	UAP2	2	7.3m	1,470	473 (EB)	631 (WB)	Within Capacity

Table 4.21 demonstrates that Greenfields Road, Maglin Road, Castle Road, Sunningdale and Carriganarra Road are currently operating within the normal design threshold in both the morning and evening peak hours under 2024 Baseline Year.

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c) Operational Phase 2032 Opening Year – Junction Capacity

A traffic capacity assessment of the Junction 1 to Junction 4, Junction 10, Junction 11 and Junction 12 were undertaken utilising the flows illustrated in Figure 4.27 and Figure 4.28 and the TRL's ARCADY, PICADY and OSCADY traffic modelling software for roundabout, priority and signalized junctions respectively. A summary of the results of the analysis for the 2032 Opening Year, "without" development and "with" development scenarios, during the morning and evening peak hours is shown below in Table 4.22 to Table 4.28 inclusive.

Junction 1 - Northern Roundabout at Junction 2 of N22 Ballincollig Bypass

Table 4.22 2032 Opening Year Junction Capacity Analysis for Junction 1

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road	Without Development	0.79	0.65	4	2	24	10
	With Development	0.92	0.71	10	3	52	12
N22 Eastbound (On-ramp)	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
L-2216	Without Development	0.80	0.77	4	4	15	13
	With Development	0.83	0.81	5	5	18	17
N22 Eastbound (Off-ramp)	Without Development	0.20	0.14	0	0	5	5
	With Development	0.22	0.16	0	0	5	5
Greenfields	Without Development	0.69	0.35	2	1	13	5
	With Development	0.72	0.37	3	1	15	5

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for good operation and 0.85 -1.0 for variable operation within capacity. The results shown in Table 4.22 demonstrate that all arms will operate within capacity (less than 1.0 RFC), with the largest delay on Greenfields Road of 52 secs in the morning peak hour.

It should be noted that the queue and delay in the peak hours for this junction is deemed acceptable. Therefore, a RFC of between 0.85 and 1 for this junction is considered to be operating adequately.

Junction 2 - Greenfields Road / Flynn's Road / Castle Road

Table 4.23 2032 Opening Year Junction Capacity Analysis for Junction 2

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
Flynn's Road	Without Development	0.58	0.62	1	2	33	37
	With Development	0.72	0.80	3	4	56	70
Castle Road	Without Development	0.53	0.63	2	3	12	13
	With Development	0.59	0.69	2	4	14	15

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 4.23 demonstrate that Junction 2 will operate within the normal design threshold in both the morning and evening peak hours in 2032 for both the "without" development and "with" development scenarios.

Junction 3 - Sunningdale / Maglin Road / Castle Road

Table 4.24 2032 Opening Year Junction Capacity Analysis for Junction 3

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Sunningdale	Without Development	0.26	0.38	0	1	3	3
	With Development	0.27	0.41	0	1	3	3
Maglin Road	Without Development	0.77	0.58	3	1	61	36
	With Development	0.87	0.66	5	2	96	49
Castle Road	Without Development	0.45	0.35	2	1	8	8
	With Development	0.53	0.39	2	1	9	8

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for good operation and 0.85 -1.0 for variable operation within capacity. The results shown in Table 4.24 demonstrate that the highest RFC is 0.87 (less than 1.0) on Maglin Road in the morning peak hour with 2 additional PCU queue.

It should be noted that the queue and delay in the peak hours for this junction is deemed acceptable. Therefore, a RFC of between 0.85 and 1 for this junction is considered to be operating adequately.

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Junction 4 - Sunningdale / Station Road / Carriganarra Road

Table 4.25 2032 Opening Year Junction Capacity Analysis for Junction 4

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)	
		AM	PM	AM	PM
Sunningdale	Without Development	0.79	0.88	14	16
	With Development	0.86	0.92	17	18
Station Road	Without Development	0.80	0.88	8	13
	With Development	0.82	0.92	8	14
Carriganarra Road	Without Development	0.72	0.88	10	20
	With Development	0.72	0.88	10	21

The normal design threshold for the degree of saturation (DOS) is 0.9 for a signalised junction, a DOS of between 0.9 and 1 for signalised junction represent variable operation, and may be said to be operating adequately. The results shown in Table 4.25 demonstrate that the highest DOS is 0.92 (less than 1.0) on Sunningdale in the evening peak hour with 2 additional PCU queue.

It should be noted that the queue and delay in the peak hours for this junction is deemed acceptable. Therefore, a RFC of between 0.85 and 1 for this junction is considered to be operating adequately.

Junction 10 - Greenfields Road / New Link Road

Table 4.26 2032 Opening Year Junction Capacity Analysis for Junction 10

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road North	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
New Link Road	Without Development	-	-	-	-	-	-
	With Development	0.43	0.18	1	0	21	14
Greenfields Road South	Without Development	-	-	-	-	-	-
	With Development	0.06	0.10	0	0	8	9

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 4.26 demonstrate that Junction 10 will operate within the normal design threshold in both the morning and evening peak hours in 2032 for the "with" development scenario.

Junction 11 - Secondary Site Access on Greenfields Road

Table 4.27 2032 Opening Year Junction Capacity Analysis for Junction 11

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road North	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
Secondary Site Access	Without Development	-	-	-	-	-	-
	With Development	0.27	0.11	0	0	15	12
Greenfields Road South	Without Development	-	-	-	-	-	-
	With Development	0.08	0.11	0	0	5	5

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 4.27 demonstrate that Junction 11 will operate within the normal design threshold in both the morning and evening peak hours in 2032 for the "with" development scenario.

Junction 12 - Southern Roundabout at Junction 2 of N22 Ballincollig Bypass

Table 4.28 2032 Opening Year Junction Capacity Analysis for Junction 12

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
L-2216 North	Without Development	0.21	0.45	0	1	4	6
	With Development	0.25	0.48	0	1	5	7
N22 Westbound (Off-ramp)	Without Development	0.29	0.84	0	6	4	22
	With Development	0.30	0.89	1	8	5	31
L-2219	Without Development	0.03	0.08	0	0	5	10
	With Development	0.03	0.09	0	0	5	11
L-2216 South	Without Development	0.66	0.40	2	1	12	9
	With Development	0.70	0.44	3	1	13	10
N22 Westbound (On-ramp)	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for good operation and 0.85 -1.0 for variable operation within capacity. The results shown in Table 4.28 demonstrate that the highest RFC is 0.89 (less than 1.0) in the evening peak hour, with some minor queuing on N22 Westbound (Off-ramp), an additional 2 PCU which is deemed acceptable.

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d) Operational Phase 2032 Opening Year – Link Capacity Assessment

A summary of the results of the analysis of relevant link roads for the 2032 Opening Year during the morning and evening peak hours is shown in Table 4.29.

Table 4.29 2032 Opening Year Link Capacity Analysis

Link Road	Road Type	No. of Lanes	Road Width	Max. Capacity (Veh/hr)	Scenario	AM Peak Flow	PM Peak Flow	Outcome
Greenfields Road	UAP3	2	6.75m	1,110	Without Development	668 (NB)	647 (SB)	Within Capacity
					With Development	717 (NB)	701 (SB)	Within Capacity
Maglin Road	UAP3	2	6.75m	1,110	Without Development	384 (NB)	296 (SB)	Within Capacity
					With Development	391 (NB)	302 (NB)	Within Capacity
Castle Road	UAP3	2	7.3m	1,300	Without Development	574 (EB)	651 (WB)	Within Capacity
					With Development	650 (EB)	722 (WB)	Within Capacity
Sunningdale	UAP2	2	9.0m	1,550	Without Development	639 (EB)	730 (WB)	Within Capacity
					With Development	699 (EB)	788 (WB)	Within Capacity
Carriganarra Road	UAP2	2	7.3m	1,470	Without Development	578 (EB)	748 (WB)	Within Capacity
					With Development	625 (EB)	791 (WB)	Within Capacity

Table 4.29 demonstrates that Greenfields Road, Maglin Road, Castle Road, Sunningdale and Carriganarra Road will operate within the normal design threshold in both the morning and evening peak hours in 2032 for both the "without" development and "with" development scenarios.

The expected impact of the construction traffic on the surrounding road network is expected to be well below the operational vehicle numbers. As such, the analysis focuses on the operational traffic volumes as a worst-case scenario.

e) Operational Phase 2047 Design Year – Junction Capacity

A traffic capacity assessment of the Junction 1 to Junction 4, Junction 10, unction 11 and Junction 12 were undertaken utilising the flows illustrated in Figure 4.29 and Figure 4.30 and the TRL's ARCADY, PICADY and OSCADY traffic modelling software for roundabout, priority and signalized junctions respectively. A summary of the results of the analysis for the 2047 Design Year, "without" development and "with" development scenarios, during the morning and evening peak hours is shown below in Table 4.30 to Table 4.36 inclusive.

Junction 1 - Northern Roundabout at Junction 2 of N22 Ballincollig Bypass

Table 4.30 2047 Design Year Junction Capacity Analysis for Junction 1

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road	Without Development	0.95	0.74	11	3	63	14
	With Development	1.09	0.80	41	4	172	18
N22 Eastbound (On-ramp)	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
L-2216	Without Development	0.90	0.86	9	6	27	21
	With Development	0.93	0.90	11	9	35	30
N22 Eastbound (Off-ramp)	Without Development	0.25	0.17	0	0	6	5
	With Development	0.27	0.20	0	0	6	5
Greenfields	Without Development	0.83	0.40	5	1	26	5
	With Development	0.87	0.43	6	1	33	6

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for good operation and 0.85-1.0 for variable operation within capacity. The results shown in Table 4.30 demonstrate that Junction 1 will operate within a capacity of RFC less than 1.0 in the morning peak hour for the "without" development scenario and in the evening peak hour in 2047 for both the "without" development and "with" development scenarios. It should be noted that the queue and delay in the peak hours for this junction is deemed acceptable. Therefore, a RFC of between 0.85 and 1 for this junction is still considered to be operating adequately.

Under this robust and conservative assessment (i.e. without considering any emerging transport developments as mentioned in Section 4.3.5), Junction 1 will slightly exceed the theoretical capacity of 1.0 in the morning peak hour in 2047 for the "with" development scenario. However, the likely development of infrastructure (i.e. upgrading Killumney Road, construction of Eastern Link road, Western Link Road and Maglin By-Pass), the provision of public transport infrastructure (BusConnects and light rail) and the provision of the Maglin Greenway to encourage increased modal shift away from the use of the private car as mentioned in Section 4.3.5 will result in a decrease in the traffic at the exiting junctions along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.). After completion of these improvements, the performance of this junction could be further improved.

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Junction 2 - Greenfields Road / Flynn's Road / Castle Road

Table 4.31 2047 Design Year Junction Capacity Analysis for Junction 2

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
Flynn's Road	Without Development	0.74	0.81	3	4	61	75
	With Development	0.98	1.04	8	12	155	220
Castle Road	Without Development	0.62	0.75	3	5	15	19
	With Development	0.69	0.82	4	8	19	26

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for good operation and 0.85 -1.0 for variable operation within capacity. The results shown in Table 4.31 demonstrate that Junction 2 will operate within a normal design threshold (less than 0.85 RFC) in the morning and evening peak hours in 2047 for the "without" development scenario. Additionally, this junction will operate within capacity (less than 1.0 RFC) in the morning peak hour in 2047 for the "with" development scenario, with some minor queuing on Flynn's Road, an additional 5 PCU which is deemed acceptable.

Under this robust and conservative assessment (i.e. without considering any emerging transport developments as mentioned in Section 4.3.5), Junction 2 will slightly exceed the theoretical capacity of 1.0 in the evening peak hour in 2047 for the "with" development scenario. However, the likely development of infrastructure (i.e. upgrading Killumney Road, construction of Eastern Link road, Western Link Road and Maglin By-Pass), the provision of public transport infrastructure (BusConnects and light rail) and the provision of the Maglin Greenway to encourage increased modal shift away from the use of the private car as mentioned in Section 4.3.5 will result in a decrease in the traffic at the exiting junctions along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.). After completion of these improvements, the performance of this junction could be further improved.

Junction 3 - Sunningdale / Maglin Road / Castle Road

Table 4.32 2047 Design Year Junction Capacity Analysis for Junction 3

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Sunningdale	Without Development	0.29	0.42	0	1	3	3
	With Development	0.30	0.45	1	1	3	3
Maglin Road	Without Development	0.98	0.74	9	3	149	65
	With Development	1.04	0.91	14	5	211	125
Castle Road	Without Development	0.52	0.41	2	1	9	8
	With Development	0.61	0.45	3	2	11	9

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for good operation and 0.85 -1.0 for variable operation within capacity. The results shown in Table 4.32 demonstrate that Junction 3 will operate within a normal design threshold (less than 0.85 RFC) in the evening peak hour in 2047 for the "without" development scenario. Additionally, this junction will operate within capacity (less than 1.0 RFC) in the morning peak hour in 2047 for the "without" development scenario and in the evening peak hour in 2047 for the "with" development scenario, with some minor queuing on Maglin Road, an additional 2 PCU which is deemed acceptable. There are relatively small increases in queueing at the junction with the development.

Under this robust and conservative assessment (i.e. without considering any emerging transport developments as mentioned in Section 4.3.5), Junction 3 will slightly exceed the theoretical capacity of 1.0 in the morning peak hour in 2047 for the "with" development scenario. However, the likely development of infrastructure (i.e. upgrading Killumney Road, construction of Eastern Link road, Western Link Road and Maglin By-Pass), the provision of public transport infrastructure (BusConnects and light rail) and the provision of the Maglin Greenway to encourage increased modal shift away from the use of the private car as mentioned in Section 4.3.5 will result in a decrease in the traffic at the exiting junctions along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.). After completion of these improvements, the performance of this junction could be further improved.

Junction 4 - Sunningdale / Station Road / Carriganarra Road

Table 4.33 2047 Design Year Junction Capacity Analysis for Junction 4

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)	
		AM	PM	AM	PM
Sunningdale	Without Development	0.87	0.97	17	23
	With Development	0.94	1.02	22	31
Station Road	Without Development	0.89	0.97	10	18
	With Development	0.90	1.01	11	23
Carriganarra Road	Without Development	0.79	0.98	11	26
	With Development	0.79	0.98	12	27

The normal design threshold for the degree of saturation (DOS) is 0.9 for a signalised junction, a DOS of between 0.9 and 1 for signalised junction represent variable operation, and may be said to be operating adequately. The results shown in Table 4.33 demonstrate that Junction 4 will operate within capacity (less than 1.0 DOS) in the morning and evening peak hours in 2047 for the "without" development scenario and in the morning peak hour in 2047 for the "with" development scenario, with some minor queuing on Sunningdale Road, an additional 5 PCU which is deemed acceptable.

Moreover, the above results present a "worst-case" situation because the assessment has included on-demand stage (i.e. all red stage), which may appear occasionally in a cycle, for pedestrian movement phasing. Without calling any on-demand stage, the junction performance will be improved.

Under this robust and conservative assessment (i.e. without considering any emerging transport developments as mentioned in Section 4.3.5), Junction 4 will slightly exceed the theoretical capacity of 1.0 in the evening peak hour in 2047 for the "with" development scenario. However, the likely development of infrastructure (i.e. upgrading Killumney Road, construction of Eastern Link road, Western Link Road and Maglin By-Pass), the provision of public transport infrastructure (BusConnects and

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light rail) and the provision of the Maglin Greenway to encourage increased modal shift away from the use of the private car as mentioned in Section 4.3.5 will result in a decrease in the traffic at the exiting junctions along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.). After completion of these improvements, the performance of this junction could be further improved.

Junction 10 - Greenfields Road / New Link Road

Table 4.34 2047 Design Year Junction Capacity Analysis for Junction 10

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road North	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
New Link Road	Without Development	-	-	-	-	-	-
	With Development	0.48	0.20	1	0	25	15
Greenfields Road South	Without Development	-	-	-	-	-	-
	With Development	0.06	0.10	0	0	8	9

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 4.34 demonstrate that Junction 10 will operate within the normal design threshold in both the morning and evening peak hours in 2047 for the "with" development scenario.

Junction 11 – Secondary Site Access on Greenfields Road

Table 4.35 2047 Design Year Junction Capacity Analysis for Junction 11

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Greenfields Road North	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-
Secondary Site Access	Without Development	-	-	-	-	-	-
	With Development	0.29	0.12	1	0	17	13
Greenfields Road South	Without Development	-	-	-	-	-	-
	With Development	0.08	0.12	0	0	4	5

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 4.35 demonstrate that Junction 11 will operate within the normal design threshold in both the morning and evening peak hours in 2047 for the "with" development scenario.

Junction 12 - Southern Roundabout at Junction 2 of N22 Ballincollig Bypass

Table 4.36 2047 Design Year Junction Capacity Analysis for Junction 12

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
L-2216 North	Without Development	0.23	0.50	0	1	5	7
	With Development	0.27	0.53	0	1	5	7
N22 Westbound (Off-ramp)	Without Development	0.32	0.97	1	17	5	61
	With Development	0.34	1.02	1	30	5	100
L-2219	Without Development	0.04	0.11	0	0	5	12
	With Development	0.04	0.12	0	0	5	13
L-2216 South	Without Development	0.75	0.47	3	1	16	11
	With Development	0.79	0.51	4	1	19	12
N22 Westbound (On-ramp)	Without Development	-	-	-	-	-	-
	With Development	-	-	-	-	-	-

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for good operation and 0.85 -1.0 for variable operation within capacity. The results shown in Table 4.36 demonstrate that Junction 12 will operate within a normal design threshold (less than 0.85 RFC) in the morning peak hour in 2047 for both the "without" development and "with" development scenarios, Additionally, this junction will operate within capacity (less than 1.0 RFC) in the evening peak hour in 2047 for the "without" development scenario.

Under this robust and conservative assessment (i.e. without considering any emerging transport developments as mentioned in Section 4.3.5), Junction 12 will slightly exceed the theoretical capacity of 1.0 in the morning peak hour in 2047 for the "with" development scenario. However, the likely development of infrastructure (i.e. upgrading Killumney Road, construction of Eastern Link road, Western Link Road and Maglin By-Pass), the provision of public transport infrastructure (BusConnects and light rail) and the provision of the Maglin Greenway to encourage increased modal shift away from the use of the private car as mentioned in Section 4.3.5 will result in a decrease in the traffic at the exiting junctions along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.). After completion of these improvements, the performance of this junction could be further improved.

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f) Operational Phase 2047 Design – Link Capacity Assessment

A summary of the results of the analysis of relevant link roads for the 2047 Design Year during the morning and evening peak hours is shown in Table 4.37.

Table 4.37 2047 Design Year Link Capacity Analysis

Link Road	Road Type	No. of Lanes	Road Width	Max. Capacity (Veh/hr)	Scenario	AM Peak Flow	PM Peak Flow	Outcome
Greenfields Road	UAP3	2	6.75m	1,110	Without Development	739 (NB)	715 (SB)	Within Capacity
					With Development	788 (NB)	769 (SB)	Within Capacity
Maglin Road	UAP3	2	6.75m	1,110	Without Development	411 (NB)	319 (SB)	Within Capacity
					With Development	418 (NB)	327 (NB)	Within Capacity
Castle Road	UAP3	2	7.3m	1,300	Without Development	635 (EB)	719 (WB)	Within Capacity
					With Development	711 (EB)	790 (WB)	Within Capacity
Sunningdale	UAP2	2	9.0m	1,550	Without Development	703 (EB)	803 (WB)	Within Capacity
					With Development	763 (EB)	861 (WB)	Within Capacity
Carriganarra Road	UAP2	2	7.3m	1,470	Without Development	637 (EB)	825 (WB)	Within Capacity
					With Development	684 (EB)	868 (WB)	Within Capacity

Table 4.37 demonstrates that Greenfields Road, Maglin Road, Castle Road, Sunningdale and Carriganarra Road will operate within the normal design threshold in both the morning and evening peak hours in 2047 for both the "without" development and "with" development scenarios.

4.6 Mitigation Measures and Monitoring

With the objective of mitigating the potential impact of the proposed development during both its construction and operational phases, the following proposals (mitigation measures) have been identified and form an integral part of the subject development proposals.

4.6.1 Construction Phase

A Construction and Environmental Management Plan (CEMP) has been prepared (Appendix 2-1) by the Applicants to ensure that proper procedures are put in place to minimise the impact of the construction stage on public roads and the surrounding environment in general. This CEMP is being submitted as part of this Planning Application to Cork City Council, which includes, inter alia, indicative phasing of the works, hours of operation, a traffic management plan, noise and dust mitigation measures etc. A Construction Manager will be appointed to liaise directly with the various sections of Cork City Council and develop the plan as required.

The construction management plan will take into account construction vehicle routing and timing to mitigate any issues with vehicles on public roads. The development will be progressed in phases to further manage the construction traffic:

- Phase 1A 140 units
- Phase 1B 150 units
- Phase 2A 106 units
- Phase 2B 148 units

The following mitigation measures shall be provided to minimise the impacts to the public road network during the construction phase:

- Good construction management practices will be employed such as fencing the site off from the public and neighbouring sites, adequate external/internal signage, secure internal site offices, dedicated construction access points all to facilitate the safety of construction staff and the public;
- Appropriate levels of staff parking and compounding will be provided to ensure no potential overflow or haphazard parking in the area. The site will be able to accommodate employee and visitor parking throughout;
- Set construction traffic routes to and from the site will be agreed with Cork City Council prior to the commencement of construction activities on site. Where necessary the time of day permittable for such routes will also be agreed upon and outside of the morning/evening peak hours;
- Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive on the street pavements;
- Wheel washers / judder bars will be placed at all site access points to minimise the migration of detritus onto the public roads. The roads will be inspected and cleaned on a regular basis; and
- Haul vehicles will be covered after loading to ensure there is no risk of construction material falling.

4.6.2 Operational Phase

4.6.2.1 Proposed Infrastructure under Proposed Development

The proposed road works under proposed development are illustrated in Appendix 4B. The works provide dedicated walking and cycling facilities from the development access to Greenfields Road. Additionally, two uncontrolled crossings and one signalised crossing will be constructed on Greenfields Road to provide safe crossing points for pedestrian and cyclists. Moreover, another two uncontrolled crossings will be provided on the New Link Road.

The proposed design took cognisance of the Design Manual for Urban Roads and Streets (DMURS). At the site entrances to the proposed development, priority will be given to pedestrian and cyclists. Raised areas at the site entrances will indicate priority for crossing pedestrians and cyclists. Corner radii have been reduced to shorten crossing points for pedestrians and slow vehicles further when making turning manoeuvres. The proposed footpaths tie in with existing footpaths on Greenfields Road.

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The dedicated segregated cycle track will provide cyclists with a 2m wide one-way cycle track on both sides of the New Link Road and 3m wide two-way cycle track on the southeast side of Greenfields Road (adjacent to the site). The proposed road works will also tie-in to the proposed greenway route (BC-GW4) as mentioned in Section 4.3.5.4. Additionally, the proposed development will provide a greenway connecting between Greenfields Road and the New Link Road, and shared spaces for pedestrians/cyclists within the site. Dropped kerbs and transition areas will be provided to enable easy and safe access for cyclists to/from the cycle track. Dropped kerbs (where appropriate) and tactile paving have been designed in at the pedestrian crossing points.

The proposed road works will encourage a shift to more sustainable modes of transport and provide safer facilities particularly for children walking and cycling to school, but also travelling to and from the town centre and beyond.

4.6.2.2 Maglin Urban Expansion Area

As detailed in Section 4.3.5.2, to accommodate the target population growth in Ballincollig, the Maglin Valley has been designated an urban expansion area, including the provision for a new residential neighbourhood.

Under the Cork City Development Plan 2022-2028, there are several road projects to be developed as part of the Maglin Urban Expansion Area. These off-site infrastructure projects are associated with the proposed number of housing units to be developed in the area. These include upgrading the Killumney Road, providing new link roads, and improving walking and cycling facilities.

After completion of those elements of vehicular infrastructure, it is anticipated that traffic along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.) will reduce.

4.6.2.3 CMATS

The Cork Metropolitan Area Transport Strategy (CMATS) represents a coordinated land use and transport strategy for Cork Metropolitan Area (CMA). It sets out a framework for the planning and delivery of transport infrastructure and services to support the CMA's development in the period up to 2040.

As part of CMATS, there are a number of improvements to public transport, walking and cycling facilities in the immediate vicinity of the proposed development. The land use distribution chapter of CMATS indicates the proposed development is located adjacent to a proposed residential area. See Figure 4.31.

Further to this, measures are outlined in CMATS to provide appropriate transit options for the proposed residential area. Included in CMATS is an indicative route showing Light Rail along the Killumney Road, just west of the proposed site and a proposed station nearby. BusConnects could be a precursor to Light Rail but either way, this development will be well served by these future public transport services.

Additionally, this development, can support the case for BusConnects/Light Rail along this route by improving its viability due to the potential increase in passengers from this area. These future projects will further assist in the modal shift from private car to public transport, walking and cycling.

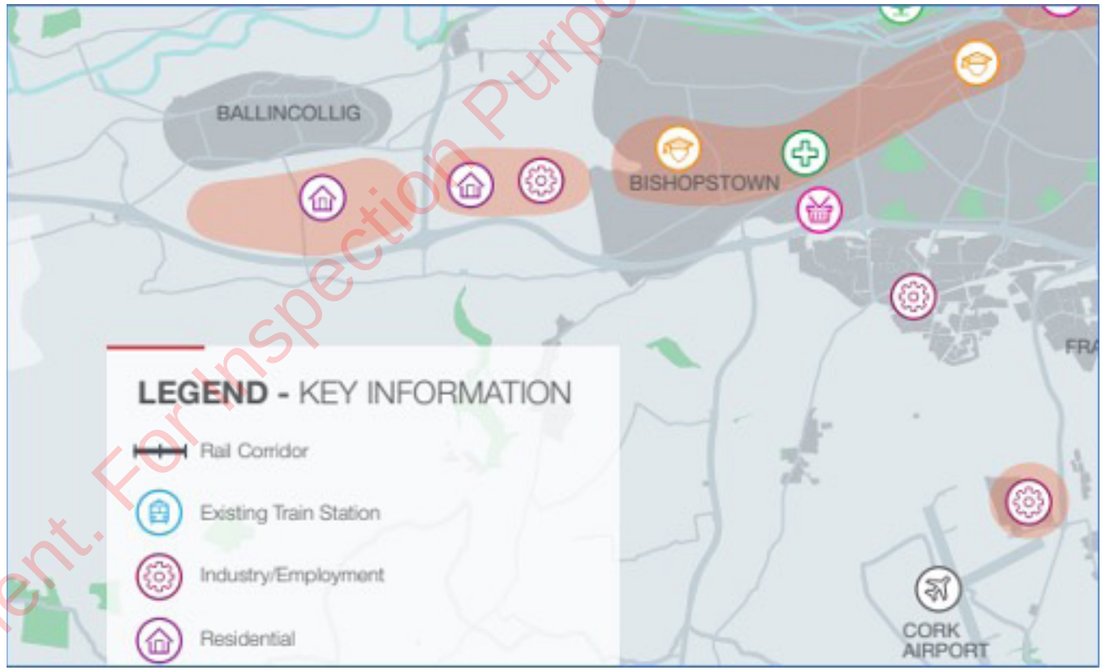

Figure 4.31 CMATS Land Distribution

4.6.2.4 Other Measures

A number of measures have been and will be implemented prior to the subject scheme opening which include:

- **Parking**: All car parking and bicycle parking within the development will comply with the Development Plan. The residential development and non-residential development (i.e. creche and café) have also provide with cycle parking in excess of the Development Plan requirements. Additionally, the proposed development will provide 48 bicycle parking spaces for cyclists using the proposed greenway. This leads to a strong emphasis on bicycle parking, thus reducing the need for private single occupancy vehicles.
- **Mobility Management Plan (MMP)**: A MMP will be rolled out with the aim of guiding the delivery and management of coordinated initiatives by the scheme promoter. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the developments. Details of the MMP are contained below.

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4.6.3 Mobility Management Plan

Mobility management plans (MMP) for developments have the potential to help achieve more sustainable communities by improving accessibility and travel choice. This MMP should be considered as guidance and an available resource which identifies objectives and measures aimed at improving sustainability and choice. The effectiveness of the MMP will be increased if adopted by a residents group or committee. The benefits of a MMP can be summarised as follows:

- Reducing the need for car use and carbon emissions;
- Education with respect to sustainable travel;
- Improve accessibility and travel choice for reaching local facilities and amenities;
- Complement nearby existing Travel Plans;
- Achieving a more attractive and safer development by reducing car use;
- Increasing marketability of the development as more households seek to change their travel behaviour;
- Improving the health of residents; and
- Improve knowledge of residents in relation to travel routes and locations of facilities.

The proposed development will have a management company who will make available the necessary travel information for residents on how to access a number of key destinations within and surrounding the Cork City. The aim of the measures of a MMP would be to minimise single-occupancy car-based travel and to encourage residents and visitors to use more sustainable modes of travel such as walking, cycling, public transport and car sharing.

4.6.3.1 Specific Measures

In order to achieve the long-term objectives and modal split targets, a number of specific measures are proposed to be put in place.

a) Management of Co-ordination

A Mobility Management Plan Co-ordinator will be appointed as part of a residential committee or management agent. This may be a group of keen likeminded people that can assist in promoting. The implementation and management of the MMP will be the responsibility of the Mobility Management Plan Co-ordinator team on site. The role will be to assist in proving travel information and be a point of contact for any travel issues for all events and ensure the MMP is monitored and updated as required. The duties of a Mobility Management Plan Co-ordinator are:

- Liaising with Cork City Council and developers in progressing the future measures for the area;
- Support the implementation of various schemes aimed at encouraging the use of more sustainable travel methods;
- Use noticeboards to keep people up to date with accessible public transport provision, walking/cycling opportunities and available schemes. These can also be used in open spaces for residential information such in local commercial unit; and
- Potential to provide residential packs to new residents highlighting the bus routes, walking and cycling routes.

b) Car Sharing

Initial contact has also been made with Go-Car (https://www.gocar.ie/). This is a membership based program where, once you join, you can rent a car or van for as little as an hour and up to a year. The service aims to reduce car dependency by promotion on demand cars near where you live, work and play so you can have a car close to hand should you need one. Once you've signed up you simply book the car you want for the time you need, unlock it using our app/membership card, take the keys from the glovebox and drive it as normal. To finish your booking you just drop the car back to where you picked up. The developer is keen to work with Go-Car to provide 3 spaces in the proposed development to provide this attractive service for residents. This can be reviewed based on usage and further spaces added if it is successful. There are approximately 700 go car locations in Ireland where cars can be collected or dropped with numerous locations in Cork. There are currently 2 go-cars located in Lidl Ballincollig as shown in Figure 4.14.

c) Cycle/Pedestrian Facilities

There are a range of walking and cycle facilities in the area with links from the proposed development to these. Additional walking and cycling routes will be provided throughout the development.

4.7 Residual Effects

4.7.1 Construction Phase

There will be minor impacts on the safety or operation of the road network as a result of the construction phase of the development. Having consideration for the mitigation measures outlined above, any impacts during the construction phase will be negligible. All construction related traffic will be outside the morning and evening peak hours and will not have a significant impact the operation of the adjoining junctions. Furthermore, they will be temporary in nature and of relatively short duration. The overall residual impact during the construction phase of the proposed development on traffic and transportation, after the implementation of mitigations measures outlined above, will be short term and not significant.

4.7.2 Operational Phase

4.7.2.1 2032 Opening Year

Typically, a RFC of less than 0.85 normal design threshold for priority junction/roundabout junction and a DOS of less than 0.9 normal design threshold for signalised junction are considered to indicate satisfactory performance (i.e. operating in an efficient and stable condition). A RFC of between 0.85 and 1 for priority junction/roundabout junction and a DOS of between 0.9 and 1 for signalised junction represent variable operation, and may be said to be operating adequately, if the queue and delay are deemed acceptable. RFC and DOS values in excess of 1 represent an oversaturated condition.

In 2032, the proposed development slightly increases the RFC/DOS for each junction by approximately 10%. All RFC/DOS values remain below 1 (less than its theoretical capacity) with relatively low levels of queuing and delay, and with the majority below the normal design threshold (i.e. 0.85 RFC or 0.9 DOS) for both the with and without the development.

Therefore, a RFC of between 0.85 and 1 or a DOS of between 0.9 and 1 for the aforementioned junctions are still considered to be operating adequately.

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4.7.2.2 2047 Design Year

Under this robust and conservative assessment (i.e. without considering any emerging transport developments as mentioned in Section 4.3.5) in 2047, majority RFC/DOS values remain below 1 (less than its theoretical capacity) with relatively low levels of queuing and delay for both the "without" and "with" development scenarios. However, Junction 1 to Junction 4 and Junction 12 will slightly exceed the theoretical capacity of 1.0 for the "with" development scenario. It should be noted that the likely development of infrastructure (i.e. upgrading Killumney Road, construction of Eastern Link road, Western Link Road and Maglin By-Pass), the provision of public transport infrastructure (BusConnects and light rail) and the provision of the Maglin Greenway to encourage increased modal shift away from the use of the private car as mentioned in Section 4.3.5 will result in a decrease in the traffic at the exiting junctions along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.). After completion of these improvements, the performance of aforementioned junctions could be further improved.

The mitigation measures, future public road and transport infrastructure improvement works and the likely modal shift away from the use of the private car will all further reduce the impact that this development has on the surrounding road network.

The location of the proposed development is ideally situated to take advantage of the existing and proposed public transport and active travel options planned for the area - BusConnects and Light Rail, Maglin Greenway, cycle infrastructure, etc as detailed in the Cork City Development Plan (2022-2028) and CMATS.

4.7.2.3 Conclusion

In view of the above analysis, the overall residual impact during the operational phase of the proposed development on traffic and transportation, after the implementation of mitigations measures outlined above, will be long term and slight.

4.8 Cumulative Effects

4.8.1 Construction Phase

As per Section 4.7.1.

4.8.2 Operational Phase

Cumulative impacts are the potential combined impacts from the other committed developments in conjunction with the proposed development. At the time of writing, three other developments (including Stonecrest Phase 1 development, Stonecrest Phase 2 development and Heathfield Phase 4 development) in the vicinity of proposed development were obtained planning permission from the An Bord Pleanála. Those permitted developments shall be considered for this study in both the "without" and "with" development scenarios. This is because whether or not the proposed development is built, the trips generated by those permitted developments will still apply. The overall cumulative impact during the operational phase of the proposed development on traffic and transportation can be reference to the Section 4.7.2.

4.9 Difficulties Encountered

No difficulties were encountered in completing this chapter of the EIAR.

4.10 References

- TII Traffic and Transport Assessment Guidelines;
- TII PE-PAG-02017 - Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections (issued in October 2021);
- Design Manual for Urban Roads and Streets (DMURS);
- Cork City Development Plan 2022-2028;
- Cork Metropolitan Area Transport Strategy (CMATS);
- Cork Cycle Network Plan;
- Draft Cycle Design Manual (September 2023); and
- Smarter Travel – A New Transport Policy for Ireland 2009-2020.

4.11 Chapter Appendices

Appendix 4-1 – Permitted Road Works on Maglin Road under Stonecrest Phase 1 Development.

Appendix 4-2 –. Site Layout of Proposed Development (Including Proposed Road Works).

Appendix 4-3 – Traffic Count Data.

Appendix 4-4 - TRICS output result.

Appendix 4-5 - Trip Distribution for the Permitted Developments.

Appendix 4-6 - Trip Generation for the Permitted Developments

Appendix 4-7 - Trip Distribution for the Proposed Development.

Appendix 4-8 -Trip Generation for the Proposed Development.

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CHAPTER FIVE

MATERIAL ASSETS: SERVICES, INFRASTRUCTURE & UTILITIES

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CHAPTER FIVE

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CHAPTER 5 | Material Assets: Services, Infrastructure & Utilities

5.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) document has been prepared by Liam O'Toole, DOSA Consulting Engineers.

This chapter assesses the material assets that could potentially be impacted by the proposed development including services, utilities, and infrastructure, within and around the site during the construction and operational phases. Impacts can be both positive and negative, direct and indirect, temporary and permanent in nature. This chapter assesses the impacts on the existing environment to include the following:

- Foul sewerage,
- Surface water drainage,
- Water supply,
- Electricity supply,
- Public lighting
- Broadband.

5.2 Methodology

The significance of the impact of the proposed development on the existing environment will be described in this chapter. A desktop study investigating existing services, infrastructure, and utilities serving the development area was conducted. This involved the examination of recorded material gathered from the following sources.

- Cork City Council Stormwater Asset Records
- Uisce Eireann Asset Records (Foul Sewer and Watermain Networks).
- Site Survey (Feature & Topographical Data)
- ESB Networks Records (Electricity Supply).
- Telecommunications Providers - Eir,
- Ordnance Survey Ireland (OSI) Mapping.
- Aerial Photography.
- Office of Public Works (OPW) Flood Hazard Mapping; (floodinfo.ie)

Information received was further supplemented by a series of site visits/investigations and consultations with the Local Authority – Cork City Council.

The assessment of the elements within this chapter has been completed in line with the relevant standards and guidelines associated with each element. In addition to EPA guidelines, the following standards and guidelines have informed the assessment process:

The proposed surface water drains have been designed in accordance with the

- Greater Dublin Strategic Drainage Study (GDSDS) Volume 2 – New Developments
- Sustainable Drainage Strategy – South Ballincollig Drainage Study (December 2021)
- CIRIA report C753 The SuDS Manual-v6
- Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas – Water Sensitive Urban Design
- Department of the Environment's Recommendations for Site Development Works for Housing Areas
- Department of the Environment's Building Regulations, "Technical Guidance Document Part H Drainage and Wastewater Disposal"
- BS EN 752: 2008 Drain and Sewer Systems Outside Buildings Part 4: Hydraulic Design and Environmental Considerations.
- Uisce Eireann Code of Practice for Wastewater Management Doc IW-CDS-5030-03.
- Uisce Eireann Code of Practice for Water Infrastructure Doc IW-CDS-5020-03.
- Wastewater Pumping Stations & Rising Main Doc IW-TEC-800-02
- EN 13201 Road Lighting – European Standard.
- BS 5489 Design of Road Lighting – British Standard.
- Housing Schemes: Guidebook for ESB Networks Standards for Electrical Services.

5.3 Existing Environment

5.3.1 Description of the Existing Environment

The subject site (currently greenfield) is located within the Ballincollig town boundary. The site is a greenfield site characterised by its gently sloping topography. The site is directly bound on the north by the existing Greenfields Road and to the south by the Ballincollig Bypass (N22). The western lands are currently in agricultural use but are also zoned in the Current City Development Plan.

5.3.2 Access

Access to the site is available from the Local Road known as Greenfields Road which directly abuts the site to the north of the development.

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5.3.3 Surface Water Drainage

The site is within hydrometric area19 (Lee, Cork Harbour and Youghal Bay). Hydrometric area No19 includes the surface catchment drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy. The site is in the sub catchment of Glasheen(Corkcity)_SC_010 (EPA Segment Code 19_17). The surface water catchment divide is shown on Figure 5.1.

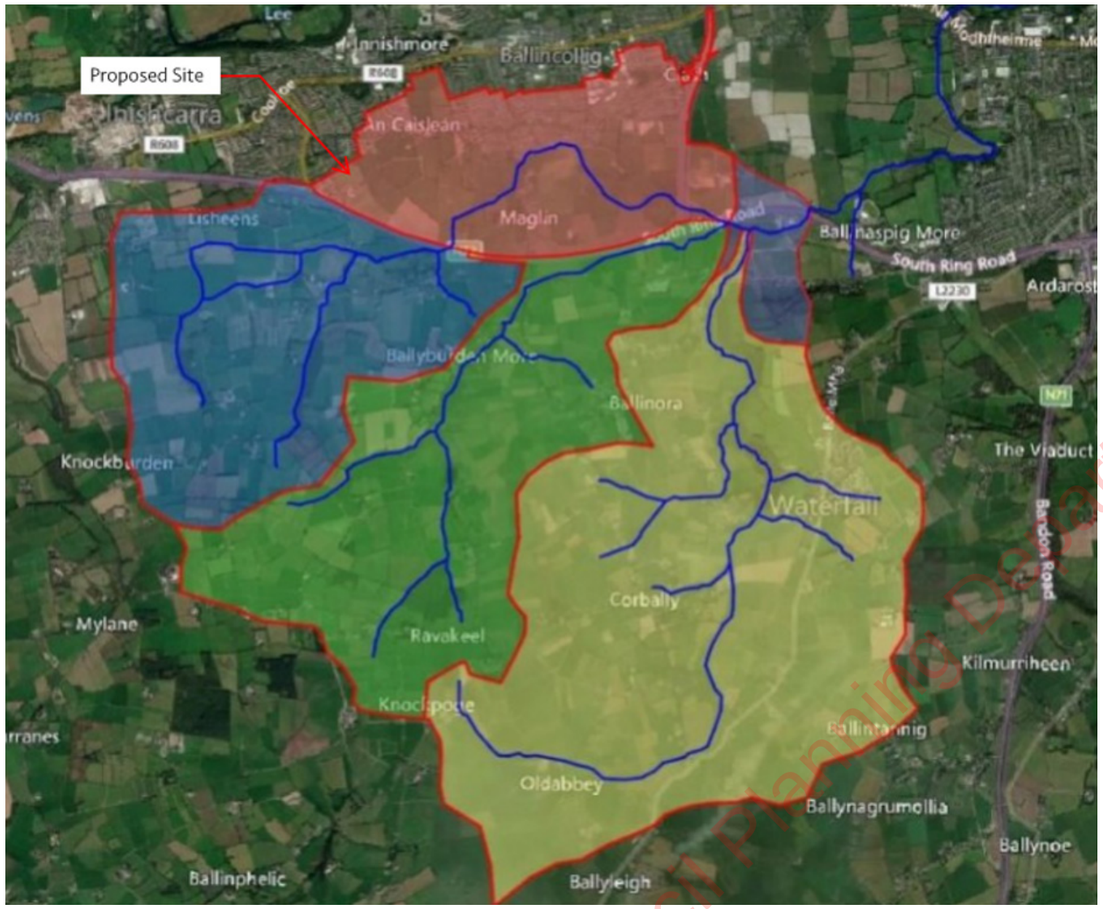

Figure 5.1 Hydrological Features of the Area

The main hydrological features of the area are the "Lisheens Stream" and "Maglin" networks. Both of these watercourse's flow in a westerly direction. The Maglin North watercourse is joined by the Maglin South approximately 2km downstream from the subject site before discharging to the Curragheen River, which is approximately a further 2km downstream. The Curragheen River then flows in a north-easterly direction and joins the River Lee before ultimately discharges to Cork harbour. Figure 5.2 below illustrates the main hydrological features associated with the site.

Figure 5.2 Hydrological Features of the Area

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5.3.4 Foul Water Drainage

There are no records or evidence indicating the presence of any constructed foul water drainage infrastructure within the site.

The nearest foul water drainage system to the site is the public network located in the Turain Glas which has been taken in charge by Uisce Eireann. It is located directly opposite the northern boundary of the proposed development. Existing foul sewer asset drawings have been obtained from Uisce Eireann and are depicted in Figure 5.3 below

Figure 5.3 Uisce Eireann Foul Assets

5.3.5 Potable Water

From available water main records and liaison with Uisce Eireann, the following existing watermains have been identified within the vicinity of the site:

- 1 No. 150mm diameter watermain located in the public road - Greenfields Road directly north of the site

Existing watermain asset drawings have been obtained from Uisce Eireann and are depicted in Figure 5.4.

Figure 5.4 Uisce Eireann Watermain Assets

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5.3.6 Electrical Supply

Based on information received from ESB Networks, the areas adjacent to the proposed development are served by extensive networks of Low Voltage and Medium Voltage power supplies, routed both overhead and under- ground. There is currently a

- 10KV/20KV Medium Voltage overhead Line present along part of the eastern boundary
- 400V/230V Low Voltage overhead Line present along part of the northern & western boundary
- 10KV/20KV/400v/230V underground cable routes to the north and west of the boundaries
- Supply to existing dwelling to the west.

These are depicted in Figure 5.5.

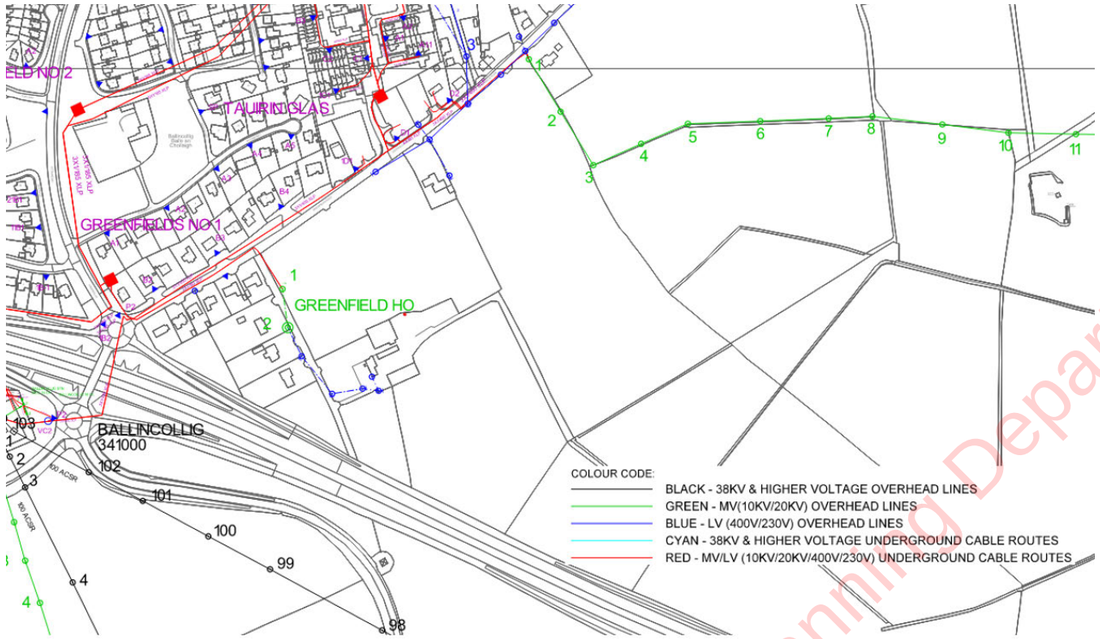

Figure 5.5 Low & Medium Voltage Infrastructure

5.3.7 Telecommunications

From utility maps received from EIR, there are telecommunications networks in the vicinity of the proposed development.

The National Broadband Ireland online network mapping indicates that the site is served by commercial providers with the remainder lying within the National Broadband Plans intervention area details which are highlighted in Figure 5.6.

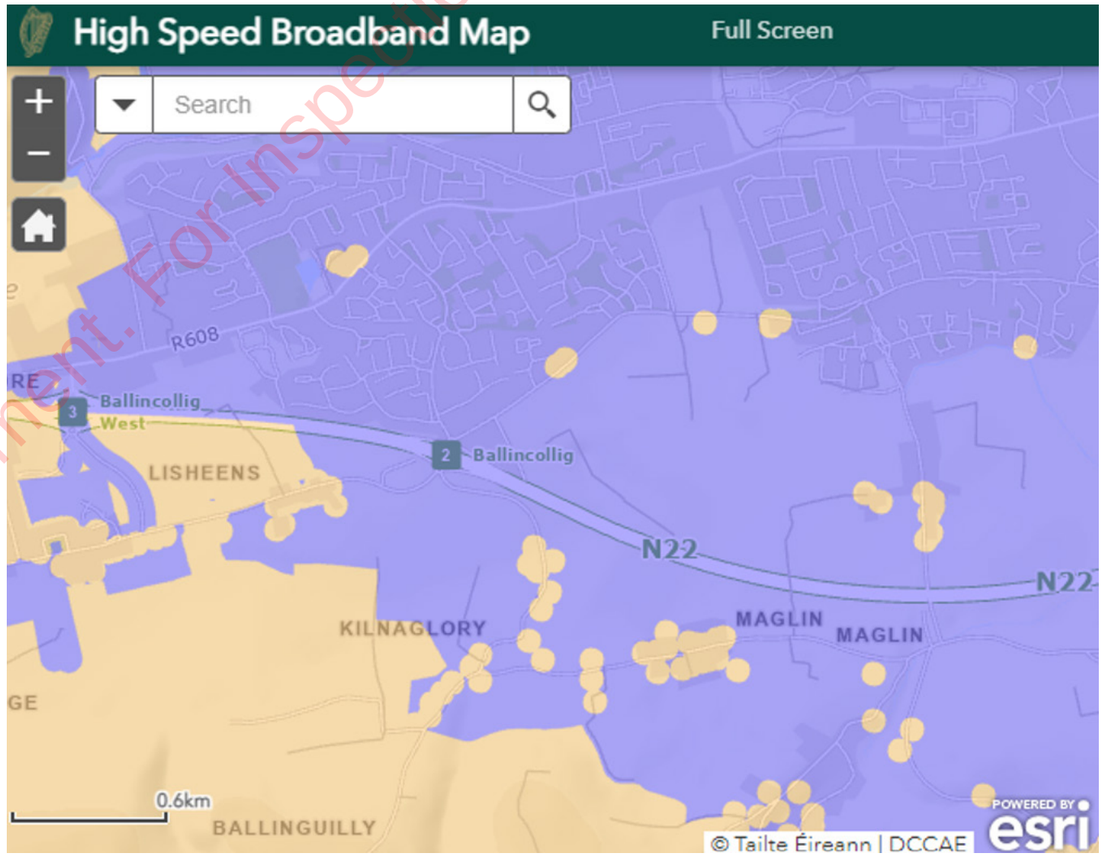

Figure 5.6 National Broadband Plans Intervention Area

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5.3.8 Public Lighting

The existing Greenfields Road (interface area between proposed site access point and existing public road) is currently served by public lighting with the columns positioned generally on both the northern and southern side of the public road, Details which are highlighted in Figure 5.7.

Figure 5.7 Existing Public Lighting Infrastructure

5.4 Proposed Development

The proposed project description is described in detail in Chapter 2 of the EIAR.

5.4.1 Proposed Storm Water Drainage

The proposed surface water drainage system, refer to Appendix 5-1, is in accordance with Sustainable Urban Drainage Systems (SUDS) principles.

The development site is a single overall catchment subdivided into a no. of sub catchments for design purposes. Groundwater flow direction is interpreted to be to the northwest / southeast, providing baseflow to the Lisheens Stream /Maglin North Watercourse.

The runoff from the entire developed site will however discharge to the existing drainage network as detailed below in Figure 5.8.

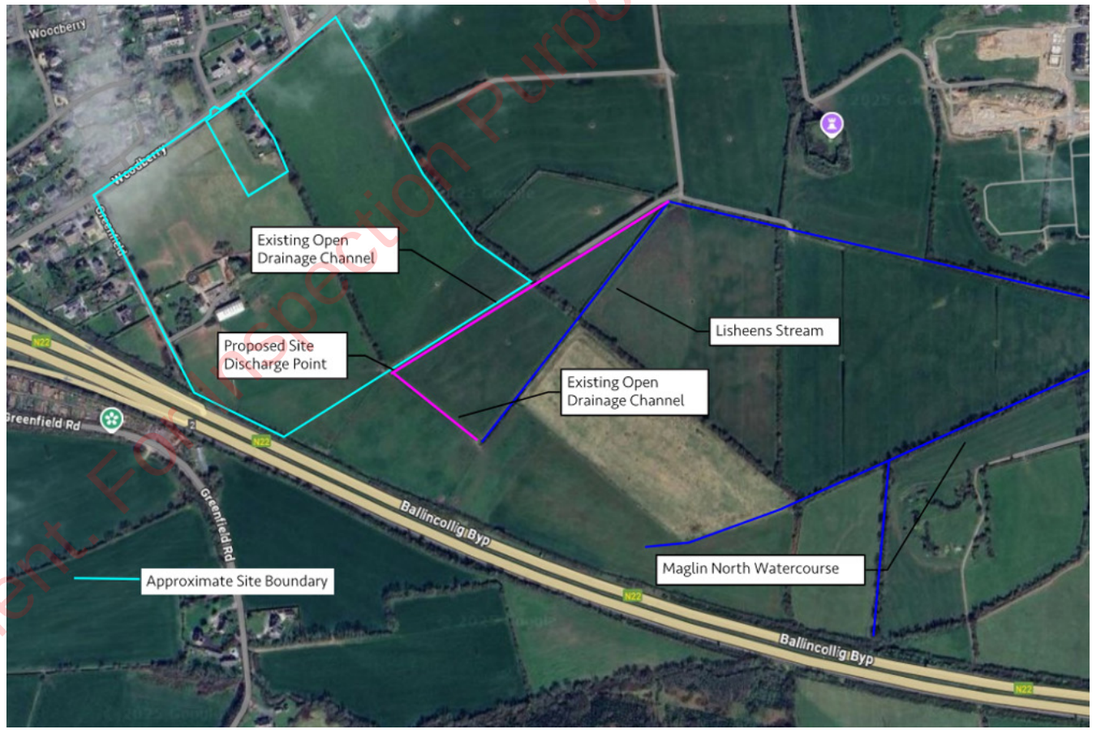

Figure 5.8 Stormwater Discharge Location

The increased runoff flows will be attenuated to greenfield runoff rates prior to discharging to the watercourse. There are no anticipated negative impacts from the proposed design methodology.

Discharge from the site will be at a single location along the southernmost boundary. One single discharge point will facilitate the overall development. The discharge will be via a headwall to dissipate energy and avoid bank erosion / scouring in the streambed

The proposed storm water drainage system has been designed to cater for all surface water runoff from all hard surfaces within the proposed development including roadways, roofs, parking areas etc. The development has been split into several catchment areas.

Surface water generated from the proposed residential development will be conveyed through a proposed surface water network including SuDS and attenuated / managed on site prior to final discharge at Q_{bar} greenfield run-off rates.

Surface water discharge rates from the proposed surface water drainage network will be controlled by a vortex flow control devices (Hydrobrakes or equivalent) and associated attenuation tanks. Surface water discharge will also pass via a full retention fuel / oil separators (sized in accordance with permitted discharge from the site). The storm sewer network was designed using Innovyze MicroDrainage modelling software. Outputs from the storm sewer design can be found in the Appendices of the Infrastructure Report in Appendix 2-4.

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The proposed surface water drainage network will collect surface water runoff from the site via a piped network prior to discharging off site via the attenuation tanks, flow control devices and separator arrangement as noted above. Prior to entering the system, the stormwater generated will be treated through a number of nature-based solutions in line with adopted SuDs measures. Design details of the proposed SuDS measures are contained in the Drainage Impact Assessment contained in Appendix 7-4

All flow velocities within the network fall within the limits of 0.75 and 3m/sec as set out in "Recommendations for Site Development Works" as published by the Department of Environment. The storm water network and the attenuation system is designed to accommodate the 100-year return period plus an additional 20% to account for the effects of climate change. A schematic overview of the proposed stormwater network is depicted in Figure 5.9 below Drawings for the proposed Storm Water Network are contained in Appendix 5-1.

Figure 5.9 Proposed Storm Water Network

Upon reviewing the Flood Risk Assessment, the proposed development is subject to minor flooding in the most southeastern corner of the site. Refer to Specific Flood Risk Assessment in Appendix 7-3.

5.4.2 Proposed Foul Sewer Drainage

The proposed development will require a new separate drainage network to collect and convey the effluent generated by the proposed development. Gravity sewers are designed using Micro-Drainage WINDES design software to ensure self-cleansing velocities will be achieved on all pipe runs. For each pipe run the accumulative number of households contributing to that section of pipework is used to calculate the design flow. The drainage network for the proposed development has been designed in accordance with:

- Uisce Eireann Code of Practice for Wastewater Infrastructure Doc IW-CDS-5030-03.
- Wastewater Infrastructure Standard Details (Uisce Eireann)
- Wastewater Pumping Stations & Rising Main Doc IW-TEC-800-02
- Building Regulations, Technical Guidance Document Part H 'Drainage and Wastewater Disposal'
- IS EN752, "Drain and Sewer Systems Outside Buildings"

Within that area of the development, 225mm and 150mm diameter sewers will collect discharges from houses and apartments and flow by gravity to the southeastern corner of the site. It is proposed to install a pumping station which will collect, store and pump to the existing Uisce Eireann drainage system to the existing foul sewer network located in

- Option A – Existing Network located in Turain Glas Estate
- Option B – Existing network to the west in Maglin.

The final discharge location will be confirmed post-planning stage. This will be at Connection Agreement stage and in accordance with the issued Confirmation of Feasibility (COF) and Statement of Design Acceptance (SODA) as issued by Uisce Eireann (IW).

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A schematic overview of the proposed site Foul Sewer network is depicted in Figure 5.10 below

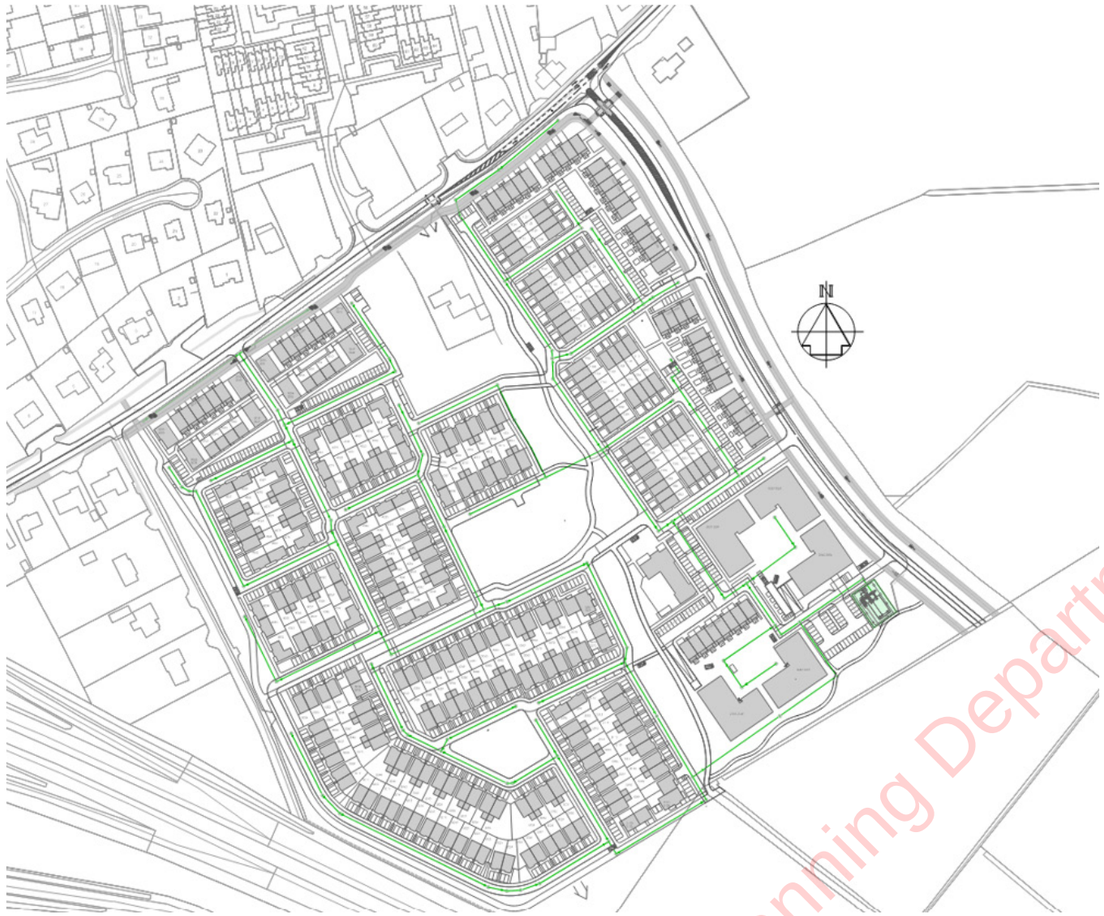

Figure 5.10 Proposed Foul Sewer Network

A Pre-Connection Enquiry (COF) was lodged with Uisce Eireann to allow an assessment of the local & regional infrastructure to accommodate the proposed development. Uisce Eireann reverted to this enquiry confirming feasibility to connect (Ref:CDS24008100).

A Statement of Design Acceptance letter has been received from Uisce Eireann for the proposed network.

Refer to the Infrastructure Design Report in Appendix 2-4 for copies of both the Confirmation of Feasibility and Letter of Design Acceptance from Uisce Eireann. The proposed Wastewater Drainage Drawings for the development are contained in Appendix 5-1.

5.4.3 Proposed Water Supply

The proposed development will require a new separate watermain network to serve the proposed development. The network for the proposed development has been designed in accordance with:

- Uisce Eireann Code of Practice for Water Infrastructure Doc IW-CDS-5020-03
- Building Regulations, Technical Guidance Document Park B 'Fire Safety'

Uisce Eireann Assets indicate a public watermain running in the public road (Greenfields Road) to the north of the site.

The proposed development will be served by a network of 200mm, 150mm and 100mm diameter watermains laid out as shown on the engineering drawings in Appendix 5-2. The mains will be connected to the existing watermain on the Greenfields Road attached drawings and connected to the public watermain.

The new site watermain network has been designed to adequately serve the firefighting requirements of the development. Fire hydrants will be provided such that each house will be within 45m of a hydrant and these hydrants will be provided so as to be fully accessible to the fire service. Sluice valves will be installed on all principal watermain connections to ensure that sections of the development can be isolated for maintenance and repaired as required. Appropriate positioning of scour valves is at low points within the design.

A water-meter will be installed on the main connections, subject to detailed agreement with Uisce Eireann/Cork City Council.

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A schematic overview of the proposed Watermain network is depicted in Figure 5.11 below

Figure 5.11 Proposed Watermain Network

A Pre-Connection Enquiry (COF) was lodged with Uisce Eireann to allow an assessment of the local & regional infrastructure to accommodate the proposed development. Uisce Eireann reverted to this enquiry confirming feasibility to connect (Ref:CDS24008100).

A Statement of Design Acceptance letter has been received from Uisce Eireann for the proposed network.

Refer to the Infrastructure Design Report in Appendix 2-4 for copies of both the Confirmation of Feasibility and Letter of Design Acceptance from Uisce Eireann. The proposed Watermain Drawings for the development are contained in Appendix 5-2.

5.4.4 Proposed Electrical Supply

The proposed development is to be served by the ESB via a new network connection to be agreed upon with the ESB prior to construction. An underground LV network will be provided for by the developer along with the supply of mini pillars are required to serve all units within the development.

5.4.5 Proposed Telecommunications

The proposed development is to be served by a new telecommunications network. This network with be constructed in a series of underground cabling and chambers (located primarily within footpaths and under roads) All buildings will be connected to this system with appropriate ancillary ducting.

5.4.6 Proposed Public Lighting

The scheme proposes public lighting to all roads and paths within the development.

The public road lighting is designed to EN 13201 and British Standard BS 5489 utilising the software package “Lighting Reality Pro”. This design package is used to select an appropriate lantern type and to optimise the lighting design. The selected lantern is designed and manufactured to comply with EN 13201 with IP65 optic, and 10 joules shock resistant gear housing. The proposed Lighting Strategy prepared by Molloy Engineering is included in Appendix 5-3 of this EIAR.

The primary lighting mitigation which will be implemented for this project relates to bats, as these are considered the most sensitive species in relation to night-time lighting. It is noted however that the mitigation proposed will also lessen in the impact in relation other nocturnal species such as Badger and Otter. The lighting scheme has considered best practice, as published by the UK Bat Conservation Trust (2018), in respect of mitigation strategies, to minimise the impact of outdoor lighting upon bat populations. The external lighting design concept is to illuminate lighting levels outlined within BS EN 12464-2:2014 external lighting. The following mitigation measures have been incorporated into the site lighting plan

- Warm White type, have been specified, with a Colour Temperature of 2,700 kelvin, as is considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations.
- LED luminaires have been specified due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights have been carefully considered to minimise light spill. Specialist bollard and ground recessed lighting have been included where possible;
- Lanterns are of the fully cut off type with no light output above the horizontal plane;
- Screening by existing trees and newly planted trees will prevent light spillage onto boundary habitats; and
- Exterior lighting will be controlled from a timeclock, daylight sensor and manual switching that will be located within the external mini pillars.

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5.5 Impact Assessment

Four headings are used to consider the potential impact of the proposed development on the existing material assets. These can be categorised as follows

- Do Nothing Scenario.
- Construction Phase.
- Operation Phase.
- Cumulative Impacts.

5.5.1 Do Nothing Scenario

The 'Do Nothing' scenario refers to what would occur should the proposed development not be progressed. In this scenario, the impacts described in this chapter would not emerge meaning that the 'Do Nothing' scenario is considered to have a neutral effect with regards to utilities. The 'Do Nothing' scenario is therefore not addressed any further in this chapter.

5.5.2 Potential Construction Phase Impacts

The construction phase of the proposed development has the potential to result in slight and temporary impacts to the existing population in the local area.

5.5.2.1 Earthworks & Civil Works

The bulk earthworks and excavations required within the development will result in both the importation and exportations of some material. It is anticipated excavations quantities will be greater than the expected material to be generated within the development from excavation. Excavation for grading within the development will disturb the existing ground and has potential to introduce suspended solids into water run-off from the site.

5.5.2.2 Asset Installation

The construction of below-ground services such as watermain, storm & foul pipeline, telecommunication conduits, ESB conduit will require excavation works for trenching. Similar to bulk earthworks, the excavation work required for the trenches has the potential to introduce suspended solids to water run-off from the site.

Road openings and associated licenses will be required to connect the proposed watermain, and foul, networks to the existing public networks on the Greenfields Road. This will require minor local traffic management measures for the duration of the works.

Regarding the surface water run-off from the site, there is potential for this to become contaminated from construction activities leading directly to a negative impact on the receiving waters to the south of the development. This could result in a moderate short-term negative impact on the water quality in the Lisheens Stream and Maglin Watercourse.

5.5.2.3 Construction Personnel

The activities during the construction phase will generate effluent and sanitary waste from workforce facilities provided for the duration of the proposed works. A site compound will be provided, and a temporary foul connection and potable water connection will be required for the duration of construction works. These have the potential for a direct negative impact on the existing water/wastewater infrastructure in the area of the development and may result in a slight short-term impact on the capacity of the existing water/wastewater networks.

5.5.3 Potential Operation Phase Impacts

5.5.3.1 Foul and Water

The operation of the proposed development will result in the generation of additional foul effluent an increase in water demand. This has the potential, in the absence of any mitigation, to have a direct negative impact on the water/ wastewater infrastructure serving the development resulting in a significant long-term impact on the capacity of the water/wastewater infrastructure.

5.5.3.2 Surface Water

Surface water run-off from the development site during the operation phase has the potential to be contaminated with extra organic material. Inadequate control measures within the development could result in large quantities of surface water discharge from the development lands into the Lisheens Stream & Maglin Watercourse. This could lead to significant long-term negative impacts on the water quality and quantity entering the surrounding watercourses.

5.5.3.3 Potential Cumulative Impacts

The potential cumulative impacts of the relevant plan for the area were assessed, which is considered to be the Cork City Development Plan 2022. The assessment of the potential impacts on the environment of the Cork City Development Plan 2022 was undertaken utilising the Strategic Environmental Objectives (SEOs) which are detailed in Table 5.1 of the CDP's Strategic Environmental Assessment. The potential cumulative impacts of the Plan were assessed having regard to these SEO's. Table 5.1 of the SEA identifies the SEO's for 'Material Assets' as being to.

- Optimise existing infrastructure and provide new infrastructure to match population distribution proposals - this includes transport infrastructure.
- Ensure access to affordable, reliable, sustainable and modern energy for all which encourages a broad energy generation mix to ensure security of supply – wind, solar, hydro, biomass, energy from waste and traditional fossil fuels.
- Promote the circular economy, reduce waste and increase energy efficiencies.
- Ensure there is adequate sewerage and drainage infrastructure in place to support new development.

Table 7.5 of the CDP's Strategic Environmental Assessment, 'Comparative Assessment of each of the Alternatives against Strategic Environmental Objectives' indicates that Alternative/Scenario 3 'Compact Liveable Growth', the 'Selected Scenario' has positive interactions with the status of the SEO's for ''Material Assets'.

The potential cumulative impacts on material assets have been assessed having considered other permitted and planned developments in the surrounding area. The nearby proposed and permitted developments considered are highlighted in Table 1.1.

The cumulative operational impact of the proposed development and other consented development are considered to be slight with regards to services, infrastructure, and utilities With the proposed mitigation measures being implemented and monitored.

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5.6 Mitigation Measures

This section addresses the measures to be implemented during the construction and operational phases of the development to mitigate the potential impacts outlined earlier in this chapter.

5.6.1 Construction Phase

A Construction and Environmental Management Plan (CEMP) has been prepared has been appended to this EIAR in Appendix 2-1. The final CEMP, which will include any additional construction phase mitigation measures required pursuant to conditions attached to any grant of permission, along with all measures currently set out in the CEMP, will be implemented in full. Site inductions for all construction staff and sub-contractors aim to ensure all are aware of the procedures and best practices as outlined in the CEMP.

Control measures shall be put in place to protect surface waters from contamination prior to the commencement of any site works. Control measures will also be provided to control surface run-off during the construction phase. These proposed measures follow best practice and are set out in full in the CEMP.

For ease of reference, the principal mitigation proposed in relation to the type of construction activities to facilitate the development of material assets on the site include:

- Surface water shall be directed to settlement ponds where topographically feasible. Where this is not practicable the surface water shall be allowed to percolate to ground and/or be removed by tanker to a designated waste-water treatment plant if excessive build-up of surface water on site occurs.
- Protection of surface water gullies or drains using silt fences
- Use on-site bund structures (including incorporating existing ditches) on site to retain surface waters on site and to prevent runoff from the site.
- Minimal and short-term storage and the removal of excess materials (soil, stones, and construction wastes) off site in an efficient manner.
- Daily checks of surface water regime on site and logging of same.
- Works associated with excavations or earth moving not to be undertaken in periods of forecasted bad weather.
- Drainage channels beside construction roadways to direct surface water to settlement areas and allow for natural percolation to ground.
- Ensure good site management is maintained at all times during the construction phase including regular site clean-ups and use of appropriate bins.
- Chemicals or fuel/oils shall be stored in temporary bunded storage areas and plant is re-fuelled via delivery trucks in specific bunded re-fuelling areas, rather than the storage of large quantities of fuel on site in a designated bunded area.
- The pouring of concrete, application of chemicals, painting or any other activity that has the possibility of being toxic to aquatic life shall be undertaken in a controlled and isolated manner, preventing the possibility of any pathway to a surface water source.

The construction compound will be adequately served regarding foul drainage and water supply for construction staff. Effluent generated on site from the contractors' sanitary facilities will be discharged to a holding tank and removed off site by a licenced removal contractor in accordance with Cork City Council and Uisce Eireann requirements. The potable water supply to the compound shall be agreed between the site contractor and Uisce Eireann and shall be protected from possible contamination by construction activities.

The connection of all proposed utilities to existing infrastructure shall be in accordance with the relevant code of practice as listed below and coordinated by the relevant utility provider. Where the standards and codes below refer to or rely on additional codes, then these additional codes are deemed to apply to these works where they are relevant to the matter under consideration.

- "Code of Practice for Water Infrastructure", Doc No. IW-CDS-5020-03, July 2020 (Revision 2) – Uisce Eireann
- "Code of Practice for Wastewater Infrastructure", Doc No. IW-CDS-5030-03, July 2020 (Revision 2) – Uisce Eireann.
- Wastewater Pumping Stations & Rising Main Doc IW-TEC-800-02
- ESB Networks: "National Code of Practice for the Customer Interface", Doc No. DOC-030303-AEN, April 2021.

Construction Waste generated during the construction phase shall be managed in line with the CEMP "Construction & Demolition Waste Management on Site" Report appended to this EIAR in Appendix 2-1.

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid exceedance of the adopted construction noise threshold values at the nearest NSLs. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

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

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring.

5.6.2 Operational Phase

All installed assets including watermain, foul, storm and utility services will be and surveyed prior to being made operational. In relation to stormwater assets this will include pressure testing. Uisce Eireann assets (i.e. – foul sewer and watermain) will be tested in accordance with the codes of practice prior to being commissioned by Uisce Eireann. The purpose of this will be to identify any possible defects. Any defects will be made good prior to operation.

Waste generated by the development during operation will be removed by licensed waste contractors only and in accordance with the Operational Waste Management Plan compiled by AWN Consulting. Refer to Appendix 5-4.

Water conservation measures such as the use of low flush toilets and low flow taps will be incorporated into the proposed dwellings to reduce water volumes entering the foul water network. This measure will also reduce the demand on the public water supply.

The proposed storm water drainage system has been designed to cater for all surface water runoff from all hard surfaces within the proposed development including roadways, roofs, parking areas etc.

Surface water generated from the proposed residential development will be conveyed through a proposed surface water network including SuDS measures and an attenuation system on site prior to final discharge at Q_{bar} greenfield run-off rates.

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Surface water discharge will also pass via a full retention fuel / oil separators (sized in accordance with permitted discharge from the site). Surface water discharge rates from the proposed surface water drainage network will be controlled by a vortex flow control devices (Hydrobrakes or equivalent) The storm water network and attenuation system are designed to accommodate the 100-year return period plus an additional 20% to account for the effects of climate change.

5.7 Monitoring

5.7.1 Construction Phase

Regular site audits will be undertaken during the construction phase to visually monitor the works and ensure compliance with all measures as set out in the CEMP.

Daily checks of the surface water regime put in place during the construction phase will be undertaken with detailed logs maintained.

Communications with utility providers will be maintained during construction. Supervision of work by the respective utility operator as required will be accommodated during the works.

5.7.2 Operational Phase

Watermain and foul sewer assets become the property of Uisce Eireann at operational phase and responsibility for same reverts to them. Water usage within the proposed development will be monitored by Uisce Eireann utilising water meters. The monitored water usage will be utilised to locate and isolate any leaks which may develop over time are present within the network.

The relevant service providers regarding power supply and telecommunications will be responsible for monitoring their respective services.

5.8 Residual Impacts

5.8.1 Predicted 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 permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied.

5.8.2 Construction Phase

In the absence of mitigation, potential impacts associated with the construction phase of the proposed development would be expected to include potential disruption to local natural and human material assets resulting in both short-term and long-term impacts. In circumstances where the proposed mitigation measures referenced in this chapter are effectively implemented for this development, the residual impacts on material assets will be short term and slight during the construction phase.

5.8.3 Operation Phase

The proposed development will have a long-term positive impact on the existing environment by creating high quality residential units to cater for the needs of a growing population and responding to a significant housing need and demand in the locality and the region, while occupying a presently underutilised zoned site at an appropriate location for sustainable development.

The predicted wastewater generation of the proposed development will be adequately accommodated in the local foul sewer network, as confirmed in the Confirmation of Feasibility from Uisce Eireann. No additional planning permissions or other third-party consents are required to deliver this infrastructure.

In relation to water supply, the Confirmation of Feasibility from Uisce Eireann confirms a water connection is feasible. No additional planning permissions or other third-party consents are required to deliver this infrastructure.

A 'Design Acceptance Statement' from Uisce Eireann has been received for both the foul sewer design and water supply design and is submitted with the application.

In relation to stormwater the proposed development is designed to comply with the provision of SUDS and is therefore unlikely to have any residual impacts in terms of the impact on surface water drainage.

The proposed development is unlikely to have any significant impact on the local electricity, telecommunications, or public lighting supply

Where the proposed mitigation measures referenced in this chapter are effectively implemented for this development, the residual impacts on these material assets will be long-term and neutral.

5.8.4 Cumulative Impacts

Cumulatively with other surrounding, permitted, planned and existing development, it is predicted that the proposed development will contribute to the improvement of the overall urban structure and fabric, will benefit the surrounding area through improvements to the public realm and both cyclist and pedestrian infrastructure. Where the mitigation measures referenced in this chapter have been implemented the cumulative effects of development on electrical supply, telecoms, wastewater generation, water supply and stormwater runoff are anticipated to be long-term and neutral.

5.9 Difficulties in Compiling Information

The were no notable difficulties encountered when compiling information.

5.10 List of Chapter Appendices

Appendix 5-1 – Proposed Surface Water Drainage & Wastewater Layout Drawings - DOSA Consulting Engineers.

Appendix 5-2– Proposed Water Supply Drawings – DOSA Consulting Engineers.

Appendix 5-3 – Public Lighting Strategy – Molloys Engineering.

Appendix 5-4– Operational Waste Management Plan – AWN Consulting.

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CHAPTER SIX

LAND, SOILS & GEOLOGY

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CHAPTER SIX

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CHAPTER 6 | Land, Soils & Geology

6.1 Introduction

This Chapter was prepared by Dan Keohane of Keohane Geological & Environmental Consultancy (KGEC). It addresses the potential significant direct, indirect and cumulative impacts on land, soils and geology resulting from the proposed large-scale residential development (LRD) at Greenfield, Ballincollig, Cork. The existing land use, soils and geological setting are described, potential impacts on these environmental aspects assessed and evaluated, and where appropriate, measures recommended to avoid, reduce or mitigate potential impacts. The residual impacts following mitigation are then summarised.

A full description of the proposed development is provided in Chapter 2. In summary, the proposed development comprises a Large-Scale Residential Development (LRD) at Greenfield (townland), Ballincollig Cork. The proposed development consists of the demolition of an existing dwelling house, farmyard and associated agricultural buildings and the construction of a residential development of 544 no. units (232 no. dwelling houses and 312 no. apartment/duplex units). Vehicular access to the proposed development will be provided via 2 no. entrances from the Greenfields Road with separate pedestrian entrances also provided. Ancillary site works include the provision of bicycle parking and bin storage facilities serving the proposed apartment/duplex buildings, a creche facility and public realm upgrades to the Greenfield Road.

6.1.1 Scope & Purpose

This chapter of the EIAR provides details of the land use and geological environment in which the development is proposed. It identifies and describes the unconsolidated deposits, their land uses and bedrock geology underlying the site. The hydrogeology of the site is discussed in Chapter 7 (Water).

The purpose of the assessment is to identify the potential direct impacts of the proposed development on geology and land use within the site and potential indirect impacts beyond the site boundary; and to assess the potential impacts in the context of other developments (proposed / completed) to determine cumulative effects. Having identified and quantified the potential impacts, to recommend measures to avoid, mitigate and/or reduce significant potential negative impacts for the construction of the development and during its lifespan, where relevant. To audit the effectiveness of the mitigation measures, a construction monitoring programme is also outlined as set out in the CEWMP (Construction Environmental & Waste Management Plan) - Appendix 2-1.

6.1.2 Policies & Guidelines

There are several local, national and international policies and guidelines relied upon in the preparation of this chapter. In addition to the EIAR guidelines (as referenced in Chapter 1), those specific to the land and soils aspect of the environment include:

- Cork City Development Plan 2022-2028 (CDP).
- Environmental Protection Agency, May 2022 guidelines.
- Office of the Planning Regulator, 2022.
- European Commission, 2017 EIA guidelines.
- European Commission, 2017 EIA scoping.
- European Commission, 2013 EIA incorporating climate change.
- Department of Housing, Planning and Local Government 2018 EIA guidelines.
- Institute of Geologists of Ireland, 2013 EIS (EIA) guidelines.
- National Roads Authority 2008 guidelines for geology and hydrogeology assessments.

6.1.2.1 Cork City Development Plan 2022-2028 (CDP)

Chapter 6 of the CDP 2022-2028 addresses Green and Blue Infrastructure, Open Space and Biodiversity. In Sections 6.72 and 6.73, the geological heritage of the city is recognised. Two County Geological Sites are listed within the city, at Blackrock and the Lee Road. Objective 6-27 Areas of Geological Importance states:

Objective 6.27: '*To seek the conservation of important features of geological interest in Cork City*'.

Chapter 7 of the CDP 2022-2028 addresses Economy and Employment. Section 7.68 address Quarries and Aggregate Resources. There are no quarries registered under Section 261 of the Planning & Development Act 2000 within the functional area of Cork City Council, and given its built-up nature, opportunities for quarry development are limited. Objective 7.23 Quarries and Aggregate Resources states:

Objective 7.23: '*To recognise the importance role the mineral extraction and aggregate industry can play by protecting any reserves of aggregates and minerals from development that might impact on their utilisation, Extraction that would result in a reduction of the visual amenity of areas of high amenity or damage to areas of scientific importance or of geological, botanical, zoological and other natural significance including all designated European Sites or have a detrimental impact on residential amenity will not be permitted. The Planning Authority will have regard to the Guidelines for Planning Authorities for Quarries and Ancillary Activities (DoEHLG, 2004) when assessing applications relating to the extraction industry*'.

Chapter 13 of the CDP 2022-2028 outlines Implementation of the Plan. Table 13.3 sets out the contributions of the strategic environmental objectives. In relation to Soil and Land, the guiding principle is to ensure the long-term sustainable management of land. The strategic environmental objectives are:

- Protect soils against pollution, and prevent degradation of the soil resource.
- Promote the sustainable use of infill and brownfield sites over the use of greenfield sites.
- Safeguard areas of prime agricultural land and designated geological sites.

6.1.3 Sources of Baseline Data

The main sources of baseline data and information relating to land, soils and geology include:

- Soils, bedrock, hydrogeology, heritage etc - Geological Survey of Ireland - www.gsi.ie
- Archived maps and reports - Department of Communication, Climate Action & Environment - https://secure.dccae.gov.ie/goldmine/index.html
- Land use - Environmental Protection Agency - www.epa.ie
- Designated sites – National Parks & Wildlife Service www.npws.ie
- Cork City Development Plan – list of geological heritage sites in Cork City.
- Priority Geotechnical Ltd - Ground Investigation Borehole Logs, provided in Appendix 6-1.
- Hydro Survey - Geophysical Survey Report, also provided in Appendix 6-1.
- KGEC - Ground Investigation Trial Pit Logs, also provided in Appendix 6-1.
- Borehole logs for Ballincollig By-pass site investigation locations near the project site.

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The literature reviewed as part of the desk study included:

- Geology of South Cork.
- Soils Association of Ireland and their Land Use Potential.
- Directory of Active Quarries, Pits, and Mines in Ireland, GSI 2001.
- 2022 Cork City Development Plan.
- Memoir of Localities of Minerals of Economic Importance and Metalliferous Mines in Ireland, 1998.
- CAAS Environmental Services Ltd, May 1999. Ballincollig By-Pass EIS.
- Geotech, 1995. Ballincollig By-Pass Site Investigation.

6.1.4 Assessment Methodology

The assessment of geology was carried out with reference to relevant policies, regulations and guidelines (listed above) and following this general methodology:

- The preliminary design of the proposed development was reviewed to identify elements which could have the potential to impact on land and soils.
- Consultation was carried out with agencies with an interest in the geological environment, including Geological Survey of Ireland (GSI).
- A literature review was carried out to determine any policies and / or guidelines to which the proposal should have regard.
- A desk-based assessment of the land use and geological setting relevant to the proposed development was undertaken. It was confirmed that the site is underlain by rock susceptible to karstification. As such, a detailed ground investigation was carried out to evaluate the overburden and bedrock at the project site.
- Field surveys were conducted to collect geological and geotechnical data. A ground investigation was carried out across the site, consisting of geophysical surveys (seismic and resistivity), the excavation of 2 No. trial pits, and drilling of 5 No. rotary boreholes.
- Review of the Biodiversity chapter (Chapter 8) prepared for the project by Dixon Brosnan Ltd to assess the interaction of land use and soils with ecology.
- Findings from the desk-based study, field surveys and ground investigations were used to modify the site layout, guide SuDS (sustainable drainage systems) design and inform foundations design.

The site walkovers and collection of data were carried out on several occasions between July 2023 and June 2025. Initial data collection was used to identify areas that might be unsuitable for development (e.g., poor quality, low-lying areas). There were no land use or geological constraints identified within the site affecting the site layout.

The aspects considered in the assessment were soils, land use, slope stability, bedrock geology, and the interaction of these with other aspects of the development. These are discussed in the sub-sections below.

The information collected during the desk-based assessment, site walkovers and ground investigations were used to establish the importance, quality and sensitivity of the receiving geological environment. This follows the NRA (2008) guidelines as summarised in Table 6-1.

Table 6.1 Estimation of Importance of Soil & Geology Attributes

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

6.1.5 Consultation

As part of the EIA process, consultation was carried out with organisations and individuals who might have an interest in the soils / geology and land use aspects of the project. The information package sent, and the consultation responses received, are provided in Appendices 1-3 and 1-4 of this EIAR. The response from GSI is summarised here and incorporated, where appropriate, into the avoidance, mitigation and monitoring proposals for the proposed development.

6.1.5.1 Geological Survey of Ireland

The GSI responded to the consultation by email dated 22 January 2025. The GSI advised of its programmes focused on the various geological aspects, such as heritage, groundwater, flood monitoring, landslide susceptibility, aggregate potential etc. The GSI recommended use of its on-line data and information services. GSI also requested copies of any ground investigation reports prepared for the project.

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6.2 Receiving Environment

The site is located on relatively flat low-lying agricultural land to the south of Ballincollig and extends to an area of 15.2 hectares (ha). The valley is drained by the Maglin North River (EPA name - Grange Hill Stream). The Lisheens Stream (a first order stream) is feed by several field drains, many ephemeral, draining the project site and adjacent fields. It joins the Maglin North River just east of Ballincollig Castle. The site is comprised of three large fields separated by sod & stone ditch with dense hedgerow. Based on historic mapping, many of the internal hedgerows have been removed. The farmhouse and farmyard are located centrally towards the western side of site at what was formerly Greenfield House. The two western fields are used for grazing horses and are subdivided by wooden post & rail fencing. The eastern field is used for grazing cows. The site is bound to the north by the Greenfield Road (formerly known as the Killumney Road) and on the west by a cul-de-sac (Woodberry Road). The Ballincollig By-pass bounds the southwest corner of the site. The southeastern boundary of the site coincides with the alignment of the former Cork-Macroom railway. The regional terrain is controlled by the underlying bedrock geology, which has been folded to form west-east orientated ridges and valleys; ridges being underlain by the older Devonian sedimentary rocks, and valleys, such as at the project site, underlain by younger Carboniferous limestones. Elevations across the site range from approximately 30mOD (at the north-western corner of the site) to approximately 18.5mOD near the south-eastern corner of the site. According to the GSI mapping, there is one bedrock outcrop (exposure) at the site. This occurs at the north-western corner, coinciding with high point of the site. The historic 25-inch maps show a disused lime kiln and small quarry at this location. The quarry is shown to be on both sides of the Greenfield Road. Currently, there is no evidence of quarrying / lime kiln apparent. Site location maps and layout plans are provided in Chapter 2. Images 6-1 to 6-4 show the general topography across the site.

Image 6.1 Views of General Topography – Eastern Site Area Looking South

Image 6.2 View of General Topography Western Site Area Looking Southeast

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Image 6.3 View of General Topography – South of Site Looking North

Image 6.4 View of General Topography – Southwestern Site Area Looking Northeast

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6.2.1 Geological Heritage Site

The GSI - Irish Geological Heritage Section (IGH) and NPWS (National Parks and Wildlife Service) has been conducting a programme since 1998 to identify and select important geological and geomorphological sites throughout the country for designation as NHAs (Natural Heritage Areas) – the Irish Geological Heritage Programme. This is being addressed under 16 different geological themes such as economic geology, karst, Devonian, coastal, Quaternary, etc. For each theme, a larger number of sites from which to make the NHA selection are being examined, in order to identify the most significant scientifically. The criteria of designating the minimum number of sites to exemplify the theme means that many sites of national importance are not selected as the very best examples. However, a second tier of County Geological Sites (CGS) (as per the National Heritage Plan) means that many of these can be included in County / City Development Plans and receive a measure of recognition and protection through inclusion in the planning system. Cork City Council includes two CGS in the 2022 CDP. As noted above, it is an objective of the CDP to conserve these features. The audit for County Cork commenced in 2021 and is now completed as indicated in the GSI web-mapping.

The 2022 CDP lists two sites of geological interest in Cork City (Blackrock diamond quarry and Saint Joesph's section on the Lee Road), however, there are eight in total listed by the GSI within the City. These are:

- Blackrock Diamond Quarry – IGH 6 (mineralogy), IGH 1 (karst) and IGH 7 (Quaternary). This is a County Geological Site, recommended for Geological NHA. This historical quarry is located between Monaghan Road and Blackrock Road, where amethyst was found, has largely been built over, though some portions of quarry walls are still visible.
- St Joseph's Section - IGH 8 (Lower Carboniferous) and IGH 10 (Devonian). This is a County Geological Site, recommended for Geological NHA. It consists of a roadside outcrop showing sub-vertical bedding planes and includes the transition from the Devonian to the Carboniferous.
- St Fin Barre's Cathedral - IGH 15 (economic geology) and IGH 3 (Carboniferous-Pliocene palaeontology). This is a County Geological Site, designated as it was built primarily from several local lithologies, and exhibiting rock sourced internationally.
- Ballinlough Fields - IGH 7 (Quaternary), IGH 1 (karst) and IGH 15 (economic geology). This is a County Geological Site, designated for the presence of carboniferous crinoidal limestone exhibiting karst features, some of which have been infilled by Quaternary diamict.
- Beaumont Quarry – IGH 1 (karst), IGH 8 (Lower Carboniferous) and IGH 15 (economic geology). This is a County Geological Site, designated as the limestone quarry is of historical importance in the city having been the source of stone for many of its buildings. It also has accessible cave systems.
- Patrick's Hill - IGH 10 (Devonian). This is a County Geological Site, consisting of an Old Red Sandstone outcrop incorporated into a roadside wall.
- Shandon Tower - IGH 15 (economic geology), IGH 8 (Lower Carboniferous) and IGH 10 (Devonian). This is a County Geological Site, consisting of alternating walls of red Devonian sandstone and white Carboniferous limestone, likely quarried locally, highlighting the key lithologies of Cork City.
- Inniscarra Bar - IGH 7 (Quaternary). This is a County Geological Site, consisting of outwash gravel deposits, found high up the margin of the valley. It assists in the understanding of glacial deposition during the Quaternary.

In addition to the above sites within the functional area of Cork City, there is one audited site located 2.5km to the west in Killumney and extending west towards Kilcrea. This is the Killumney Moraine (IGH 7 - Quaternary). It is a County Geological Site consisting of a major moraine and fluvioglacial terraces associated with local ice-cap expansion from the Cork/Kerry mountains.

The geological heritage site at Inniscarra is the closest to the Greenfield site. It is shown on Figure 6-1; the other heritage sites within Cork City are outside the map coverage. The Greenfield site is not listed as being an area of geological interest. The Inniscarra site is the closest and located approximately 1.7km to the north-northwest and the other sites are greater than 5km distance with no connectivity. As such the development will have no direct or indirect impact on any geological heritage sites.

Figure 6.1 Geological Heritage Sites

In addition to the geological heritage sites, the Ballincollig Caves, located to the east and southeast of the Greenfield site, are proposed Natural Heritage Area (pNHAs) for flora assemblages – refer to Chapter 8 (Biodiversity).

6.2.2 Economic Geology

According to the Directory of Active Quarries, Pits and Mines in Ireland, there are no active quarries within the immediate vicinity of the site. As noted in Section 6.2, there is a small historic limestone quarry at the site, and several other historic limestone quarries often with associated lime kilns along the valley to the south of Ballincollig. There are also several gravel pits (exhausted and active) to the west of the Greenfield site along the valley of the Bride River, including:

- Classes gravel pit – gravel extraction now ceased. Facility is used for gravel washing and concrete manufacture.
- Knockanemore gravel pit – active pit near Casey's Cross.
- Garryhesty gravel pit – active gravel pit.
- Classis South Quarry – active gravel pit, with extension recently (2024) opened on the eastern side of the pit.

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The GSI's aggregate potential mapping (https://dcenr.maps.arcgis.com/apps/webappviewer) indicates that the site:

- Is not mapped for its granular aggregate potential. The overburden is not sand / gravel, so it has no aggregate potential.
- Has Very High potential for crushed rock aggregate across the entire site.

Based on drilling and geophysical survey, bedrock on the southern half of the site is greater than 5m, making economic extraction unviable.

The site and immediate environs are not listed in the Memoir of Localities of Minerals of Economic Importance. There is no known history of mining within the site or within the immediate vicinity of the site.

6.2.3 Overburden Geology

According to the Soils Associations of Ireland and Their Potential Land Use, the soils at the site are Acid Brown Earths (70%) belonging to the Rolling Lowlands physiographical division. Associated soils are grey-brown podzolics (15%) and gleys (15%). The parent material is mixed sandstone – limestone glacial till, with the underlying rock consisting of Carboniferous limestone. It accounts for approximately 1.69% of the Country (excluding major lakes and rivers), i.e., approximately 115,900ha. They occur mainly in Cork and Waterford but also occur in Kilkenny and south Tipperary. These soils have a wide use range and are suitable for both tillage and grazing. Due to their sandy loam texture, free drainage and good structure, they are easy to cultivate and can produce a wide range of crops. The climate in their southern location increases yields for both crops and pasture. These soils are also well suited to apple production, seen particularly in south Kilkenny and Waterford. The use range of the associated grey-brown podzolic soil is similar to the principal soil, but that of the gley soil is limited due to impedance.

From the GSI web-mapping, the project site is covered by till derived from Devonian sandstones. Rock outcrop / sub-crop occurs at the north-western corner of the site. Gravels derived from Devonian sandstones occur along the Maglin South River just south of the Ballincollig Bypass and to the west along the Bride River valley. Rock outcrop / sub-crops also occur to the east along the valley of the Maglin North River, and along the hills to the south and north of the site, which are underlain by Devonian sedimentary rocks. Urban soils occur to the north in the developed areas of Ballincollig and alluvium occurs along the valleys of the Lee and Curraheen rivers. Figure 6-2 shows the overburden geology of the area.

Based on the GSI aquifer vulnerability ranking of Extreme (E and X) on the western, southern and northeastern parts of the site, the overburden would be interpreted to be up to 3m thick. Most of the eastern side of the side has an aquifer vulnerability ranking of High (H) suggesting an overburden thickness of between 3m and 5m. Six site investigation boreholes were drilled for Culvert No. 11 of the Ballincollig By-pass, located directly south of the site. Depths drilled ranged from 4.2m to 10.3m. Only one borehole encountered bedrock at a depth of 3m. The other five boreholes did not reach bedrock. Trial pits excavated as part of the ground investigation for the project indicate weathered bedrock depths in the range of 1.6 to 1.8m. Five boreholes drilled across the site as part of the ground investigation for the project indicate bedrock depths from 2.9m to 10.2m, with depth to bedrock increasing from north to south, indicating Extreme to Low aquifer vulnerability. The ground investigation report is provided in Appendix 6-1 and discussed further in Section 6.2.9.

Figure 6.2 Overburden Geology Map

6.2.4 Land Use

The EPA Corine (2018) land use indicates that the project site is mostly in an agricultural area (Pasture). This land use is mapped extending east towards Curraheen, and while mapped as pasture, is, in part, currently being developed for residential housing. The farmyard within the project site and lands to the north are mapped as Artificial Surfaces with an urban fabric (i.e., the housing estates around Ballincollig), with the town centre mapped as industrial, commercial and transport units.

The current land use at the project site is agricultural, with the entire site in grazing. Most of it is zoned in the 2022 CDP as ZO 02, New Residential Neighbourhoods. The farmhouse and farmyard are zoned ZO 03 (Tier 3 Residential Neighbourhoods). The south-eastern corner of the site is low-lying, within the flood plain of the Maglin North River, and forms part of a larger area extending east which is zoned in the 2022 CDP as ZO 15, Public Open Space. The lands zoned as Public Open Space approximate the extent of the 100-year flood of the Maglin North River. The Corine land use map is provided as Figure 6-3.

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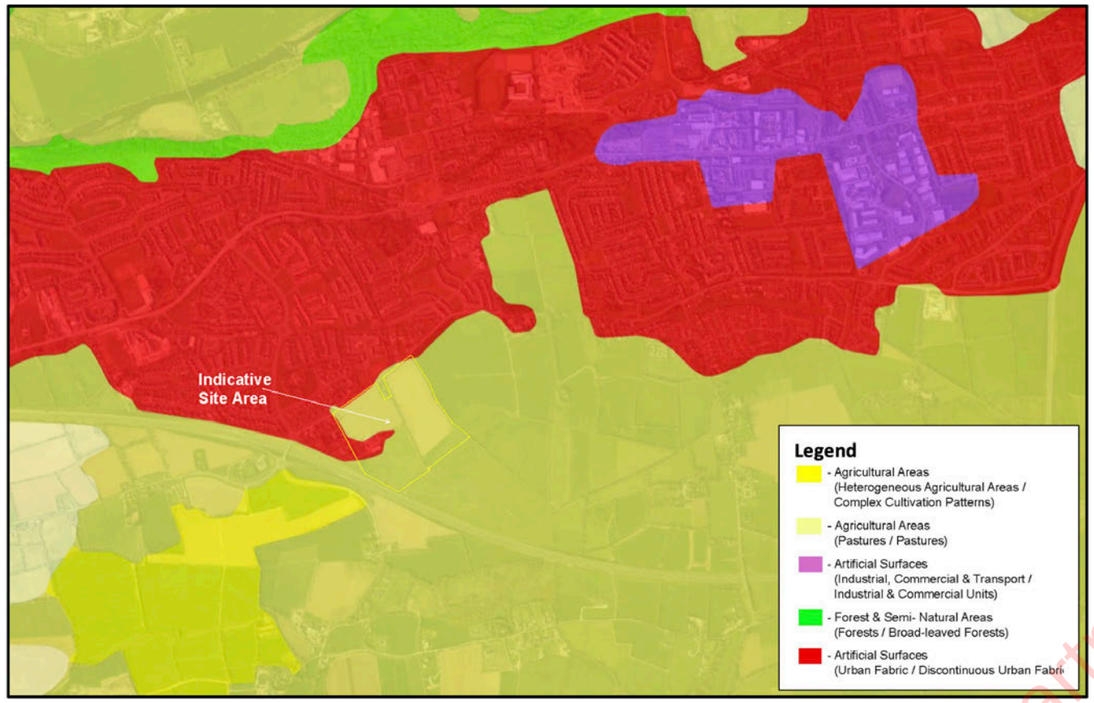

Figure 6.3 Corine Land Use Map

6.2.5 Regional Bedrock Geology

According to the GSI – Geology of South Cork, the area is underlain by Carboniferous-aged limestones. The formations underlying the site are the Little Island Formation (northern part of the site) and the Waulsortian Limestone Formation on the southern half of the site. The Little Island Formation consists of massive calcilutite[1] (mudbank facies) and crinoidal calcilutite limestones. The formation extends from Crookstown to Youghal at the eastern end of the Cork Syncline. The Waulsortian Limestone Formation consists of calcareous mudstone, wackestone[2] and packstones[3]. Regional cleavage has affected the limestone such that in some areas there are zones of intense fracture cleavage. The regional bedrock geology is shown on Figure 6-4. As noted above, rock outcrop / subcrop is present at the north-western corner of the site (i.e., small historic limestone quarry and kiln).

Following deposition, the bedrock was uplifted and compressed during the Variscan Orogeny resulting in the folding and faulting seen today. This is dominated by northeast-southwest trending anticlines and synclines. Younger Carboniferous-aged rocks (mainly limestone) lie in the synclines (such as the limestones running through Ballincollig and Cork City) and older Devonian rocks in the hills to the south and north.

1 Limestone consisting of predominantly of clay-sized particles.

2 Fine-grained limestone in which grains float in a lime-mud matrix.

3 Limestone with a self-supporting framework of calcareous mud.

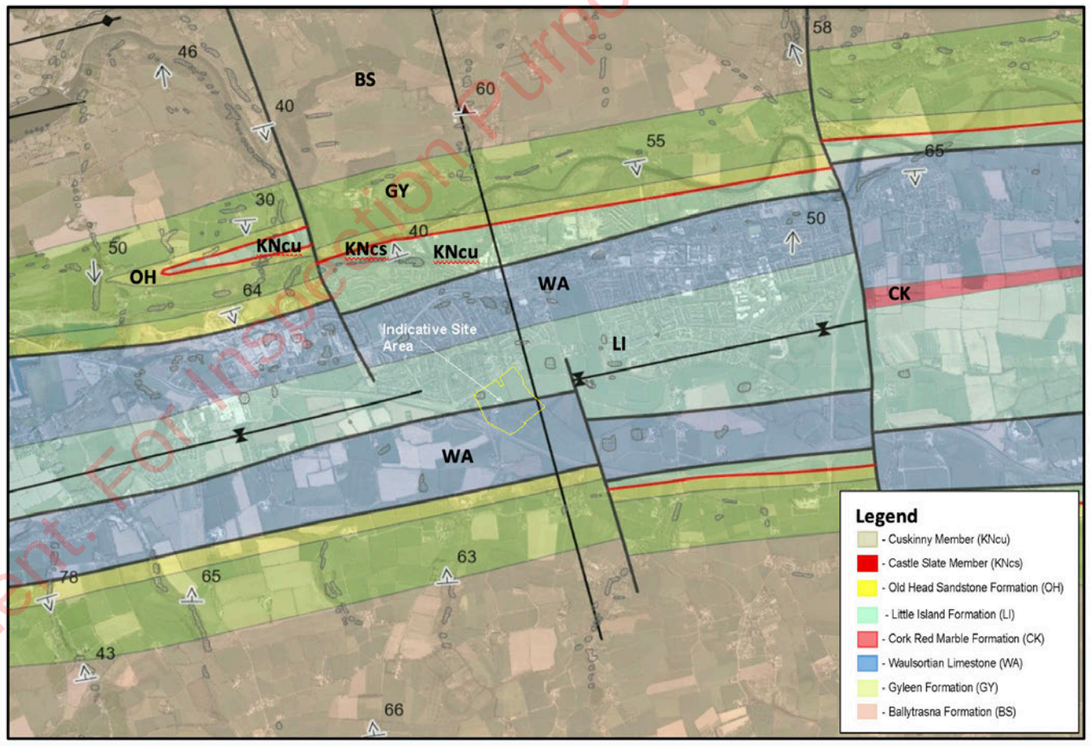

Figure 6.4 Bedrock Geology Map

6.2.6 Existing Slope Stability

Based on available data from the GSI, there are no records of slope failure within the project site or within 10km of it.

Landslide susceptibility mapping has been carried out by the GSI, based on slope and soil cover. Eight classifications for landslide susceptibility are mapped, ranging from Low to High. The Greenfield site has been mapped as 'Low' and 'Low (inferred)'.

There were no indications of slope stability issues evident within the site during the walkovers.

6.2.7 Contaminated Land

According to EPA web-mapping, there are no land uses within or adjacent to the site that could give rise to contaminated land. There were no potential contaminated land issues identified during the site walkovers. The existing farmhouse uses home heat oil, stored adjacent to the house in an 800-litre plastic tank. No signs of leaks or spillages were noted around the tank or boiler.

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6.2.8 Radon

Radon is a radioactive element which occurs naturally in earth materials. It can accumulate in buildings where elevated concentrations can increase risk of lung cancer. The EPA has produced a radon risk map for the country, indicating areas of high, medium and low risk. The risk levels for high, medium and low risk equate to 1 in 5, 1 in 10 and 1 in 20 houses that are likely to have high radon levels, respectively. The map is based on an analysis of indoor radon measurements plus geological information including, bedrock type, quaternary geology, soil permeability and aquifer type. The entire Greenfield site is in an area where 1 in 5 homes is likely to have high radon levels, as is most of Cork City, apart from areas underlain by alluvial deposits along the River Lee (and tributaries). In these areas, 1 in 10 homes is likely to have high radon levels.

6.2.9 Ground Investigations

Walkover surveys of the site and surrounding area were carried out on several occasions between July 2023 and June 2025. Observations in relation to soils, land use and geology are summarised as follows:

- The fields are used for grazing horses and cattle and slopes gently, and reasonably evenly, from northwest to southeast towards the Lisheens Stream.
- Lands directly south of the project site were raised in the early 2000's with excess soil and stone from the construction of the Ballincollig By-pass. This filling didn't extend into the project site.
- Bedrock outcrops were not observed in the area indicted on the GSI mapping as being bedrock outcrop / subcrop at the north-western corner of the site. There is no evidence of the historic quarry of lime kiln remaining.
- Large limestone outcrops occur to the east of the site such as that at Ballincollig Castle.

Hydro Survey (Priority Geotechnical Ltd) were engaged to carry out geophysical surveys. The purpose of the surveys was to estimate depth to bedrock, identify overburden type, identify areas of karstification and / or fracturing, and to inform locations of further ground investigation boreholes. This consisted of five electrical resistivity and seismic profiles. A copy of the report is provided in Appendix 6-1. The survey identified several areas of fracturing and associated potential karstification at the site.

KGEC carried out trial pit excavations at the site. The two trial pits at the northern end of the site indicated bedrock within 2m of ground surface. The typical soil profile in TP-01 and TP-02 consisted of 200mm of topsoil; 1.6m of silty, sandy, gravely overburden overlying a fractured limestone bedrock (excavated as angular cobbles). The ground investigation reports are provided in Appendix 6-1.

The geological conceptual site model is summarised in Table 6-2.

Table 6.2 Geological Conceptual Site Model

Strata Name	Description	Thickness Range (m)
Topsoil	Brown organic sandy silty clay	0.15 to 0.2
Overburden	Brown sandy gravely clayey tills	1.5 to 10.5
Weathered Bedrock	Varies from strong fractured grey limestone to Weak highly weathered white limestone	4.5 to 9.9m drilled

Priority Geotechnical Ltd drilled 5 No. of rotary boreholes at the site and installed monitoring boreholes. Borehole logs are provided in Appendix 6-1. The boreholes indicate depth to bedrock ranges 2.9m at the northern side of the site (RC-BH05) to 10.2m at the southern end of the site (RC-BH-2), deepening to 18m further south of the site. Bedrock consisted of limestone. The bedrock at the northern side of the site consisted of strong pale grey limestone, representing the Little Island Formation. The limestone underlying the southern part of the site was found to be weak and weathered white limestone. There was no core recovery of this bedrock; description and depth to bedrock is interpreted from drilling returns.

Ground investigation locations are shown on Figure 6-5.

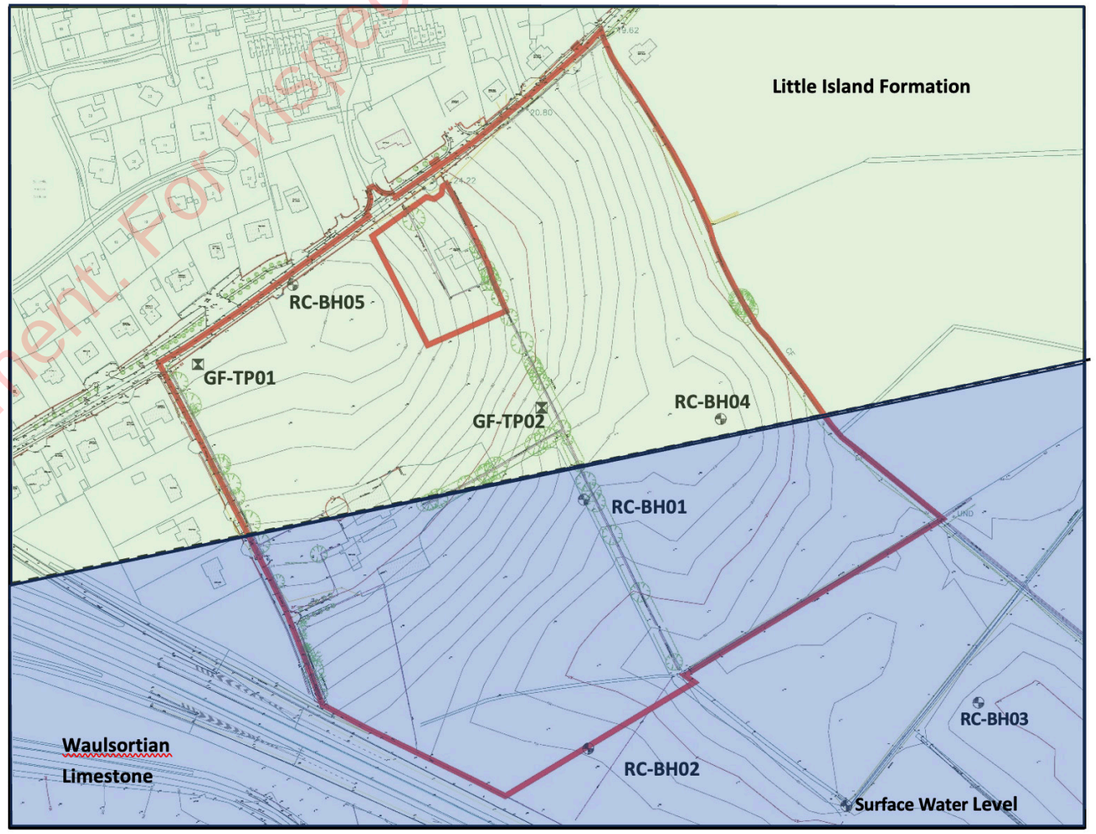

Figure 6.5 Ground Investigation Location Map

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6.2.10 Importance of Soils & Geology Attributes

Based on the NRA Guidelines, the importance of the site in terms of soils and geology is rated as Medium. This is based on the presence of moderately drained and moderate fertility soils. There are no quarries or pits on the site and while the site is mapped as having high potential for crushed rock aggregate, the development of a quarry at this location is constrained by both overburden thickness and its location within lands zoned for residential development. There are no landfills, evidence of land contamination or geological heritage sites present. The use of adjacent lands for soil recovery (during the construction of the Ballincollig By-pass) doesn't influence the rated geological importance of the site.

6.3 Characteristics of the Proposed Development

The main characteristics of the proposed development that could impact on land, soils, and geology are:

- Stripping of topsoil: Site development works will require the stripping of topsoil over a development footprint of approximately 15.2ha. Based on ground investigation works (both geotechnical and archaeological testing), topsoil depth is between 0.15 and 0.4m. Using a worse-case depth of 0.4m and taking the entire site area, it is estimated that approximately 60,800m^3 of topsoil will be excavated. [Note that part of the site is already developed (farmyard), so topsoil will not be generated from this area].
- Excavation of subsoil: Although the site is gently sloping, the housing units will need to be 'terraced' into the slopes. This will require the excavations / cuts generally up to approximately 1.5m deep, extending through the overburden. Beneath the apartment blocks, excavations of approximately 4m will be required. Bedrock is not expected to be encountered in these excavations. It is estimated that approximately 38,964m^3 of subsoil will be excavated to achieve the required profiles.
- Construction over karst bedrock: Construction over karst bedrock could result in subsidence resulting from changes in the hydrological regime, depending on the approach taken to the manage stormwater runoff.
- Demolition of existing buildings: The existing farmhouse, farm sheds and northern site boundary wall along Greenfield Road will be demolished as part of the proposed development. This will result in approximately 1,300m^3 of construction and demolition (C&D) waste.
- Demand on quarries: Aggregate, concrete and concrete products will be used in the construction of foundations, roads, footpaths and buildings placing a demand on local quarries.
- Land use change: The residential development will change the land use from agricultural to urban.

6.4 Impacts Assessment

6.4.1 Impact Assessment Methodology

The criteria in the EPA Guidelines (2022) are used to evaluate and describe the potential impacts in terms of quality, significance, extent, probability and duration as set out in Chapter 1. The NRA guidelines are used to further rate the magnitude of the impact - these are set out in Table 6-3. Determining the significance of the impact on the feature (geology attribute) based on the Importance of the feature and the magnitude of the impact is given in Table 6-4.

Table 6.3 Estimation of Magnitude of Impact on Hydrology Attribute

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves. Irreversible loss of high proportion of local high fertility soils. Removal of entirety of geological heritage feature. Requirement to excavate / remediate entire waste site. Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Loss of moderate proportion of future quarry or pit reserves. Removal of part of geological heritage feature Irreversible loss of moderate proportion of local high fertility soils. Requirement to excavate / remediate significant proportion of waste site. Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves. Removal of small part of geological heritage feature. Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Requirement to excavate / remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes.
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature.
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature.
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature.

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For the Greenfield site, the magnitude of impact on the soils / geology attribute is rated as small adverse - Irreversible loss of small proportions of local high fertility soils and/or high proportion of local low fertility soils.

Table 6.4 Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Impact			
	Negligible	Small	Moderate	Large
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

Using Table 6-4, the significance of environmental impacts of land / soils / geology is Slight.

The following sections detail the potential impacts, prior to mitigation, which have been identified from the assessment methodology presented above.

6.4.2 Do Nothing Scenario

In the 'do-nothing' scenario, the lands would continue in agricultural use, with the lands used for grazing. Over-working of the lands could lead to erosion of the topsoil layer. The application of fertilizers and agricultural chemicals could impact on soil quality. However, with good farm management, the continued farming of the lands will have a neutral imperceptible effect on land use, soils and geology.

6.4.3 Construction Phase

The potential impacts of the proposed development on land, soils and geology during the construction phase are discussed below.

6.4.3.1 Re-profiling of the Site Topography to Achieve Design Levels

Re-profiling of the site topography to achieve design levels. This will involve excavation of soils to lower high parts of the site, and the use of engineered fill to raise low parts of the site to reach design levels for the proposed development. Based on the design levels required, it is estimated that 60,800m^3 of topsoil and 38,964m^3 of overburden will need to be excavated. Approximately 38,780m^3 of fill will be required to raise low parts of the site. Unmitigated, these earthworks would likely have permanent, slight, negative local / site effects. It is unlikely that cumulative effects of these works with other residential and infrastructure projects in the area will result.

6.4.3.2 Removal of Surplus Soils off Site

It is envisioned that some excavated material will be removed off site. Unmitigated, this would likely have an indirect, permanent, slight, beneficial effect on land use at off-site locations; soil recovery sites are typically associated with raising of levels to improve agricultural potential and restoration of quarries to improve land use potential. There are likely cumulative effects if soil is moved offsite from the other residential and infrastructure projects in the area.

6.4.3.3 Demolition of Existing Buildings

There is an existing farmhouse and farm sheds on the site that will be demolished as part of the proposed development. The farmhouse is of masonry construction, built in the 1960's. The farm sheds are of concrete block and mass concrete construction with mostly sheet metal roofs. There are also large areas (approximately 2,750m^2, including shed floors) of concrete yards. The northern site boundary wall along Greenfield Road will also be removed – approximately 350m of 2m high wall. It is estimated that approximately 1,300m^3 of C&D waste (concrete rubble) will result from these demolition works. The demolition works will have a direct, neutral, not significant, temporary effect at the local / site scale on soils and geology. It could result in indirect, not significant, permanent negative off-site effects depending on its deposal / reuse management.

6.4.3.4 Slope & Ground Stability

The re-profiling of the site topography might result in cut slopes that could fail resulting in landslips. Based on the finished levels, the cuts of up to approximately 1.5m in height are required. Unmitigated, the failure of this slope would be temporary imperceptible localised negative effect.

6.4.3.5 Geological Heritage

No direct or indirect impact on geological heritage sites, or Ballincollig Caves pNHA, is predicted.

6.4.3.6 Soils Exposed to Erosion

During construction, soils will be exposed in excavations and in stockpiles. These soils will be subject to erosion by wind and rain. Unmitigated this would be a short-term, slight, local, negative effect, with eroded soils potentially carried to the streams draining the site.

6.4.3.7 Use of Quarry Products

Concrete, concrete products (blocks, curbing etc.) and aggregates will be required for the construction of housing units and roads at the development. Table 6-5 summarises the approximate volumes of quarry products needed to complete the development. These materials will be sourced from local quarries.

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Table 6.5 Estimate of Quarry Products Requirements

Product	Per Dwelling	No of Dwellings*	Per Apartment	No of Apartments	Total (tonnes)
Stone – Annex E	78 tonnes	237	15.6 tonnes	312	23,353
Stone Annex E – Apportioned to site works	956 tonnes	237	191.2 tonnes	312	286,226
Concrete	95m^3	237	19 m^3	312	68,263
Concrete Blocks	6,500 No.	237	1,300 No.	312	38,922
Bricks	1,745 No.	237	349 No.	312	1,567
Concrete Tiles	1,300 No.	237	0	312	1,386
Concrete Kerbs	50m	237	10 No.	312	898
Concrete Cappings	20m	237	4m	312	269
TOTAL (Aggregate)					309,580
TOTAL (Concrete)					111,307

Note: * - There are 232 housing units proposed. A figure of 237 units is used in Table 6.5 to account for the materials needed for the creche.

The use of products from authorised quarries is considered a likely, indirect, slight, medium-term positive local effect as these facilities are exploiting a recognised natural resource and will have appropriate environmental controls. The demand will be cumulative with the other residential and infrastructural projects in the region.

6.4.3.8 Soil Contamination

Hydrocarbons will be stored and used at the site for construction machinery. There is potential for leaks and spillages which would impact on soil (and water) quality. The potential impact would depend on the volume and location of a fuel spill / leak. Fuel storage tanks on construction sites are typically no larger than 1,300 litres. Unmitigated, this would be an unlikely short-term, not significant, negative, local effect.

6.4.3.9 Land Use Change

The development of the site will result in a likely, permanent, slight, negative affect in terms of the loss of agricultural lands. However, it is also viewed as a likely, permanent, positive, slight, local affect in terms of development of zoned lands within the City.

6.4.4 Operational Phase

The operational phase of the development is not expected to present significant impacts to soils and geology. The impacts on land use will have already been realised with the construction of the project. The aspects of the proposed development that potentially have operational-related impacts on soils and geology are:

- The parking of cars and the storage of home-heating fuel (if used) within the development may result in the leakage of small amounts of oil resulting in contamination of soils. Any leaks or spillage is likely to be small in scale. Unmitigated, this potential impact would likely have a long-term imperceptible negative local effect.
- As noted, there are cut slopes up to approximately 1.5m. These are unlike to fail during the lifetime of the development. As such, the potential impact and consequences of a slope failure would be a temporary, imperceptible negative, local effect.
- Leakage from the foul or storm water sewer could potentially result in soil (and groundwater) contamination and / or soil erosion. Unmitigated, this potential impact would likely have a long-term, slight, negative, local effect.
- Discharges of stormwater to ground using SuDS infrastructure could affect the underlying karst bedrock. Concentrated flows could erode soils resulting in subsidence. Depending on the size of the underlying karst feature and unmitigated, this potential impact would likely have a long-term, significant, negative, reversible local effect on the built infrastructure.
- The Greenfield site is in a high-risk area for radon levels. Unmitigated, this potential impact would likely have a permanent, very significant, negative, effect on residents of the development.

The land use will be permanently changed from rural agricultural use to a residential urban land use.

6.5 Avoidance, Remedial or Reductive Measures

The avoidance and mitigation measures for the construction and operational phases are presented in the subsection below. Most relate to the construction phase.

6.5.1 Construction Phase

Measures to be employed during the construction stage to avoid, reduce and minimise the potential impacts on land, soil and geology are:

- A CEWMP has been prepared for the development. This will be updated and finalised prior to the commencement of construction. It is included in Appendix 2-1.
- The stripping of topsoil will be carried out in phases to minimise the areas exposed to wind and rain erosion. Topsoil will be carefully stored for later reuse in landscaping. Best practice will be employed in the stripping and stockpiling of topsoil. This will include:
    - Careful selection of stockpile locations to: - avoid, as far as practical, double handling of materials; avoid steep slopes; avoid natural overland flow paths of stormwater runoff; provide shelter from the prevailing wind direction.
    - Blading off the vegetative layer (for separate storage). Vegetation will not be incorporated in the stripped topsoil.
    - Avoid stripping in inclement wet weather conditions. Wet soils are more difficult to work and handle and it is more likely to damage soil structure in wet conditions.
    - Avoid extending topsoil stripping into the mineral soil layer.
    - Limiting height of stockpiles to avoid anaerobic conditions occurring.
    - Profiling of stockpiles to promote rainwater runoff.
    - Placement of silt fencing downgradient of stockpiles to catch any fines carried by storm water runoff.
    - Stockpiles will be allowed vegetate naturally, which will reduce erosion by wind and water.
- Where practical, stripped topsoil will be taken directly to on-site reuse locations for landscaping. It is estimated that 40% of the stripped topsoil will be reused in gardens and green spaces (i.e., 24,320m^3 of topsoil reused on site).

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- Where it is apparent that there will be an excess of topsoil on the site, the Site Manager will identify an off-site destination so the topsoil can be taken directly off site and so avoid stockpiling and double handling. This could be another construction site where a topsoil shortfall is experienced or a permitted soil recovery site. It is estimated that 60% of the topsoil will be taken off site either as a waste or, where appropriate, as a by-product. Where the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 and following EPA guidelines. Where material cannot be reused off site, it will be sent for recovery or disposal at an appropriately authorised facility.
- The profiling of the site has balanced the cut / fill requirements such that removal of subsoil is not predicted. However, should off-site removal of overburden be necessary it will be managed in the same manner as outlined above for surplus topsoil.
- Excavated mineral soils will be managed in a similar manner to topsoil as outlined above. Excavated mineral soils will be:
    - Stored on site where a later on-site reuse has been identified. Mineral soils will be stored separately from topsoil.
    - Taken directly to their on-site reuse location when these locations are prepared to receive the fill material.
    - If excess to on-site requirements, taken directly off-site, with the appropriate authorisations in place, for beneficial reuse at another construction site.
    - Reused immediately on site, if suitable, in, for example, trench backfill.
- Vehicles and plant will use haul roads to avoid compaction of soil. This will include tipper trucks removing excess soil off-site and the delivery of building materials to site. Where vehicles (dumper trucks and HGVs) need to access areas not yet serviced by haul roads, they will follow a demarcated route along which the haul road will later be constructed.
- To minimise soil erosion, earthworks will be suspended during extreme weather conditions. An extreme rainfall event will be classified as an event that corresponds to the Met Éireann Orange – Weather Alert for rainfall. The Site Manager will monitor the weather forecast to make preparations ahead of adverse weather conditions.

Met Eireann Orange Weather Alert for Rainfall
50 mm – 80 mm in 24 hrs
40 mm – 60 mm in 12 hrs or less
30 mm – 50 mm in 6 hrs or less

- Hydrocarbons (oils, diesel and chemicals) will be stored and managed in an appropriate manner to ensure no negative effects. Specific measures will include:
    - Any storage of oils and diesel on site will be in steel or plastic tanks of good integrity and bunded to 110 % of tank capacity. All fuel and hydraulic fluids will be stored in the site COSHH store located in the site compound.
    - Refuelling of site plant will be carried out at the site compound where a concrete refuelling pad will be provided adjacent to the fuel storage tank. When refuelling takes place directly from self-bunded mobile refuelling bowsers, spill kits will be readily available (kept in the machine). Refuelling of mobile plant will not take place within 50m of any sensitive receptor. Toolbox talks on refuelling will be given to delivery drivers in addition to plant operatives.
    - Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
    - Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
    - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
    - Appropriate spill control equipment, such as oil soakage pads, will be kept in the site plant to deal with any accidental spillage. Spare spill kits will be kept at the construction site compound in the container adjacent to the fuel storage.
- Surface water management infrastructure will be installed as detailed in Chapter 7, which will avoid / reduce soil erosion.
- Concrete, concrete products and aggregates needed for the construction will only be sourced from authorised quarries, at which appropriate environmental controls are implemented per planning conditions.
- Monitoring and inspection of the soil stockpiles, slope cuts, fuel storage, refuelling operations, etc, will be carried out by the Client's Engineer and improvement made as required. Temporary supports for excavations will be used where considered necessary by the Client's Engineer.

6.5.2 Operational Phase

The mitigation measures to be employed during the operational phase to address the identified potential impacts are:

- To avoid potential subsidence arising from stormwater management, use of infiltrating SuDS features will be minimal. Engineering solutions (6 No. attenuation tanks) will be the primary mechanism for controlling stormwater runoff to greenfield rates. The discharge from the tanks will be to the drain flowing to Lisheens Stream. This is in accordance with the recommendations in the Ballincollig drainage study.
- In addition to the SuDS approach, the foundations design will further reduce potential impacts of subsidence. Subject to detail design, foundations will be reinforced concrete rafts on end-bearing bored piles.
- Spillage and leaks of oil from cars parked in the development during the operational phase is unavoidable. To reduce the potential impacts, hydrocarbon interceptors will be incorporated into the site drainage design. The parking areas will also be paved, so impacts on soils and geology are unlikely. The hydrocarbon interceptors will be maintained by the Management Company during the operational phase.
- With regard to home heating, it is noted that heat pumps will be used at the development. The use of home heating oil should therefore not arise. It is, however, possible that some homeowners will use oil. Any leaks or spillage is likely to be small in scale. Although the likelihood is reduced, the potential impact remains, with long-term slight negative effects.
- Storm water and foul sewers will be tested. Any leaks would therefore be identified and repaired prior to being put into service. They will be maintained by the Management Company / Local Authority. Leakage, and subsequent pollution of the underlying geology, is therefore unlikely.
- Cut slopes will be shallow (less than 1.5m), so potential for slope failure is avoided.
- Radon barriers and venting are standard construction best practices to prevent radon gas ingress into buildings. This risk of radon ingress into living spaces is greatly reduced and unlikely to occur.

6.5.3 Monitoring

Monitoring of the works will be carried out by the Client's Engineer, project engineer and geotechnical engineer. This will involve visual inspection of the works for soil storage, deep excavations and general site operations. During construction, monitoring will be conducted at excavations and fill areas, and within the soil stockpile areas. Inspections and testing of roads and foundations will be carried out during their construction to ensure that they can accommodate the design loadings. Excavations will be inspected to ensure no stability issues arise. Remedial measures, if required, will be implemented as appropriate.

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6.5.4 Worst-Case Scenario

The worst-case scenario would be a slippage of stockpiled soil or an excavation cut that could impact on worker safety, property and potentially water quality in the Lisheens Stream. However, with appropriate design solutions, management of stockpiles, monitoring and inspections, and good construction practices this scenario is unlikely to occur.

6.5.5 Predicted Impacts

With the implementation of these avoidance and mitigation measures, the predicted impacts of the proposed development are:

- The excavation of topsoil and overburden cannot be avoided to reprofile the site contours. This will result in large volumes of excavated soil. A materials balance has been carried out to reuse on site all of the overburden and 40% of the topsoil.
- The use of concrete, concrete products and aggregate from local quarries is also unavoidable.

6.6 Cumulative Impacts

The three projects that are considered for cumulative assessment of the potential impacts on land and soils are summarised in Chapter 1 and include two housing schemes and a creche.

In terms of land use, these projects will have a cumulative effect in increasing the transition of agricultural lands to an urban use. According to the planning documentation for these projects, the land area involved totals approximately 8.8ha. This is in addition to the project site which extends to an area of 15.2ha.

Two of the projects involve large-scale earthworks, namely the two housing schemes. All three projects are subthreshold for EIA and the planning documentation doesn't provide the information to fully assess the cumulative effects of earthworks, such as the creche off Maglin Road (planning Ref No. 24/43308) being developed by Coleman New Homes Ltd.

The two housing developments (Cois Caisleán, Phase 2, in Maglin and Heathfield Phase 2 in Carriganarra) include CEMPs but do not give estimates of excavated soil / subsoil quantities. Both indicate that most of the excavated soils will be reused on site. Surplus will preferentially be taken off site as a by-product subject to meeting the requirements of the Article 27 provisions of the Waste Management Act. If beneficial use at another construction site is not identified, and as a last resort, the inert soil will be taken to an authorised facility for recovery (i.e., a facility permitted by the Local Authority or licenced by the EPA). Cois Caisleán, Phase 2 is also being developed by Coleman New Homes Ltd, so it is likely that the same approach will be taken for the construction of the creche. It is noted that both housing developments have commenced construction and are likely to be close to completion within 12 months. The overlap of their construction phase with the Greenfield site will be minimal.

There will be a cumulative impact in terms of demand for quarry products, however, it is likely that overlap in the construction phases will be of short duration.

The potential cumulative impacts of the relevant plan for the area were assessed, which is considered to be the Cork City Development Plan 2022. The assessment of the potential impacts on the environment of the Cork City Development Plan 2022 was undertaken utilising the Strategic Environmental Objectives (SEOs) which are detailed in Table 5.1 of the CDP's Strategic Environmental Assessment. The potential cumulative impacts of the Plan were assessed having regard to these SEO's. Table 5.1 of the SEA identifies the SEO's for 'Soil (and Land)' as being to:

- Protect soils against pollution, and prevent degradation of the soil resource.
- Promote the sustainable use of infill and brownfield sites over the use of greenfield sites.
- Safeguard areas of prime agricultural land and designated geological sites.

Table 7.5 of the CDP's Strategic Environmental Assessment, 'Comparative Assessment of each of the Alternatives against Strategic Environmental Objectives' indicates that Alternative/Scenario 3 'Compact Liveable Growth', the 'Selected Scenario' has positive interactions with the status of the SEO's for 'Soil (and Land)'.

There are no significant cumulative impacts predicted for soils and geology during the operational phase.

6.7 Difficulties Encountered in Compiling

No difficulties were encountered during the preparation of this EIAR chapter.

6.8 Interactions

Interactions associated with land and soils with other aspects of the environment include:

- Water (Hydrology & Hydrogeology) - management of soil (stripping and storage) will interact with surface water quality in terms of potential soil erosion and siltation of the receiving surface water environment. The risk of soil contamination from hydrocarbons also presents a risk to the groundwater and surface water environments.
- Air Quality - fugitive dust emissions from the management of soils (stripping and storage) could affect air quality locally. Removal of excess soils and importation of quarry products will increase emissions from HGVs, affecting air quality locally.
- Traffic - the reprofiling of the site will require the removal of excess topsoil offsite, increasing HGV traffic and noise locally. The importation of concrete and aggregate will also increase HGV traffic and noise locally.
- Noise - reprofiling of the site using large plant will increase noise levels during the construction stage. Much of this work will be completed with excavators. The removal of excess topsoil offsite will increase HGV traffic noise.

6.9 Conclusions on Land & Soils

The site geology consists of a thin layer of topsoil over between approximately 1.6m and 10.2m of glacial tills (and thickening to the south), resting on karstified limestone bedrock. The topography of the site is gently sloping from northwest to southeast with an average slope of approximately 1°. Relatively minor re-profiling is required for the development of the housing scheme. There are no significant geology-related impacts identified at the site that can't be addressed with good construction management.

The land use will be permanently changed from rural agricultural use to an urban residential neighbourhood.

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Table 6.6 Summary of Potential Effects & Mitigation

Impact	Affected Attribute	Importance	Potential Effects	Mitigation	Residual Impact
Bulk Excavations	Soil	Medium	Permanent removal of topsoil & overburden	Phased removal. Proper handling and storage. On-site reuse. Off-site beneficial reuse of surplus.	Imperceptible
	Bedrock	Low to Medium	None predicted	None required.	No impact
Contamination	Soil		Fuel spillage or leaks presenting a short-term, not significant, negative, local effect.	Proper storage and dispensing. Proper emergency response to spillage. Removal & off-site disposal of contaminated soil.	Imperceptible
	Bedrock	Low to Medium			
Slope Stability	Soil	Medium	Stability of excavations, cuts, and stockpiles presents a potential temporary slight localised negative effect.	Cuts designed with safe slopes (batter). Temporary supports as required for workers safety. Proper stockpile storage.	Imperceptible
Bedrock Stability	Bedrock	Low to Medium	Influence on existing karst features resulting in subsidence	Use of piles supporting raft foundations. Selection of SuDS features compatible with karst regions – i.e., non-infiltrating features	Imperceptible
Wind & Water Erosion	Soil	Medium	Soil erosion from stockpiles and stripped areas presents short-term, slight, negative effect, with eroded soils potentially carried to the Lisheens Stream.	Phased removal. Proper handling and storage. Erosion control measures.	Imperceptible
Land Use	Land	Medium	Development will result in: permanent, imperceptible, negative affect in terms of the loss of agricultural lands. permanent, positive, slight, local affect in terms development of zones lands within the City.	Suitable housing density. Provision of section of local greenway amenity providing connectivity and beneficial land use of residents.	Imperceptible -agriculture Slight beneficial - provision of residential housing

6.10 References

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6.11 Chapter Appendices

Appendix 6-1- Ground Investigation Reports.

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CHAPTER SEVEN

WATER (HYDROLOGY & HYDROGEOLOGY)

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CHAPTER SEVEN

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CHAPTER 7 | Water (Hydrology & Hydrogeology)

7.1 Introduction

This chapter of the EIAR addresses the potential significant direct, indirect and cumulative impacts on hydrology (surface water) and hydrogeology (groundwater) resulting from the proposed large-scale residential development (LRD) at Greenfield, Ballincollig, Cork. The existing water environments are described, potential impacts on these environmental aspects assessed and evaluated, and where appropriate, measures recommended to avoid, reduce or mitigate potential impacts. The residual impacts following mitigation are then summarised. It was prepared by Dan Keohane of Keohane Geological & Environmental Consultancy. Aquatic ecology of the site was assessed by Dixon Brosnan Ltd and is presented in Chapter 8. Sustainable Drainage Systems (SuDS) was designed by Denis O'Sullivan Associates, Consulting Engineers (DOSA). SuDS is discussed in detail in the Drainage Impact Assessment Report, which is appended to this EIAR. It is summarised in this chapter where appropriate. Malachy Walsh & Partners (MWP) prepared the flood risk assessment report, which is also summarised in this chapter where appropriate and appended to this EIAR.

A full description of the proposed development is provided in Chapter 2. In summary, the proposed development comprises a Large-Scale Residential Development (LRD) at Greenfield (townland), Ballincollig Cork. The proposed development consists of the demolition of an existing dwelling house, farmyard and associated agricultural buildings and the construction of a residential development of 544 no. units (232 no. dwelling houses and 312 no. apartment/duplex units). Vehicular access to the proposed development will be provided via 2 no. entrances from the Greenfields Road with separate pedestrian entrances also provided. Ancillary site works include the provision of bicycle parking and bin storage facilities serving the proposed apartment/duplex buildings, a creche facility and public realm upgrades to the Greenfield Road.

7.1.1 Scope & Purpose

This chapter of the EIAR provides details of the surface water and groundwater environments in which the development is proposed. It identifies the surface water catchment(s), drainage patterns, surface water uses, runoff characteristics, flooding potential, groundwater users and hydrogeology. It provides baseline water quality data based on publicly available information and monitoring carried out as part of this assessment.

The purpose of the assessment is to identify the potential direct impacts of the proposed development on the hydrology (surface water quality, runoff characteristics etc.) and hydrogeology (groundwater quality, uses etc.) within the site and potential indirect impact beyond the site boundary; and to assess the potential impacts in the context of other developments (proposed / completed) to determine cumulative effects. Having identified and quantified the potential impacts, to detail measures to avoid, mitigate and / or reduce significant potential negative impacts for the construction of the development and during its lifespan, where relevant. To audit the effectiveness of the construction phase mitigation measures, a quality monitoring programme is also outlined.

7.1.2 Policies & Guidelines

There are several local, national and international policies and guidelines relied upon in the preparation of this chapter. These include:

- Water Framework Directive (2000/60/EC).
- Cork City Development Plan 2022 - 2028.
- Environmental Protection Agency, May 2022 guidelines.
- Office of the Planning Regulator, 2022.
- European Commission, 2017 EIA guidelines.
- European Commission, 2017 EIA scoping.
- European Commission, 2013 EIA incorporating climate change.
- Department of Housing, Planning and Local Government 2018 EIA guidelines.
- Office of Public Works (OPW), 2009 flood risk assessment (FRA) guidelines.
- Department of the Environment, Community and Local Government, 2014 FRA guidelines clarification.
- Institute of Geologists of Ireland, 2013 EIS (EIA) guidelines.
- National Roads Authority 2008 guidelines for geology and hydrogeology assessments.
- National Roads Authority, 2005 guidelines for crossing watercourses during construction.
- Construction Industry Research and Information Association (CIRIA), 2015 SuDS handbook.
- CIRIA, 2017 SuDS manual.
- CIRIA, 2006 guidance on control of water pollution from linear construction projects.
- CIRIA, 2001 guidance on control of water pollution from construction sites.
- Inland Fisheries Ireland, 2016 guidelines on protection of fisheries during construction works.
- Inland Fisheries Ireland, 2020 guidelines on planning for watercourse in the urban environment.
- Malachy Walsh and Partners, 2021 Ballincollig drainage study.

7.1.2.1 Cork City Development Plan 2022-2028 (CDP)

Chapter 9 of the City Development Plan 2022-2028 sets out the objectives for the protection of surface water quality and compliance with the Water Framework Directive and River Basin Management Planning. Objectives in Chapter 9 address water supply, wastewater, private wells, SuDS, water quality, flood risk etc.

There are some cross-cutting themes in Chapter 6 of the CDP - Green and Blue Infrastructure, Open Space and Biodiversity. This chapter of the CDP highlights the importance of the water environmental as an integral component of Green-Blue Infrastructure. The Curraheen Lowlands (immediately east of the project site) is identified on Figure 6.4 (City Scale GBI Opportunities for Cork City) of the CDP as one of the 'Cork City Rewilding, Rewetting and Reafforestation Projects' - refer to Figure 7-1. Objective 6.6 relates to the protection of rivers, waterway and wetlands, and Objective 6.21 relates to the development of a river use management plan for the River Lee.

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Figure 6.4: City Scale GBI Opportunities for Cork City.

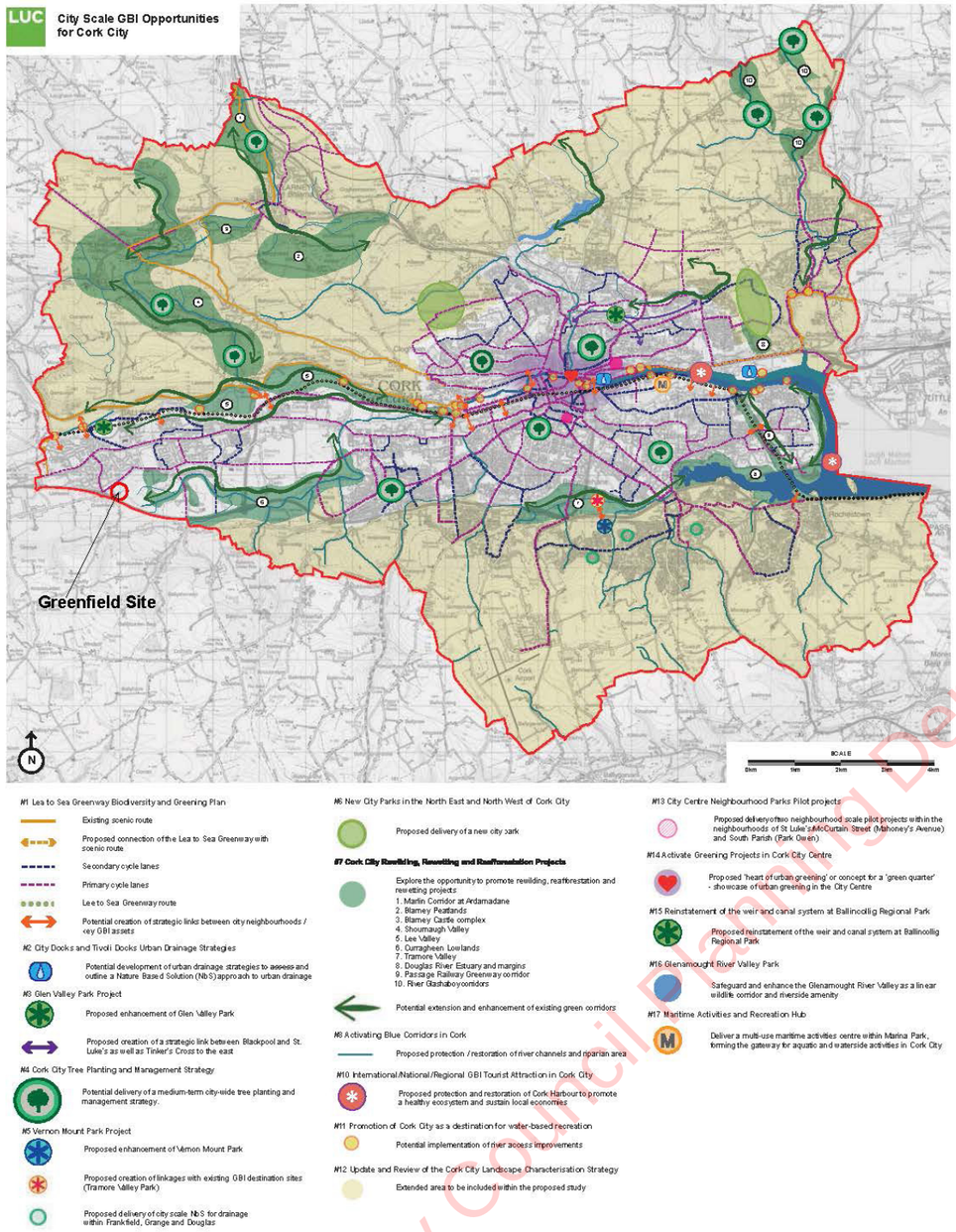

Figure 7.1 CDP GBI Opportunities Map

7.1.3 Sources of Baseline Data

The main sources of baseline data and information relating to the water environment include:

- Surface water data including catchments, flows, surface water quality etc - Environmental Protection Agency www.epa.ie , www.catchments.ie and http://www.wfdireland.ie/maps.html . For the purposes of this assessment, watercourses shown on the EPA web-mapping are defined as streams / rivers, and watercourses not shown are referred to as drains (these are generally man-made drains).
- Historical flood information and flood risk maps - Office of Public Works www.opw.ie , www.cframs.ie and www.floodmaps.ie
- Rainfall data - Met Eireann www.met.ie
- Designated sites – National Parks & Wildlife Service www.npws.ie
- Groundwater, wells, aquifers, etc - Geological Survey of Ireland - www.gsi.ie

7.1.4 Assessment Methodology

The assessment was carried out with reference to relevant policies, regulations and guidelines, as listed above, and following this general methodology:

- The preliminary design of the proposed development was reviewed to identify elements which could have the potential to impact or change the water environment.
- Consultation was carried out with agencies with an interest in the water environment, including Inland Fisheries Ireland (IFI), Office of Public Works (OPW), Uisce Éireann, Geological Survey of Ireland (GSI) and Transport Infrastructure Ireland (TII).
- A literature review was carried out to determine any policies and / or guidelines to which the proposal should have regard.
- A desk-based assessment of the water quality, flows, drainage pattern and uses in the catchment relevant to the proposed development, was undertaken. Any particularly sensitive receptors were identified – water abstractions for drinking water, sensitive aquatic habitats or fauna, etc. The water management proposals in the planning documentation for nearby developments were reviewed.
- Field surveys were conducted to identify any significant water features.
- Review of the biodiversity chapter prepared for the project by Dixon Brosnan Ltd to assess the interaction of surface / groundwater with ecology. Review of the Drainage Impact Assessment report prepared by DOSA to assess the surface water management proposals for the development.
- Findings from the desk-based study and field surveys were used to modify the site layout. Further field surveys were then carried out to assess any modifications to the site layout.

The site walkovers and collection of data were carried out on several occasions between July 2023 and June 2025. Data collected included:

- Mapping of surface water drainage.
- Collection of surface water samples for analysis.
- Search for local users of surface water for drinking water supply.
- Search for local users of groundwater for drinking water supply.

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The information collected during the desk-based assessment and site walkovers were used to establish the importance, quality and sensitivity of the receiving surface water (Table 7-1) / groundwater (Table 7-2) environments. This follows the NRA Guidelines (2008).

Table 7.1 Estimation of Importance of Hydrology Attributes

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale.	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2-3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes. Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 7.2 Estimation of Importance of Hydrogeology Attributes

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

7.1.5 Consultation

As part of the EIA process, consultation was carried out with organisations and individuals regarding the proposed development, namely IFI, OPW, Uisce Éireann, GSI and TII. The information package sent, and the consultation responses received, are provided in Appendices 1-3 and 1-4 of this EIAR. The relevant responses are summarised here and incorporated, where appropriate, into the avoidance, mitigation and monitoring proposals for the proposed development. The OPW didn't provide a consultation response.

7.1.5.1 Inland Fisheries Ireland (IFI)

IFI responded by email to on 15 January 2025 raising the following points / queries:

- Disposal of septic effluent to the public sewer. IFI requested that Irish Water confirm sufficient capacity, and if this is not the case, provided alternative treatment and disposal options.
- There should be no interference with, bridging, draining, or culverting of any watercourse its banks or bankside vegetation to facilitate the development, without the prior approval of IFI and that full cognisance is given to IFI '*Guidelines on protection of fisheries during construction works in and adjacent to waters*'.
- Loss of flood plain or increase in runoff flows above greenfield rates should be avoided.

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7.1.5.2 Transport Infrastructure Ireland (TII)

TII responded to the Council's LRD consultation on 24 March 2025. It advised that the surface water drainage infrastructure for the N22 (Ballincollig By-pass) was only designed to manage runoff from the road. TII would not support any private development accessing the nation road drainage regime. [Note that the proposed development will not access / interfere with the N22 drainage infrastructure]. TII also made the following points:

- A site-specific flood risk assessment to address both pluvial and fluvial flood risk should be included with the application.
- Management of surface water runoff (particularly in the vicinity of the N22) should be clearly demonstrated. TII raised concerns regarding proposals for manholes, attenuation tanks and interceptors close to the N22 boundary. There is an inference that the proposed surface water management infrastructure would affect drainage from the N22.
- The application should include confirmation that the proposals do not outfall to any nation road drains.

7.1.5.3 Irish Water (Uisce Éireann)

Uisce Éireann responded to the Council's LRD consultation on 26 March 2025. Irish Water raised the following points:

- It confirmed that there is capacity for both water and wastewater connections for the proposed development, subject to the following upgrades:
    - In order to complete the proposed water supply connection for the development, approximately 250m of watermain upgrades are required between Station Road and Maglin Road.
    - A 200mm diameter spine main, located through the Greenfield site, will be required to service future development.
    - To complete the proposed foul sewer connection, there is a requirement for a pumping station with 24-hour storage. The discharge connection would be to the 450mm diameter sewer line located on Maglin Road.
    - An alternative foul sewer connection could be made to the network to the north of the site, but this would require downstream upgrades near the R608 road.
- Protection of drinking water sources should be implemented, where appropriate, to ensure that the development does not give rise to deterioration of water quality of supply sources (surface or ground water).
- It requested to be consulted via an EIAR scoping letter 6 months prior to submission of the formal planning application.

7.1.5.4 Geological Survey of Ireland (GSI)

The GSI responded to the consultation by email dated 22 January 2025. The GSI advised of its programmes focused on the various geological aspects, such as heritage, groundwater, flood monitoring, landslide susceptibility, aggregate potential etc. The GSI recommended use of its on-line data and information services. GSI also requested copies of any ground investigation reports prepared for the project.

7.2 Hydrology in the Receiving Environment

The site is within hydrometric area 19 (Lee, Cork Harbour and Youghal Bay). Hydrometric area No 19 includes the surface catchment drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy, extending to an area of 2,153km^2.

The surface water catchments and drainage networks are shown on Figure 7-2. The site is in the Curraheen (Cork City)_010 WFD River sub-basin; Glasheen (Cork City)_SC_010 WFD sub-catchment; and River Lee WFD catchment. The Maglin North[1] is a second order stream that rises in the townland of Grange, to the southwest of the site. It flows north for approximately 1.3km, then turns east, passing under the Ballincollig By-pass in Kilnaglory, flowing generally in an easterly direction. The Lisheens Stream[2] (a first order stream) is fed by several field drains, many ephemeral, draining the project site and adjacent fields. This stream is shown on the 25-inch historic mapping as rising at 'Greenfield Well'. On the historic 6-inch mapping this well is identified as 'The Boiling Well', possibly indicating that it represents groundwater discharge under artesian conditions. The groundwater level recorded in the nearby monitoring well supports this interpretation. The Lisheens Stream was included in the OPW's arterial drainage scheme carried out under the Arterial Drainage Act (1945) to improve land for agriculture and to mitigate flooding. These works included dredging, bridge modification and embankment construction. Lands upstream of Maglin Bridge, extending to southern perimeter of the Greenfield site, benefited from these works. More recently, land drains have been installed in the lower fields of the site which discharge to the drains flowing to the Lisheens Stream or discharge directly to the Lisheens Stream.

The Lisheens Stream is slow moving and for much of its length is choked with aquatic vegetation. It joins the Maglin North River just east of Ballincollig Castle. The Maglin North River joins the Curraheen Stream just east of Clash Road and just south of the Ballincollig By-pass. The Curraheen Stream flows east towards Bishopstown, turns north and then east again, joining with the Glasheen River near Victoria Lodge on the Wilton Road. The Glasheen River joins the south channel of the River Lee near Victoria Cross. The local drainage is shown on Figure 7-3. Figure 7-4 shows the N22 drainage infrastructure near the Greenfield site.

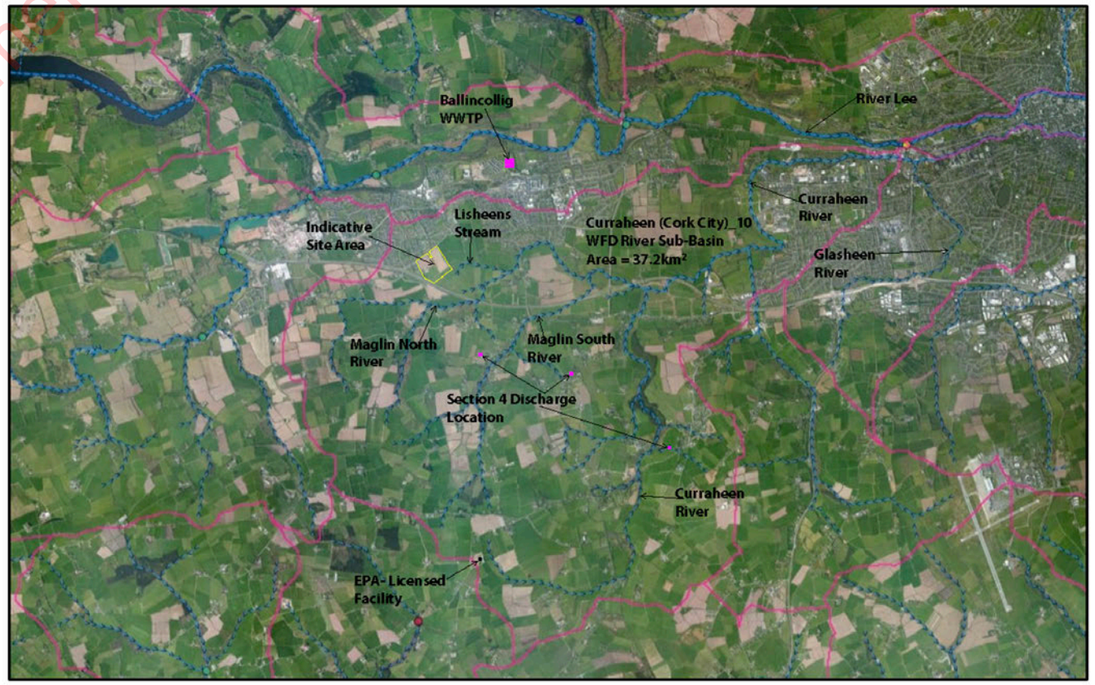

Figure 7.2 Surface Water Features + River Sub-basins

1 The EPA name for the Maglin North River is the Grange Hill Stream. The stream is named Maglin North River in the Ballincollig Drainage Study and this nomenclature is used in this EIAR.

2 The EPA name 'Lisheens Stream' is used in this EIAR. This watercourse is referred to as 'Artificial Drain' in the Ballincollig Drainage Study. Lisheens Stream is used in this EIAR to distinguish this watercourse from the other artificial drains in the study area

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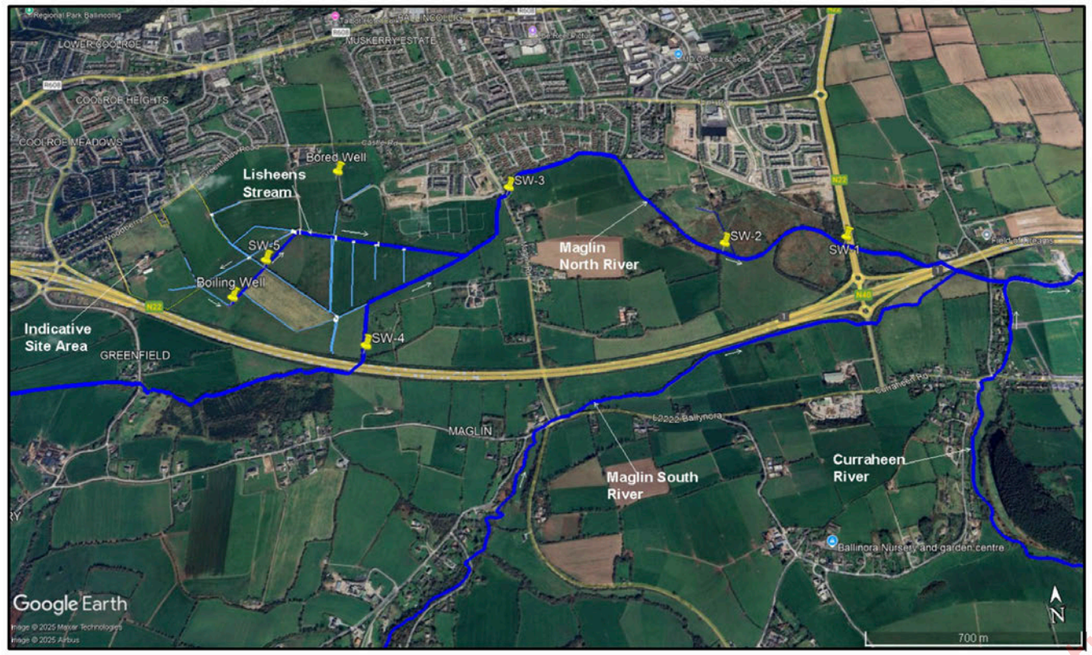

Figure 7.3 Local Surface Water Drainage

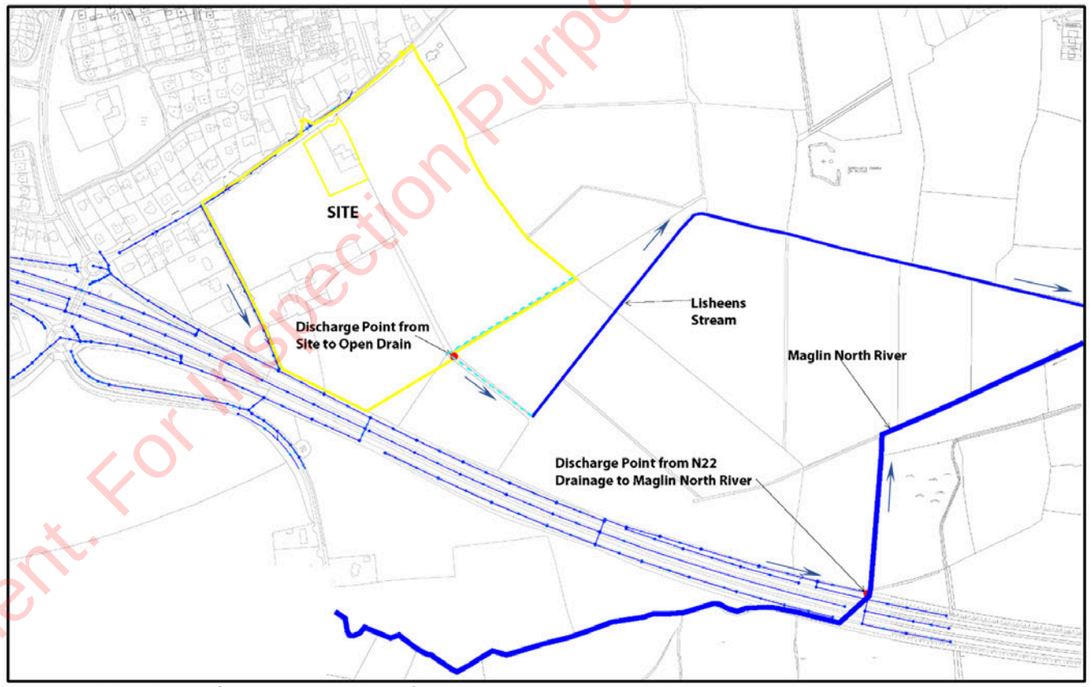

Figure 7.4 N22 Drainage Infrastructure Near Greenfield Site

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Image 7.1 Lisheens Stream to Southeast of Site – Looking East

Image 7.2 Confluence of Lisheens Stream & Maglin North River – Looking West (Upstream)

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Image 7.3 Man-Made Drain along Southeastern Site Boundary – Looking West

Image 7.4 Maglin North River Just North of Ballincollig By-pass (SW4)

The River Lee is designated downstream of Blackrock as a Special Protection Area (SPA) - Cork Harbour SPA.

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7.2.2 Runoff Estimates

The nearest synoptic weather station is Cork Airport (W665662), approximately 8.6km to the southeast of the site at an elevation of 154mOD. The mean monthly rainfall for Cork Airport synoptic station is summarised in Table 7-3. The long-term average rainfall for Cork Airport is 1,239 mm/annum for 1991 to 2020. An extreme rainfall event of 73.2mm/day was recorded during that 30-year period. The 30-year (1991 to 2020) rainfall 1km x 1km grid data available from Met Eireann indicates a rainfall of 1,110mm/year for the Greenfield site

Table 7.3 Monthly and Annual Average Rainfalls (mm)

Cork Airport													
Period	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
1961-1990	148	116	97	70	84	68	65	90	97	126	109	137	**1,207**
1981-2010	131.4	97.8	97.6	76.5	82.3	80.9	78.8	96.8	94.6	138.2	120	133.1	**1,228**
1991-2020	131.3	97.2	91.5	86.5	80.8	83.3	87.2	94.6	92	131.2	127	136.6	1,239
Greatest Daily Total – Cork Airport													
1981 – 2010	45.7	49.9	55.2	34.2	34.9	59.7	73.2	60.9	58.9	52.1	47.9	41.9	73.2
1km x 1km Grid - Greenfield													
1991 - 2020	120	89	81	78	69	73	75	83	82	118	117	126	1,110

The catchment characteristics are quantified as soil type 2 (high winter rain acceptance potential). The soils are well drained with gentle to moderate slopes on the development area of the site. Based on the mean annual gridded rainfall data for 1km x 1km grid 158,000/69000, Q_{BAR} for the 15.2ha site is estimated at 49.6 s/sec (or 3.26 l/sec/ha). The development area of the site is 12.1ha.

There are no active gauging stations on the Maglin North or Curraheen rivers. There is an inactive station on the Curraheen River at Bishopstown House. The EPA Hydrotool gives flow estimates to the confluence of the Lisheens Stream and Maglin North. The catchment area extends to 8.488km^2 - refer to Figure 7-5. The EPA Hydrotool gives the long average rainfall for the catchment as 1,225mm and the dry weather flow is given at 0.025m^3/sec (i.e., 95%tile flow). Much of this catchment is within a rural setting with the northern and western parts of the catchment (approximately 1km^2) within the urban area of Ballincollig.

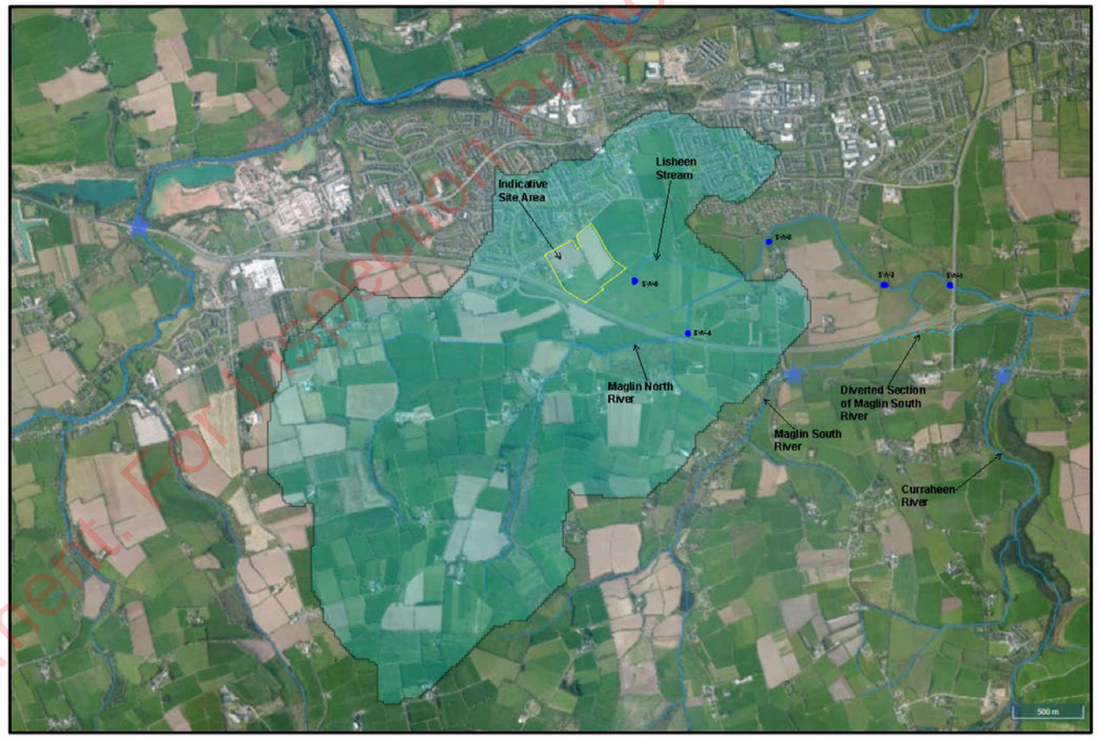

Figure 7.5 Catchment of Maglin North River & Lisheens Stream – EPA Hydrotool

7.2.3 Surface Water Quality

The EPA monitors water quality in the rivers and streams across the country – refer to https://gis.epa.ie/EPAMaps/ for most recent data. However, there are no water quality (Q-value) monitoring points on the Maglin North River or rivers further downstream of the site. There are National Water Monitoring Stations downstream of the site on the Curraheen Stream. The closest to the site are on the Model Farm Road at Inchagaggin (Carrigrohane Bridge).

The river waterbody WFD status 2016 – 2021 for the Maglin North River, Curraheen River and all streams draining this WFD River sub-basin is Moderate. This is based on 'expert judgement' (i.e., in the absence of water quality data). All waterbodies in this WFD River sub-basin are assigned 'At Risk'. It is noted that the Curraheen River is coming under anthropogenic pressures. There is one EPA licenced facility (W0214) in the Curraheen (Cork City)_010 WFD River sub-basin, located in Waterfall. This is a privately-operated waste transfer station located near the upper reaches of the Curraheen River. There are three Section 4 discharge licences in the sub-basin. All three (Ballyburden Meat Processors Ltd, Norwood Grange Nursing Home and the WWTP for a housing estate) are located in Waterfall and downstream of the Greenfield site – refer to Figure 7-2.

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The wastewater treatment plant (WWTP) for Ballincollig, operated by Uisce Eireann, is located adjacent to Ballincollig GAA grounds. The treated water is discharged to the River Lee. This stretch of the River Lee (Lee (Cork)_090) is assigned good WFD river waterbody status for 2016-2021. This is an improvement over the 2013-2018 WFD river waterbody status of moderate. It is assigned 'Not At Risk'. The latest (2023) Q-values upstream (Inniscarra Bridge) and downstream (Leemount Bridge) of the WWTP discharge point is Q4, indicating Good status – refer to Figure 7-2 for sample locations.

Five surface water samples (SW1 to SW5) were collected from the streams along the valley. Samples were collected on 14 February 2024 and 07 May 2025. The sample locations are shown on Figures 7-3 and 7-5. Results are summarised in Table 7-4. Photographs of the sampling locations are provided in Appendix 7-1; laboratory certificates are provided in Appendix 7-2.

Table 7.4 Surface Water Results

Parameter	Units	SW1		SW2		SW3		SW4		SW5	
		14/02/24	07/06/25	14/02/24	07/06/25	14/02/24	07/06/25	14/02/24	07/06/25	14/02/24	07/06/25
Total Alkalinity	mg $CaCO_3$/l	144	145	145	135	131	123	112	103	275	235
Total Nitrogen	mg N/l	4.95	5.964	5.12	6.479	5.15	6.193	5.58	6.221	4.56	6.539
Nitrate	mg N/l	3.987	5.429	4.155	5.674	4.309	5.639	4.75	5.863	3.899	6.110
Nitrite	mg N/l	0.031	0.013	0.029	0.012	0.023	0.009	0.02	0.006	0.008	0.008
Total Ammonia	mg N/l	0.097	0.038	0.09	0.020	0.078	0.027	0.077	0.021	0.033	0.034
Unionised Ammonia	mg N/l	0.004	<0.001	0.003	<0.001	0.003	<0.001	0.002	<0.001	0.001	0.001
Ortho-Phosphate	mg P/l	0.055	0.034	0.054	0.032	0.05	0.033	0.054	0.040	0.02	0.014
Total Phosphorus	mg P/l	0.139	0.055	0.127	0.055	0.118	0.045	0.106	0.049	0.042	0.023
BOD	mg O_2/l	1.7	0.8	1.3	0.8	1.0	0.6	1.2	0.8	0.3	1.2
COD	mg O_2/l	24.4	9.2	21.8	11.8	22.2	9.2	19.2	7.9	15.3	8.8
Chloride	mg Cl/l	20.0	20.7	20.2	21.0	20.5	21.0	21.1	20.2	26.5	24.7
Suspended Solids	mg/l	13.3	6.0	11.8	8.0	11.5	2.5	9.8	2.8	3.8	12.3
Conductivity @ 25°C	µS/cm	394	415	397	395	377	378	364	342	656	587
Turbidity	NTU	14.83	6.67	13.63	7.99	13.19	3.82	9.93	2.79	3.89	7.82

The results indicate varying water quality along the channel, but with no consistent pattern:

- BOD concentrations range from 0.3 to 1.7mg/l. BOD concentrations ≤1.5 mg/l indicate good status and concentrations ≤1.3mg/l indicate high status. Apart from a concentration of 1.8mg/l detected at SW-1 in February 2024, the BOD results indicate high status.
- Total ammonia concentrations ranged from 0.02 to 0.097mg/l. Total ammonia concentrations ≤0.065mg/l indicate good status and concentrations ≤0.040mg/l indicate high status. The concentrations in SW-1 to SW-4 were all above 0.065mg/l in February 2024, so the waters didn't achieve good status for this parameter. However, the total ammonia results for May 2025 were all below 0.040mg/l indicating high status.
- Total phosphorus concentrations ranged from 0.023 to 0.139mg/l. Total phosphorus concentrations ≤0.025mg/l indicate good status and concentrations ≤0.010mg/l indicate high status. The concentrations in SW-1 to SW-4 were all above 0.025mg/l for both sampling events, indicating that the waters didn't achieve good status for this parameter. The only result less than 0.25mg/l occurred at SW-5 in May 2025.
- Turbidity and TSS concentrations are low in all samples.

The EPA Phosphorus Pollution Impact Potential[3] at the site ranges from 5 to 7. The EPA Nitrate Pollution Impact Potential[4] at the site is ranked 5 (western fields) and 1 (eastern fields).

7.2.4 Surface Water Usage

The immediate area around the site is serviced by mains water, which is sourced from the Inniscarra Reservoir. There are no known surface water abstractions downstream of the site.

7.2.5 Flood Risk Assessment

A review of the available flood risk assessment carried out in the Ballincollig area include:

- The OPW CFRAM river flood extents mapping. This shows that the site doesn't flood. Flooding is shown to occur to the east of the site along the Lisheens Stream and Maglin North River for the mid-range future scenario. The CFRAM river flood extents mid-range future scenario is shown on Figure 7-6. Low probability (AEP of 0.1%), medium probability (AEP of 1%) and high probability (AEP of 10%) are shown.
- Similarly, the OPW National Indicative Fluvial Mapping (high end future scenario) indicates that flooding doesn't affect the site. Flooding is shown to occur to the southeast of the site associated with the Lisheens Stream, Maglin North and Maglin South rivers – refer to Figure 7-7.
- The Ballincollig drainage study however indicates that the 0.1% AEP high end future scenario flooding will extend into the southeastern periphery of the site – see Figure 7-8.

3 Pollutant Impact Potential for Phosphorus has 7 rankings from PIP-P-1 to PIP-P-7. PIP-P-1 is the highest ranking - i.e., highest potential to cause pollution.

4 Pollutant Impact Potential for Nitrates has 5 rankings from PIP-N-1 to PIP-N-5. PIP-N-1 is the highest ranking - i.e., highest potential to cause pollution.

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Figure 7.6 OPW CFRAM River Flood Extent

Figure 7.7 OPW NIFM River Flood Extent

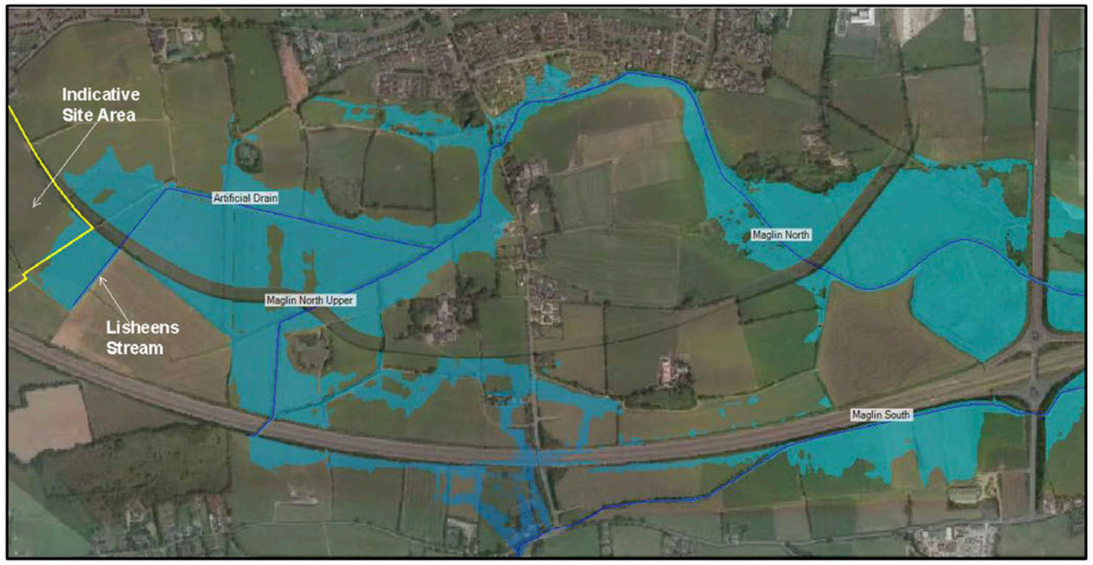

Figure 7.8 Ballincollig Drainage Study – River Flood Extent

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As there is a risk of flooding affecting a portion of the project site, a Site-Specific Flood Risk Assessment (FRA) was carried out by Malachy Walsh & Partners Consulting Engineers (MWP) in accordance with the OPW's Guidelines. A copy of the FRA is provided in Appendix 7-3. The conclusions of the MWP FRA are that:

- A hydraulic model was created to predict the flood zones and flood levels at the site. This demonstrated that the majority of the site is located in Flood Zone C and therefore has a low probability of flooding. More localised areas of the site in the southeast corner are located in Flood Zone A/B and therefore has a high/moderate probability of flooding.
- The source of potential flooding at Greenfield is an artificial drain (Lisheens Stream) located just south of the site and connected to the site by a field boundary drain (refer to Figure 7-3 for local drainage details).
- All of the residential units are located outside the flood extents, with amenity space, landscaping and the southern-most section of the sustainable access corridor located within areas at risk of flooding. As such, the development is considered appropriate in accordance with the OPW Guidelines.
- A Justification Test was carried out for the sustainable access corridor which demonstrates that its development is compliant with the OPW Guidelines (and the Objectives of Cork City Development Plan 2022 – 2028).
- To ensure that there is no unacceptable flood risk, the following mitigation measures are recommended:
    - The finished floor level (FFL) of all buildings should be set above the 1% AEP flood level for the medium range future scenario plus 500mm freeboard. On this basis, the minimum FFL would be 19.05mOD. The proposed minimum FFL of the residential units is 20.00mOD.
    - That part of the site within the flood extents area should be used only for amenity open space, landscaping or similar.
    - Provide 3no. 300mm circular pipe culverts beneath the proposed sustainable access corridor to provide continuity of flow along the existing floodplain.
    - Provide floodplain compensation storage in the open area at the southeast corner of the proposed development site.
- Once these mitigation measures are implements, the proposed development will not have an adverse impact elsewhere.

7.2.6 Importance of Surface Water / Hydrology Attributes

Based on the NRA Guidelines, the importance of the site in terms of surface water and hydrology is rated as Very High. While not extending into the development site and of limited biodiversity importance itself, the Lisheens Stream into which the site drains, flows to Cork Harbour SPA, which is protected by EU legislation.

7.2.7 Hydrogeology / Groundwater

As discussed in Chapter 6 (Soils & Land Use), the site is underlain by the Little Island Formation and Waulsortian Limestone Formation, both consisting predominately of limestones. These formations form part of the Ballincollig WFD groundwater body. The ground waterbody WFD status 2016 - 2021 is Good. It is categorised as 'Not at Risk'.

The GSI has classified these formations as Regionally Important Aquifer - Karstified (diffuse) (Rkd) refer to Figure 7-8. It is noted that in the Groundwater Protection Scheme for County Cork, karstification in the Little Island Formation is uncommon and it is classified as a Regionally Important Aquifer - Fissured (Rf). However, the GSI has confirmed that the bedrock aquifers were reclassified since the publication of the County Cork Groundwater Protection Scheme and that the classification of these bedrock formations as Rkd is correct.

Regionally important karstified (Rkd) aquifers generally are capable for providing sufficient water for public, commercial and industrial purposes. Transmissivity values of up to 1,100m²/day are recorded. Borehole productivity class is generally I and II, where class I is the best and V being the worst. Class I - II have specific capacities of between 100 and 1,000m³/day/m.

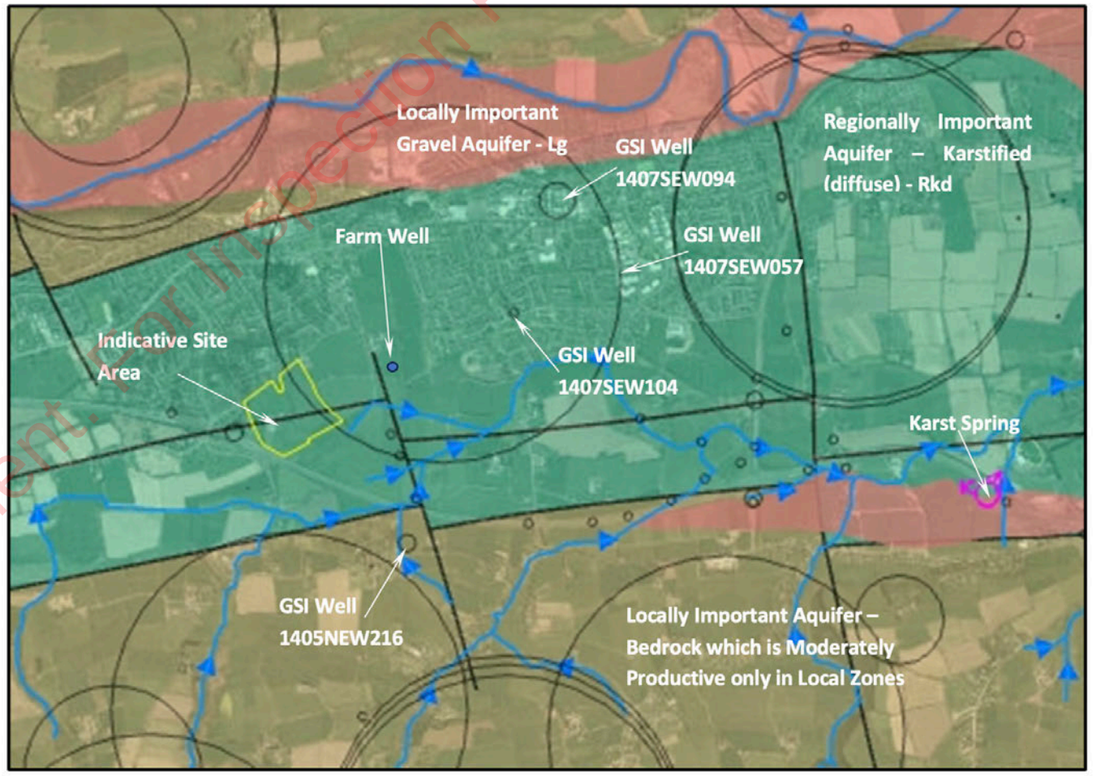

Figure 7.9 Aquifer Classification & GSI Well Location Map

There are no groundwater wells at the site. The existing farmhouse and farm are supplied by mains water, as is the wider area. According to the GSI well database, there are several wells near the site, but these are site investigation boreholes drilled for the Ballincollig By-pass in the 1990s. The available data on the closest supply wells is summarised as follows:

- Borehole drilled In Kilnaglory (1405NEW216) to a depth of 49.7m, with bedrock encountered at 4.6m. The well is used for agricultural and domestic use. It has poor yield (productivity class IV) of 21.8m³/day. Well co-ordinates 158740 / 68930.
- Borehole located in former military barracks in Ballincollig (1407SEW094). No drilling details are provided. The well is located at co-ordinates 159580 / 70850. It has a good yield class with a reported average daily abstraction of 226m³/day.
- Borehole located in Ballincollig (1407SEW057) with location known only to a 2km accuracy. The well is 36.6m deep with a good yield of 327.3m³/day. The well is centred at co-ordinates 158940 / 70380.
- Borehole located in along Castle Road in Ballincollig for industrial use (1407SEW104). The well is 36m deep. No information on yield is provided. The well is located at co-ordinates 159340 / 70220. It was likely associated with the former maltings in Ballincollig, which is now residential.

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An additional well was identified during field surveys which supplies the farmyard to the east of the site. This well is located in the field between the farmhouse and Ballincollig Castle. Its location is shown on Figures 7-3 and 7-9. The water is reportedly high in manganese.

The GSI has rated aquifer vulnerability across the western half of the site and the northeastern corner of the site as extreme (E - bedrock within 3m of ground surface and X – bedrock outcrop at the northwestern corner) - refer to Figure 7-10. Vulnerability across the eastern half of the site is high (H – bedrock between 3m and 5m below ground surface). Based on the drilling carried out at the site, the aquifer vulnerability ranges from extreme to moderate across the site.

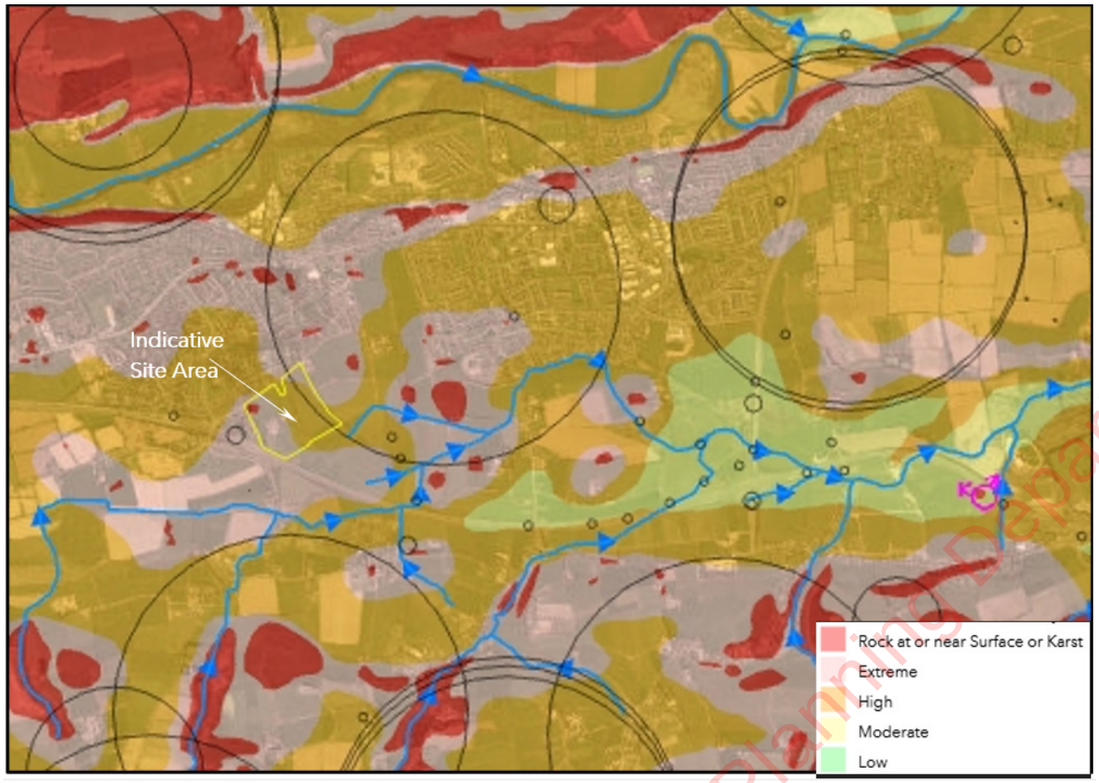

Figure 7.10 Aquifer Vulnerability Map

Five boreholes were drilled at the site to establish depth to bedrock and bedrock quality. Monitoring wells were installed into each of the boreholes to monitor groundwater level. Well locations are shown on Figure 7-11. Groundwater elevation data is summarised in Table 7-5.

Table 7.5 Groundwater Elevation Data

Well ID	Total Depth (m)	Top of Well Liner Elev. (mOD)	Depth to GW (m)		GW Elev. (mOD)	
			07 May '25	21 May '25	07 May '25	21 May '25
RC-BH1	15.0	21.76	2.25	2.53	19.51	19.23
RC-BH2	15.3	21.11	1.72	1.90	19.39	19.21
RC-BH3	19.5	19.94	1.96	2.02	17.98	17.92
RC-BH4	13.5	22.43	3.46	3.73	19.97	18.70
RC-BH5	7.8	29.38	5.98	6.70	23.4	22.68

Based on the groundwater elevation measurements, groundwater flow direction is estimated to be to the southeast, providing baseflow to the Lisheens Stream – refer to figure 7-11.

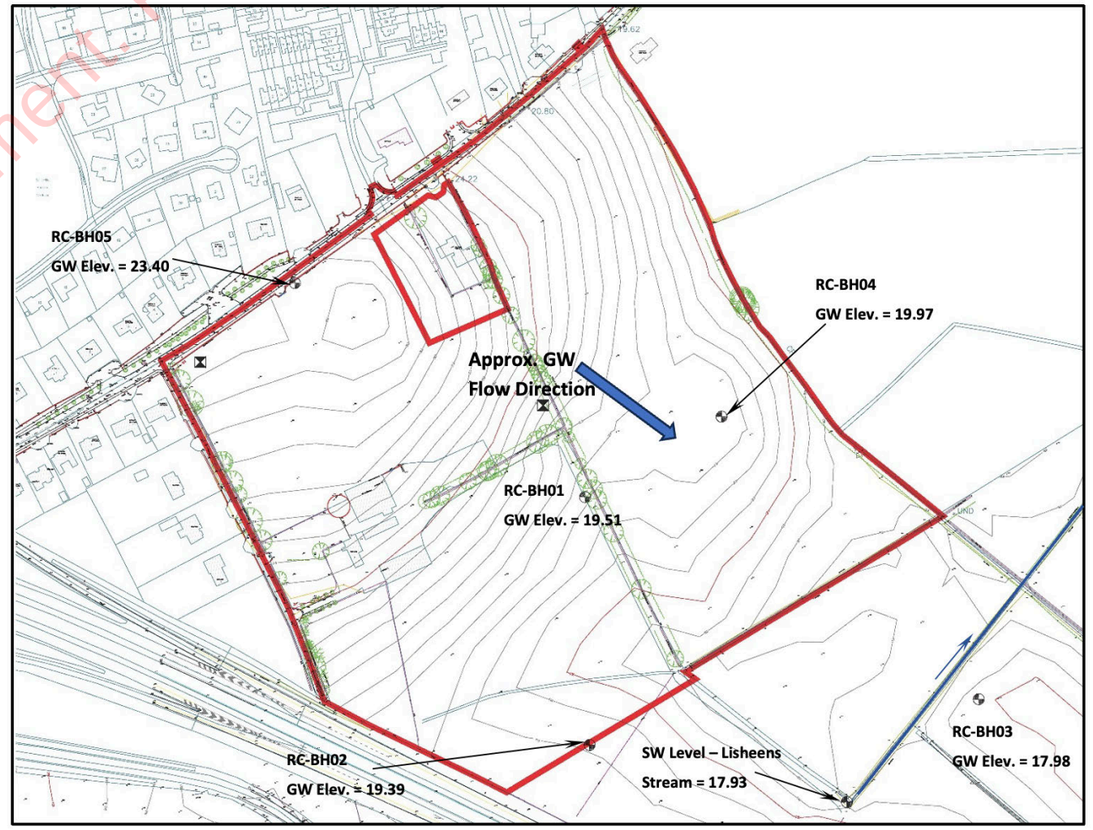

Figure 7.11 Groundwater Flow Direction Map

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7.2.8 Importance of Groundwater / Hydrogeology Attributes

Based on the NRA Guidelines, the importance of the site in terms of groundwater and hydrogeology is rated as High. The bedrock aquifer is classified as regionally important.

7.3 Characteristics of the Proposed Development

A detailed project description is provided in Chapter 2 of this EIAR and its characteristics that could potentially have an impact on surface water quality, hydrology and hydrogeology include:

- Construction of site roads, housing units and infrastructure. This work will involve:
  - Stripping of topsoil / soft subsoils to formation levels.
  - Temporary stockpiling of excavated material.
  - Importing and stockpiling of fill material.
- Use of potentially polluting materials.
  - Plant and machinery on site use diesel. This is either stored on site or delivered to site in tanker trucks. There is potential for leaks or spills which could impact surface water and groundwater quality. The risk is present primarily during the construction phase.
  - Use of concrete in buildings' foundations. Concrete has a high pH and if released into the surface water environment, could change its pH and affect aquatic fauna locally.
- Changes to hydraulic characteristics of the project site. As the site gets developed, its hydraulic characteristics will change. This could increase runoff rates and volumes, increasing flood risk downstream of the site.
- The southeastern corner of the site is within the flood extents area as mapped in the Ballincollig drainage study and as identified in the site-specific flood risk assessment – refer to Section 7.2.5. The distributor road serving the development extends into this area. As such, the development will reduce / displace flood storage capacity, potentially increasing flood extents elsewhere.
- Increased demand on water services. The site will be serviced by mains water and the mains foul sewer network. The development will place increased demands on these utilities.
- Removal of the existing septic tank and percolation area serving the exiting farmhouse, which is discharging to the groundwater environment.

The potential direct impacts associated with the above works are deterioration of surface water quality on and leaving the site, a potential increase in volume and rates of runoff leaving the site and changes to flood extents on and / or downstream of the site. Unmitigated, deterioration in water quality could potentially result in indirect impacts to downstream aquatic habitats and users of surface water and / or groundwater. Unmitigated, increased runoff rates could potentially result in indirect impacts downstream such as increased erosion along the stream channels. Unmitigated, the displacement of flood storage capacity could potentially result in increased flood levels / extents elsewhere in the catchment. There will be indirect impacts at the drinking water supply source and increased pressures on the receiving water from the WWTP servicing the development.

7.4 Impacts Assessment

7.4.1 Impact Assessment Methodology

The criteria in the EPA Guidelines (2022) are used to evaluate and describe the potential impacts in terms of quality, significance, extent, probability and duration as set out in Chapter 1. The NRA guidelines are used to further rate the magnitude of the impact - these are set out in Table 7-6 (Hydrology) and Table 7-7 (Hydrogeology). Determining the significance of the impact on the feature (hydrology / hydrogeological attribute) based on the Importance of the feature and the magnitude of the impact is given in Table 7-8.

Table 7.6 Estimation of Magnitude of Impact on Hydrology Attribute

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and / or quality and integrity of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm. Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually. Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm. Minor loss of fishery. Calculated risk of serious pollution incident >0.5% annually. Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. Calculated reduction in pollution risk of 50% or more where existing risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm.

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For the Greenfield site, the magnitude of impact on the hydrology attribute is rated as Negligible - negligible change in predicted peak flood level and negligible risk of serious pollution incident.

Table 7.7 Estimation of Magnitude of Impact on Hydrogeology Attribute

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off1 Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident <0.5% annually.

For the Greenfield site, the magnitude of impact on the hydrogeology attribute is rated as Negligible - negligible risk of serious pollution incident.

Using Table 7-8, the significance of environmental impacts on water (hydrology / hydrogeology) is Imperceptible.

Table 7.8 Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Impact			
	Negligible	Small	Moderate	Large
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

The following sections detail the potential impacts, prior to mitigation, which have been identified from the assessment methodology presented above. The main potential direct impacts of the development on the surface water and groundwater environments are:

- Deterioration of water quality from silt, concrete and / or hydrocarbons.
- Increase in runoff from a rainstorm event. This would increase the peak flow to the Lisheens Stream. The possible increase in runoff results from a change in the surface runoff coefficient due to hard surfacing of parts of the site.
- Loss of flood storage capacity at the southeastern corner of the site. Displacing flood waters could increase flood levels and / or flood extents at or downstream of the site.

Potential indirect impacts would be associated with deterioration of aquatic habitats resulting from pollution, potential for increased flooding downstream of the site and impacts on users of surface water downstream of the project site. There could also be indirect impacts at the water supply source, in this case the Inniscarra Reservoir on the River Lee, where abstraction will need to increase to meet demands. In addition, there will be increased pressure on the receiving water from the WWTP discharge. The foul sewer from the Greenfield site will connect to the Ballincollig WWTP. Treated wastewater is discharged to the River Lee.

7.4.2 Do Nothing Scenario

In the 'do-nothing' scenario, the lands would continue in agricultural use, being used for grazing of horses and cattle. The surface water and groundwater environments would remain largely unchanged. Surface water sampling at the site doesn't indicate any enrichment from current agricultural activities.

7.4.3 Construction Phase

The ground investigation carried out across the site (refer to Section 6.2.9 of this EIAR) is sufficient to inform the foundations for houses and apartments. While further ground investigations may be carried out (likely trial pit excavation and drilling), no significant direct / indirect impact on the water environment is predicted.

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7.4.3.1 Surface Water

The housing development will be built in four phases over an approximate 8-year period. There is potential for direct and indirect impacts on surface water quality during construction activity from several sources. These are:

- Increased sediment loading in the surface water runoff from the site and entering the Lisheens Stream via the existing field boundary drains. Most of the earthworks for the housing development will take place greater than 70m from the Lisheens Stream – the sustainable access corridor will be the closest works to the stream. However, there will be earthworks within 10m of the field boundary drains discharging to the Lisheens Stream. Unmitigated, sediment loading presents a short-term direct negative moderate localised effect on water quality and a short to medium-term indirect slight negative effect on habitats downstream of the site (e.g., if silt were to accumulate in the few gravel beds downstream of the site in the Maglin North River; the bed of Lisheens Stream is mostly silt for its entire length). Once the earthworks and landscaping are completed, the risk of sediment loading of watercourses is significantly reduced.
- Potential spillage of oil and diesel used on site for plant and equipment. During construction there would be typically 8 to 10 machines on site (excavators, dump trucks, teleporters, generators etc.). These would be refuelled every 2 to 3 days. This is either done using refuelling bowsers owned by the plant hire contractors or at the site compound where fuel will be stored. The machines also use hydraulic oils and motor oils. There is potential for leaks and spillages of diesel or oils during refuelling, breakdowns (e.g., breaking of a hydraulic hose) etc. Unmitigated and depending on the volume released, hydrocarbons reaching the surface water environment would have a local short-term direct slight negative effect on water quality and a short term indirect slight negative effect on habitats downstream. Hydrocarbons attenuate naturally in the environment, so any negative impacts are reversible.
- Release of cement to watercourses during concrete pours for apartment and housing foundations. Some of these will be near the field boundary drains discharging to the Lisheens Stream, so concrete spillages could reach the stream. Unmitigated, this would be a short-term direct moderate negative localised effect on surface water quality.
- In addition, the chutes of concrete trucks are typically rinsed down on site. There will be approximately 3,600 concrete loads brought to site over the construction period. If not carried out properly, concrete washdown water could reach watercourses, affecting its pH. Unmitigated, this would be a short-term direct moderate negative localised effect on surface water quality.

7.4.3.2 Groundwater

The potential impacts on groundwater quality are of a similar nature to the surface water environment as discussed above. This includes potential impacts on groundwater quality from hydrocarbon spills or leaks from construction machinery.

Based on the ground investigations conducted, dewatering of excavations (pumping of groundwater) on the housing development is not predicted.

Groundwater (aquifer) vulnerability will be increased with the removal of topsoil and overburden. While this will not change the current aquifer vulnerability rating (extreme to moderate), the depth of protection provided by the topsoil / overburden will be reduced in areas of cut. This presents a likely, imperceptible, temporary negative local effect. It is reversible with the construction of foundations and roads which will provide a barrier to downward migration of any pollutants.

During the construction phase foul effluent will be generated at the welfare facilities. The number of workers on site during the construction phase will vary depending on site activities. During peak activity, there would be approximately 100 workers on site. This would generate up to approximately 3m^3 of foul sewage per day. Depending on how this is managed, it could present a slight temporary negative local effect on the underlying aquifer (or receiving surface water body).

The decommissioning of the septic tank servicing the farmhouse will be a permanent imperceptible positive effect on the groundwater environment.

7.4.4 Operational Phase

7.4.4.1 Surface Water

There is less potential for direct and indirect impacts on surface water quality during the operational phase of the residential development. The site would be fully landscaped, there would be no earthworks, no concrete pours and comparably little hydrocarbons used or stored. The potential sources of surface water contamination during the operational phase are:

- The parking of cars and the storage of home-heating fuel (if used) within the development may result in the leakage of small amounts of oil resulting in contamination of surface water. Any leaks or spillage is likely to be small in scale. Unmitigated, this would present a local long-term imperceptible negative effect.
- The underlying bedrock formations are susceptible to karstification, which could result in subsidence. Inappropriate management of runoff from the site could affect underlying karst bedrock. Depending on the magnitude and unmitigated, ground subsidence would present significant localised negative reversible effects on site infrastructure.
- The development will be serviced by mains sewer which will be treated at Ballincollig WWTP. This WWTP has tertiary treatment with nitrogen and phosphorous removal. Discharge of treated water is to the River Lee. The increased volumes of wastewater associated with the development (approximately 252 m^3/day for all four phases) will increase the loading to the receiving water and increase pressure on its assimilative capacity. Unmitigated, this would present a regional permanent imperceptible negative effect.

The proposed development will progressively increase the hardstanding areas as roads, and housing units are constructed. The runoff characteristics of the developed site will be different to the greenfield site conditions, with increases in runoff volumes and rates. The changes in runoff are primarily associated with the operational phase. These potential direct and indirect impacts on hydrology are:

- The development site extends to approximately 15.2ha. Of this, approximately 12.1ha will be finished with hard paving or roofing, with the remaining 3.1ha landscaped and green space. The runoff from the entire developed site will discharge to the Lisheens Stream. Unmitigated, this increased runoff would represent a permanent, significant negative catchment wide effect. It could increase flood risk downstream of the site along the Maglin Valley.
- The proposed sustainable access corridor will extend into the flood extents as mapped in the Ballincollig drainage study. It will displace a small volume of flood storage capacity. During flooding events over the operational phase of the development, the flood waters that would have occupied that space will be displaced to other locations, potentially increasing flood levels and / or extents. By itself and unmitigated, this change in the flood water distribution would represent a permanent, imperceptible negative catchment wide effect. It could result in cumulative effects with the changes in runoff rates (if unmitigated).
- In addition to the surface water quality and hydrology effects, the development will place additional pressure on the water supply resources in Cork. As noted, the development will be serviced by mains water. On-site groundwater wells are not proposed. The drinking water supply for the proposed development is sourced from the Inniscarra Reservoir – a man-made reservoir on the River Lee. The development will therefore place an increased demand on this surface water supply. When completed, residents of the development will use approximately 231m^3/day. Un-mitigated, this would present a county-level permanent imperceptible negative effect. According to the EPA web-mapping the Inniscarra Reservoir is not identified as being under river abstraction pressure and Uisce Eireann has confirmed capacity in the existing potable water infrastructure to service the site.

7.4.4.2 Groundwater

The potential impacts on groundwater quality are of a similar nature to the surface water environment as discussed above. This includes potential impacts on groundwater quality from hydrocarbon spills or leaks from parked cars and home heating oil (if used). Leakage from the foul sewer could also affect groundwater quality during the operation phase.

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Interception of incident rainfall will reduce the volume of water entering the groundwater environment. This could result in lower groundwater recharge and subsequently lowering of groundwater levels. Unmitigated, this reduced recharge would represent a permanent, not significant negative local effect. There would also be a reduction in stream baseflow from the aquifer, a permanent, imperceptible negative local effect.

As noted, the development will be serviced by mains sewer with no direct discharge for foul effluent to groundwater or surface water. However, leakage from the sewer pipework at the development could impact on groundwater quality. Unmitigated this would present a local permanent imperceptible negative effect.

7.5 Avoidance, Remedial or Reductive Measures

The avoidance and mitigation measures for the construction and operational phases are presented in the subsection below. Most relate to the construction phase. Surface water and groundwater are discussed together as there is substantial crossover of the mitigation approach between these two aspects of the environment.

7.5.1 Construction Phase

The mitigation measures to be implemented for the construction phase are set out below:

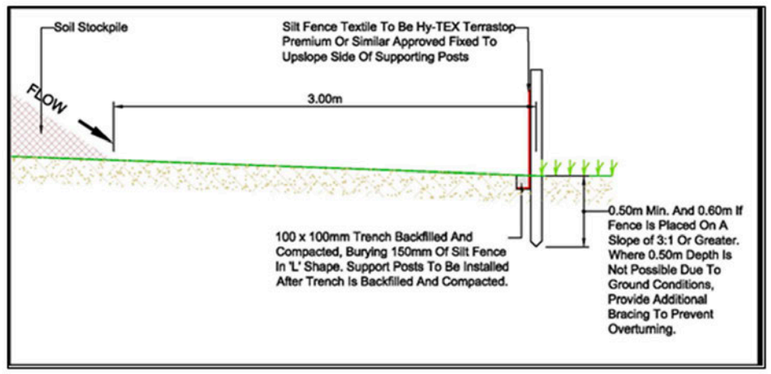
- Design considerations in the site layout to avoid and reduce impacts to surface water and groundwater include:
  - » The housing units are setback from the Lisheens Stream, providing a buffer of greater than 70m.
  - » The main field boundary drains on the site have been incorporated into the development layout.
- Following mobilisation to site, surface water management infrastructure will be the first works carried out. Additional controls will be installed as needed as construction progresses through the site, and/or as identified during site inspections of surface water management infrastructure.
- The attenuation tanks required for phase 1 of the development will be installed early in the construction sequencing to control runoff rates as the site gets developed. The attenuation infrastructure will be progressively expanded through the site ahead of housing construction. This will ensure that there is always adequate capacity in the system to deal with design flows.
- Foul sewage generated at the welfare facilities during the early construction phases will be piped to a sealed tank and collected by a waste collection contractor (with the appropriate waste collection permit) for discharge at a licensed WWTP. Once the development is connected to the Uisce Eireann network, the workers' welfare facilities will be piped to the on-site foul sewer network.
- During the construction phase, best practices will be employed to minimise the release of sediment laden storm water runoff, including;
  - » Areas stripped of vegetation will be kept to a minimum; enough to keep pace with house construction. On-going landscaping and restoration of completed units will be carried out. This will reduce areas of soil exposed to erosion.
  - » Stripped and excavated soils will be managed as described in Section 6.5.1. Soil stockpiles will be setback a minimum of 50m from any watercourse. Silt fencing will be erected downgradient to stockpiles to filter runoff water.
  - » Construction phase settlement ponds will be constructed to hold runoff water from earthworks areas. These will be located and moved as the development progresses through the site.
  - » Check dams and / or straw bales will be installed along the field boundary drains to slow flows and remove silt. Check dams will be constructed using clean stone and geotextile spanning across the drainage channel.
  - » The public road serving the site will be kept clean of mud and debris. A street sweeper will attend site regularly to clean the road when there are truck movements in and out of the site.
  - » Earthworks will be suspended during extreme weather conditions. An extreme rainfall event will be classified as an event that corresponds to the Met Éireann Orange – Weather Alert for rainfall. The Site Manager will monitor the weather forecast to make preparations ahead of adverse weather conditions.

Met Eireann Orange Weather Alert for Rainfall
50 mm – 80 mm in 24 hrs
40 mm – 60 mm in 12 hrs or less
30 mm – 50 mm in 6 hrs or less

- If required, dewatering of the excavations will be to temporary silt traps. Flow from the silt traps, placed upgradient of the silt fencing protecting watercourses, will be diffuse.
- The release of cement to watercourses will be prohibited. Concrete pours will occur in contained areas using shuttering. Rinsing down of concrete trucks will be done at a dedicated location on site – adjacent to the construction site compound, or at a suitable alternative location, a minimum distance of 75m from any watercourse. Signage will be erected at each concrete pour location directing drivers to the rinse down area. This rinse down area will be removed at the end of the construction phase.
- Hydrocarbons (oils, diesel and chemicals) will be stored and managed in an appropriate manner to ensure no negative effects. These are detailed in Section 6.5.1.

The infrastructure to be used to manage and treat surface water, and to control erosion at the construction site are:

- To reduce the volume of water to be treated during construction and to reduce the erosion potential of exposed soils, clean surface water runoff will be diverted around earthworks areas. This will be done with the use of diversion channels. Diversion channels are shallow interceptor drains to divert overland flows.
- Silt fences will be erected on the downslope side of any earthworks areas to intercept any overland flows that could potentially be carrying silt / fines. These are constructed with geotextile embedded in the topsoil and supported with wooden pegs. See example below.



- Check dams will be installed at appropriate locations along the field boundary drains. These will be constructed using geotextile supported by two wooden pegs, sandwiched by clean washed filter gravel, as illustrated. Alternatively, straw bales will be used.

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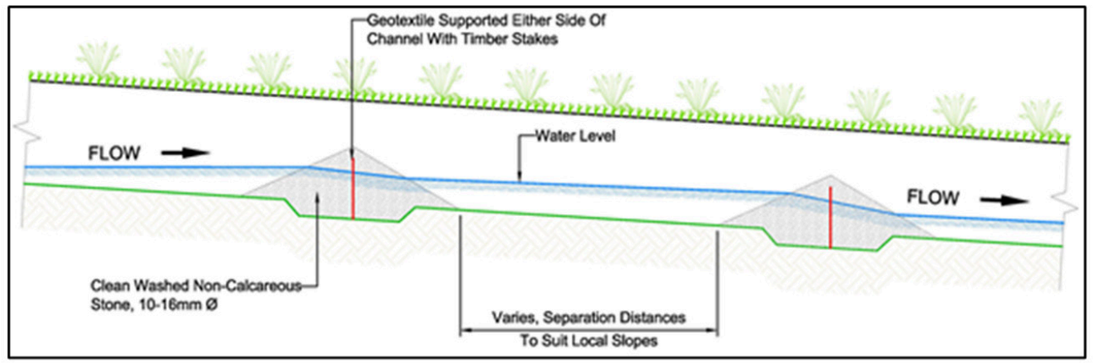

7.5.2 Operational Phase

Mitigation measures to be employed during the operation phase are:

- The runoff from the site will be controlled and managed using a suite of SuDS and engineering controls designed for a 1:100-year storm event plus a 20% allowance for climate change. These will include rainwater harvesting (water butts – to be retrofitted by homeowners), infiltration basins, filter drains, tree pits, raingarden / bioretention tree pits, green roofs and attenuation tanks fitted with flow control devices. Hydrocarbon interceptors will also be installed upstream of each attenuation tank. The overall management will limit discharge from the site to greenfield rates (i.e., 49.6 l/sec. The detail of the SuDS infrastructure is provided in the Drainage Assessment Report, prepared by DOSA and included in Appendix 7-4. Engineering details are provided in the Infrastructure Report, prepared by DOSA, and provided in Appendix 2-4.
- With the potential for oil spills and leaks from cars parked in the development, hydrocarbon interceptors and grit traps are included in the drainage design to protect the water quality in the Lisheens Stream. The hydrocarbon interceptors will be cleaned and maintained by the management company.
- The SuDS infrastructure proposed has regard to the underlying karst limestone bedrock. Infiltration to the subsurface has been avoided. Engineering solutions are proposed to manage stormwater runoff – 6 No. tanks are proposed. Discharge from the site will be to the existing field boundary drain located centrally along the southern boundary of the site. The discharge will be onto an area of stone riprap to dissipate energy and avoid bank erosion / scouring in the drain.
- The foul sewer for the facility will connect into the Uisce Eireann sewer network, which discharges to the Ballincollig WWTP – EPA license number D0049-01. This is a tertiary treatment plant with a capacity of 33,000 PE. According to the latest Annual Environment Report for this facility, the quality of the treated water discharged to the River Lee is compliant for all test parameters. Uisce Eireann has confirmed capacity in the Ballincollig WWTP to treat sewage from the Greenfield site – refer to Appendix A of the Infrastructure Report (provided in Appendix 2-4 of this EIAR).
- MWP has carried out a Site-Specific Flood Risk Assessment (SSFRA) for the proposed development. The SSFRA is provided in Appendix 7-3. The SSFRA had regard to the findings of the Ballincollig drainage study, which identified flooding extending into the southeast corner of the site for a 1:100-year rainstorm event. The conclusion of the SSFRA is that, with the recommended mitigation (refer to Section 7.2.5), the development will not result in increased flood risk at or downstream of the site.
- Groundwater (aquifer) vulnerability will be temporary increased as the site is stripped and reprofiled for development. The progressive construction of paved roads, foundations and landscaping will provide protection to the aquifer.
- To conserve water usage (and consequently reduce the volume of foul sewerage generated), each house will be fitted with a water meter, aerated shower heads, aerated strainers in taps, duel flush cisterns etc.

7.5.3 Monitoring

The Site Manager will undertake inspections at all outfalls from the construction works. Inspections will be carried out during and following heavy rainfall events. The Site Manager will organise monitoring of surface water quality at monitoring point SW5, as shown on Figure 7-3. Samples will be collected monthly and tested for turbidity and suspended solids. All sample results will be input to a database and compared to baseline monitoring data.

7.5.4 Worst-Case Scenario

The worst-case scenario would be a slippage of stockpiled soil or release of concrete into the field boundary drains discharging to the Lisheens Stream impacting on water quality, habitats, and aquatic flora / fauna. However, with appropriate management of stockpiles, monitoring and inspections, and good construction practices this scenario is unlikely to occur.

In the very unlikely event of this occurring, the following emergency response will be implemented:

- Safety of site personnel and any potentially affected neighbours will be checked as a priority and appropriate action taken.
- The appropriate authorities will be notified. This will include the City Council Environment Section, IFI, etc.
- The Site Manager will assess the situation and carry out a risk assessment to inform the appropriate mitigation to be undertaken. The priority will be to prevent any further release of pollution to the watercourses.
- Remedial works will be carried out at the location of the incident. The rest of the site will be inspected, and similar remedial works carried out where appropriate.
- Surveys of the affected watercourses will be carried out and remedial measures carried out, where possible.

7.5.5 Predicted Impacts

With the implementation of these avoidance and mitigation measures, the predicted impacts of the proposed development on the water environment are:

- The impacts on surface water quality are predicted to have not significant, localised temporary negative effects during the construction phase and imperceptible, localised brief negative effects during the operational phase. No significant indirect impact is predicted on the aquatic habitats and fauna downstream of the site.
- The impacts on hydrology / runoff characteristics of the site are predicted to have imperceptible, local, permanent negative effects during the operational phase.
- The impacts on groundwater / aquifers are predicted to have imperceptible, localised, permanent negative effects.
- The impacts on water infrastructure (drinking water treatment and WWTP) are predicted to have likely imperceptible, regional, permanent negative effects.
- The stormwater infrastructure for the development will not connect to the N22 drainage infrastructure. Drainage from the N22 adjacent to the Greenfield site passes through an interceptor and discharges to the Maglin North River near culvert No. 10 (i.e., at the northern side of the river culvert under the N22). The runoff from the N22 (and other urbanised areas in the catchment) are assessed in the SSFRA report. No impact on the N22 drainage infrastructure is predicted.

7.6 Cumulative Impacts

The projects that are considered for cumulative assessment of the potential impacts on surface and ground water are summarised in Chapter 1.

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These projects will have a cumulative effect in increasing the hard paved surfaces within the local catchment and so potentially increase runoff rates and volumes, and flood risk downstream. In reviewing the available documentation for these projects, it is stated that SuDS infrastructure will be installed and discharge from the sites will be limited to greenfield rates. These projects are located entirely outside the flood extents areas of the Maglin North River. The runoff from the Greenfield site will be maintained at greenfield rates and increased flooding arising from the development is not predicted. As such, no cumulative effect is predicted in terms of runoff rates and flood risk.

These projects will involve large-scale earthworks, which could result in silt-laden stormwater reaching watercourses. The housing development at Carriganarra has no watercourses on the site and is distant from the Maglin North River. As such, the risk of silt-laden stormwater reaching the Maglin North is low. Visits to the Carriganarra site during construction works confirms that stormwater runoff is trapped on site by temporary berms, forming silt traps. In the CEMP for the housing development at Cois Caisleán, stormwater runoff controls are proposed, including silt traps and siltbusters. As such, no cumulative effect is predicted with regard to water quality.

The potential cumulative impacts of the relevant plan for the area was assessed, which is considered to be the Cork City Development Plan 2022. The assessment of the potential impacts on the environment of the Cork City Development Plan 2022 was undertaken utilising the Strategic Environmental Objectives (SEOs) which are detailed in Table 5.1 of the CDP's Strategic Environmental Assessment. The potential cumulative impacts of the Plan were assessed having regard to these SEO's. Table 5.1 of the SEA identifies the SEO's for 'Water' as being to:

- Ensure that the status of water bodies is protected, maintained and improved in line with the requirements of the Water Framework Directive.
- Ensure water resources are sustainably managed to deliver proposed regional and City growth targets in the context of existing and projected water supply and wastewater capacity constraints ensuring the protection of receiving environments.
- Avoid inappropriate zoning and development in areas at risk of flooding and areas that are vulnerable to current and future erosion.
- Integrate sustainable water management solutions (such as SuDS, porous surfacing and green roofs) into development proposals.

Table 7.5 of the CDP's Strategic Environmental Assessment, 'Comparative Assessment of each of the Alternatives against Strategic Environmental Objectives' indicates that Alternative/Scenario 3 'Compact Liveable Growth', the 'Selected Scenario' has positive interactions with the status of the SEO's for 'Water'.

There are no significant cumulative effects predicted for surface water, hydrology or groundwater during the operational phase.

7.7 Difficulties Encountered in Compiling

There were no difficulties encountered in the compiling the water chapter.

7.8 Interactions

Interactions associated with surface water, hydrology and hydrogeology with other aspects of the environment include:

- Soils & Geology - The thickness of soil over the bedrock aquifer informs the vulnerability ranking. Reprofiling of the site topography requires the removal of soil which will temporarily increase the aquifer vulnerability.
- Soils & Geology - management of soil (stripping and storage) will interact with surface water quality in terms of potential soil erosion and siltation of the receiving surface water environment.
- Biodiversity - The quality of the surface water environment influences the quality of the aquatic habitats and the health of flora / fauna populations they support.

7.9 Conclusions on Water

The site consists of a farm holding currently used for grazing horses and cattle. The site drains to the Lisheens Stream through several man-made field boundary drains and land drains. The main impacts associated with water occur during the construction stage. Appropriate mitigation is proposed to avoid and reduce potential impacts on water quality. Surface water runoff will be controlled during the operational phase such that the runoff volumes and water quality closely match those of the greenfield runoff. With the implementation of the recommenced mitigation measures, which have been incorporated into the site design, no increased flood risk is predicted elsewhere in the catchment. No significant impacts on groundwater are identified. A Water Framework Directive Assessment report is provided in Appendix 7-5. It concludes that the proposed Greenfield development will not put at risk any good status waterbody; negatively affect any protected site; inhibit any waterbody from achieving good statis; and is not in conflict with the objectives of the River Basin Management Plan. As such, the proposed development is compliant with the Water Framework Directive.

7.10 References

- Environmental Protection Agency, May 2022. Guidelines on the information to be contained in Environmental Impact Statement Reports.
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- European Commission, 2017. Environmental Impact Assessment of Projects: Guidance on Scoping.
- European Commission, 2013. Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.
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- Inland Fisheries Ireland, 2020. Planning for Watercourses in The Urban Environment. A Guide to the Protection of Watercourses through the Use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning.
- Malachy Walsh and Partners, October 2021. Strategic Flood Risk Assessment South Ballincollig Drainage Study.
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019. S.I. No. 77 of 2019.
- Cork County Council, 07 December 2007. Wastewater Discharge License Under S.I. 684 of 2007 Regulation - Scheme / Agglomerate *Name: Ballincollig. Application*.

7.11 List of Chapter Appendices

Appendix 7-1- Surface Water Sampling Locations.

Appendix 7-2 - Surface Water Result Certificates

Appendix 7-3 - Site Specific Flood Risk Assessment – Malachy Walsh & Partners

Appendix 7-4– Drainage Impact Assessment – DOSA Consulting Engineers.

Appendix 7-5 – Water Framework Directive Assessment - Keohane Geological & Environmental Consultancy.

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CHAPTER EIGHT

BIODIVERSITY

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CHAPTER EIGHT

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CHAPTER 8 | Biodiversity

8.1 Introduction

This chapter describes the likely significant effects of the proposed development on biodiversity, including flora (plants), fauna (animals), and habitats in both the terrestrial and aquatic environment. Mitigation measures are also described, where applicable or appropriate, that avoid or minimise adverse biodiversity effects.

Chapter 2 Project Description and Alternatives Considered provides a full description of the proposed development. An Appropriate Assessment (AA) Screening and Natura Impact Statement (NIS) has also been prepared for the project, is included as Appendix 8-4 of this EIAR, and these will be submitted to the planning authority as part of the planning application documentation.

The potential effects on biodiversity in this chapter should be considered in conjunction with the other chapters of the EIAR including Chapter 3 Landscape and Visual, Chapter 6 Land, Soils and Geology, Chapter 7 Water, Chapter 10 Noise and Vibration, Chapter 11. Air Quality and Chapter 14 Interaction of Impacts as well as the Construction Environmental Waste Management Plan (CEMP) included as Appendix 2-1 of this EIAR.

This chapter was prepared by Carl Dixon MSc (Ecological Monitoring) and Dr. Sorcha Sheehy PhD (Ecology/ornithology). Details of Carl and Sorcha's relevant qualifications and experience are included in Chapter 1 Introduction.

8.2 Assessment Methodology

8.2.1 General

The biodiversity assessment addresses the potential likely significant direct, indirect and cumulative effects of the proposed development on terrestrial and aquatic biodiversity, including flora, fauna, and habitats in proximity to the proposed development site. The assessment has been carried out in three stages:

1. Desktop assessment to determine existing information and records in relation to:
    - Sites, species, and habitats protected under Council Directive 92/43/EEC (Habitats Directive), and sites and species protected under Council Directive 2009/147/EC (Birds Directive), within the zone of influence of the proposed development and more distant hydrologically linked sites. The Zone of Influence (ZoI) comprises the area within which the proposed development may potentially affect the conservation objectives (or qualifying interests) of a Natura 2000 site;
    - Biodiversity, habitats, and species present near the proposed development.

2. Site visits and field surveys by the specialist ecologists to establish the existing ecological conditions within the footprint of the proposed development and within the vicinity of all the proposed development elements.

3. Evaluation of the proposed development and determination of the scale and extent of potential likely direct and indirect significant effects on biodiversity (i.e., flora, fauna, and habitats) and the identification of appropriate mitigation and monitoring which may be required.

8.2.2 Relevant Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Act 1976, as amended, and the European Communities (Birds and Natural Habitats) Regulations 2011. They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (2009/147/EC).

Under this legislation, sites of nature conservation importance are then designated in order to legally protect faunal and floral species and important/vulnerable habitats.

The relevant categories of designation are as follows:

- Special Areas of Conservation (SAC) are designated under the European Communities (Birds and Natural Habitats) Regulations 2011 to meet the EU Habitats Directive (92/43/EEC);
- Special Protection Areas (SPAs) are designated under the EU Birds Directive (79/409/EEC) amended in 2009 as the Directive 2009/147/EC; and
- Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHA) are listed under the Wildlife (Amendment) Act 2000. A NHA is designated for its wildlife value and receives statutory protection. A list of proposed NHAs (pNHAs) was published on a non-statutory basis in 1995, but these have not since been statutorily proposed or designated.

Relevant European Legislation

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive);
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (The Birds Directive);
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (The Water Framework Directive);
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (The Fish Directive (consolidated)).

Relevant Irish Legislation

- The Wildlife Act 1976, as amended by the Wildlife Act 1976 (Protection of Wild Animals) Regulations, 1980, the Wildlife (Amendment) Act 2000, the Wildlife (Amendment) Act 2010, Wildlife (Amendment) Act 2012, European Communities (Wildlife Act, 1976) (Amendment) Regulations 2017. (The Wildlife Act);
- European Communities (Conservation of Wild Birds) Regulations 1985 (S.I. 291/1985) as amended by S.I. 31/1995;
- European Communities (Natural Habitats) Regulations, S.I. 94/1997 as amended by S.I. 233/1998 & S.I. 378/2005 (The Habitats Regulations);
- Fisheries (Consolidation) Act, 1959 (as amended), hereafter referred to as the Fisheries Act;
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011);
- Flora (Protection) Order, 2022 (S.I. No. 235/2022).

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In addition to the above, in assessing the likely significant effects on the prevailing biodiversity arising from the proposed works (including decommissioning works), due regard, where relevant, has been given to relevant legislation and guidance, including the following:

- EIA Directive (2014/52/EU)
- Planning and Development Acts 2000, as amended and the Planning and Development Regulations 2001, as amended
- Wildlife Act 1976, as amended
- EU Water Framework Directive 2000/60/EC
- European Communities (Birds and Natural Habitats) Regulations 2011 (as amended)
- National Biodiversity Action Plan 2017 - 2021
- EU Biodiversity Strategy for 2030 (EU, 2020)
- EU Strategy on Green Infrastructure (EU, 2013)
- Ireland's 4th National Biodiversity Action Plan 2023–2030
- National Parks and Wildlife Service (NPWS) Threat Response Plans (NPWS, Various) and
- Cork County Development Plan 2022-2028 (Cork County Council 2022).

8.2.3 Guidance

This chapter of the EIAR follows the Environmental Protection Agency's Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2022). It also takes account of the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government, August 2018), Guidelines on Ecological Impact Assessment in the UK and Ireland, 2nd edition (Chartered Institute of Ecology and Environmental Management CIEEM 2016) and Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1 (CIEEM, 2018).

Reference was also made to the following documents where relevant:

- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Union (EU), 2017);
- Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC (EC Environment Directorate-General, 2018);
- Guidance on integrating climate changes and biodiversity into environmental impact assessment (EU Commission 2013);
- Assessment of plans & projects in relation to N2K sites – Methodological Guidance (EC 2021);
- Biodiversity Net Gain Good practice principles for development (CIEEM 2019)
- Biodiversity Net Gain. A practical guide. (CIEEM 2016);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters Inland Fisheries Ireland (2016);
- Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EC 2021);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority (NRA) 2009);
- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011);
- A Guide to Habitats in Ireland (Fossitt, 2000);
- Guidelines for the treatment of Badgers prior to the construction of National Road Schemes. National Roads Authority, Dublin (National Roads Authority (NRA) 2005a);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority (NRA) 2005b).
- Guidelines for the treatment of bats during the construction of national road schemes (National Roads Authority (NRA) 2005c);
- Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes. (National Roads Authority (NRA) 2006).
- Guidelines for the treatment of Otters prior to the construction of National Road Schemes (National Roads Authority (NRA) 2008);
- Bird Census Techniques (Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. 2000)
- Bird Monitoring Methods - a Manual of Techniques for Key UK Species. (Gilbert, G., Gibbons, D.W. & Evans, J. (1998))
- Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed)' (Collins, 2016) and
- Bat Mitigation Guidelines for Ireland Volume 2. (F. Marnell, C. Kelleher and E. Mullen NPWS (2022))

8.2.4 Desktop Study

A desktop study was carried out to collate the available information on the local ecological environment. The purpose of the desktop study was to identify features of ecological value occurring within the proposed development site and those occurring near to it which have the potential to be affected by the proposed development. A desktop review also allows the key ecological issues to be identified early in the assessment process and facilitates the planning of surveys. Sources of information utilised for this report include the following:

- National Parks and Wildlife Service (NPWS) - www.npws.ie
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre (NBDC) – www.biodiversityireland.ie
- Bat Conservation Ireland - www.batconservationireland.org
- Birdwatch Ireland - www.birdwatchireland.ie
- National Biodiversity Action Plan 2023 – 2030 (Government of Ireland).
- Cork City Development Plan 2022-2028 (Cork City Council 2022)
- Cork Biodiversity Action Plan 2009-2014.

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8.2.5 Site Surveys

This assessment is based on surveys at the proposed development site. Site surveys were largely carried out between December 2023 to June 2025 on several dates outlined below. It is noted that DixonBrosnan previously surveys this site in September 2021 and these surveys are also referred to where relevant (14th and 15th of September 2021).

Table 8.1 Dates of Site Surveys

Surveys	Dates
Habitats (including hedgerows, botanical and invasive species)	14/05/25, 23/05/25, 24/05/25
Non-volant mammals	14/05/25, 23/05/25, 24/05/25
Bats	15/09/2021, 12/09/2022, 13/09/2022, 26/05/24, 26/09/24, 23/05/25, 24/05/25 (11/06/25 building search)
Winter birds	13/12/23, 29/01/24, 12/02/24, 22/01/25, 07/02/25, 27/02/25
Breeding birds	31/05/24 and 14/06/24
Aquatic	26/05/24 and 24/05/25

8.2.5.1 Habitats

Habitats were mapped according to the classification scheme outlined in the Heritage Council publication A Guide to Habitats in Ireland (Fossitt, 2000) and following the guidelines contained in Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011). Habitats were cross referenced with Habitats Directive Annex I habitats. Dates of the main habitat surveys are included in Table 8-1. During these surveys, the site was also surveyed for invasive species and rare floral species (Wyse et al., 2016; Stace 2019). It is noted that a considerable number of site visits were carried during the overall assessment process including winter bird surveys, bat surveys and breeding birds. Observations in relation to habitats made during these site visits are included in the habitat descriptions where relevant.

8.2.5.2 Non-volant Mammals

A general mammal survey was carried out in conjunction with the habitat survey following NRA guidelines (NRA 2005a, NRA 2005c, NRA 2008). Potential habitat including grassland, scrub and woodland to a minimum of 150m from the site boundary were systematically checked for signs of mammal activity or habitation.

8.2.5.3 Bats

Bat activity surveys were conducted within the proposed development site under suitable weather conditions on dates included in Table 8-1. The surveys were carried out 15 minutes before sunset (Collins 2023). Surveys used Elekon Batloggers, Batbox Duet, EchoMeter Touch 2 PRO bat detectors and Bat box duet. An emergence survey using a Pulsar Helion 2 XP50 Pro Thermal Imaging Camera was also carried out to identify potential emergence points from buildings within the survey area. The primary purpose of bat surveys was to assess usage of trees and habitats, located within or in close proximity to the site boundary. Activity surveys were also carried out to identify foraging and/or commuting routes within the proposed development site boundary (i.e., buildings, hedgerows, treelines, drainage ditch, etc.).

A building inspection was carried out to identify potential access points, 'potential roosting features (PRFs)' and any evidence indicating the presence of bats using the buildings within the proposed development site. A preliminary roost assessment was carried at ground level on all trees earmarked for removal within the proposed development site as per Collins (2023). These assessments followed the guidelines set out in 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th ed)' (Collins, 2023).

8.2.5.4 Breeding Birds

The breeding bird survey was carried out on dates included in Table 8-1 and based on the BTO Common Bird Census (CBC) methodology (Bibby et al., 2000 and Gilbert , 1998) which aims to capture a snapshot of breeding bird activity within the study area.

The study area focused on terrestrial habitats within the Proposed Development site. The aim of the breeding bird surveys was to identify any valuable bird habitats within the Site boundary and to identify birds present within the Proposed Development site and surrounding landscape. This survey area encompassed terrestrial habitats along the survey route including hedgerows, treelines and agricultural fields.

During breeding bird surveys the site was walked so that all habitats within 50m of potential nesting features were surveyed. The ornithological surveyor slowly walked through the Site, stopping at regular intervals to scan with binoculars and to listen for bird calls or song. Birds were identified by sight and song, and observations were plotted on a map. Survey visits were made in the early morning to coincide with the peak period of bird activity and all species seen or heard in the study area and immediate environs were recorded including those in flight. Visits were made during favourable weather conditions.

All species encountered during the survey were mapped and coded using standard BTO species codes and activity recorded using the BTO status codes for breeding evidence. In an effort to minimise potential disturbance, no attempts were made to locate nests as such behaviours are generally sufficient to determine probable or confirmed breeding.

8.2.5.5 Wintering Birds

Winter bird surveys were carried out in winter 2023/2024 and 2025 on dates included in Table 8-1. These surveys focused on grassland habitats within the proposed development site as well as grassland habitats on the boundary of the site which could provide potential foraging or roosting habitats for wintering waterbirds and waders.

The survey methodology was based on that used by the British Trust for Ornithology (BTO), Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert et al. (1998). The winter bird survey was undertaken using 8.5×45 binoculars and a Hawke Endurance Ed Spotting Scope 15-45×60 spotting scope, using a combination of transect and vantage point counts.

8.2.5.6 Aquatic Survey

Aquatic surveys were undertaken on dates included in Table 8-1. It is noted that the Lisheens Stream is generally considered as unsuitable for biological monitoring using EPA methodology as it is a depositing watercourse i.e. deep fine sediment, minimal flows with an absence of riffle habitat, dense macrophyte growth which clogs the channel. Therefore, the Q values provided below are likely to be due to morphological conditions rather than being indicative of nutrient levels.

Biological sampling was carried out at each station using the kick-sampling technique as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). This biotic index is used by the EPA and allows river quality to be compared under standardized guidelines.

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The kick-sampling technique involved using a 'D' shaped hand net (mesh size 0.5 mm; 350 mm diameter). Sweeps through the sediment and deep sediment was carried out. The substrate immediately upstream of the net was kicked for two minutes to dislodge invertebrates. Stone washings were not carried out as there was no suitable substrate within the survey area. Samples are transferred to plastic containers and preserved using 70% alcohol. Samples are subsequently sieved and sorted using a white sorting tray. Identification was undertaken in the laboratory using a high-powered binocular microscope and using standard identification keys.

An assessment was also made of the fisheries value of the watercourse and macrophytes were recorded. Full details of this survey are included in Appendix 8.3 of this EIAR.

8.2.6 Consultation

The consultation process which informed the scope of this EIAR is described in Chapter 1 Introduction. Issues raised during the consultation process relating to biodiversity are addressed where relevant within this chapter.

8.2.7 Limitations

Standard survey methods were followed and surveys were completed over a 18 month period to ensure that surveys were completed within the appropriate season. However, any biases or limitations associated with these methods could potentially affect the results collected. Although every effort was made to provide a full assessment and comprehensive description of the study area, natural fluctuations in populations may not be fully reflected due to the instantaneous nature of the field surveys. However, the field surveys together with the background knowledge provided by the desk study, provides a robust representation of the baseline for the habitats and species within the zone of influence.

8.3 Baseline Environment

8.3.1 General Landscape

The proposed development site is located to the south of Ballincollig and within the town boundary. The site is a greenfield site which is characterised by a gently sloping topography. The site is directly bound on the north by the existing Woodberry Road and to the south by the Ballincollig Bypass (N22). Lands to the north are dominated by residential developments. Lands to the south are largely agricultural. Section 2.2 of this EIAR provides full details of the sites existing baseline environment.

8.3.2 Designated Sites/Conservation Areas

8.3.2.1 European sites

Special Areas of Conservation (SACs) and candidate SACs are protected under the Habitats Directive 92/43/EEC and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Special Protection Areas (SPAs) are protected under the Birds Directive 2009/147/EC and European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, these sites are referred to as Natura 2000 or European sites.

The proposed development site does not form part of any SPA or SAC. Determination of this project's likely Zone of Impact (ZoI) was achieved by assessing all elements of the proposed project against the ecological receptors within the project footprint, in addition to all ecological receptors that could be connected to and subsequently impacted by the proposed project through impact pathways. To this end, the ZoI extends outside of the proposed development footprint to include ecological receptors connected to the project through overlap /intersection, proximity and connectivity to features such as waterbodies. The proposed development site is located within the likely ZoI of one designated sites i.e. Cork Harbour SPA (Table 8-2 and Figure 8-1).

The Cork Harbour SPA is located 11.5km east of the proposed development site. The Lisheens Stream, a tributary of the Grange Hill and Curraheen Stream, is located at the south-east corner of the proposed development site. During operation, the proposed surface water drainage network will discharge to this stream. The Lisheens Stream meets the Curraheen stream approximately 2.8km downstream of the proposed development site (via the Grange Hill Stream). The Curraheen Stream meets the Glasheen River c.5.9km downstream of this and the River Glasheen flows into the Lee Estuary 3.7km downstream of this point. The Cork Harbour SPA is located 4.5km downstream of this point. Therefore, although unlikely, surface water run-off/discharges during the construction or operational phases could potentially flow into the Cork Harbour SPA via the Lisheens Stream (16.9km downstream).

Wastewater from the site will ultimately discharge into River Lee via the Ballincollig Wastewater treatment plant (WWTP) approximately 14.6km upstream of Cork Harbour SPA. This could potentially impact on water quality within the Cork Harbour SPA.

Although unlikely given the distance involved, surface water run-off/discharges during the construction or operational phases as well as wastewater discharges from the proposed development could potentially impact on Cork Harbour SPA via the Lisheens Stream and River Lee. Habitats within or near the proposed development area could also potentially provide ex-situ foraging grounds for SCI species outside the Cork Harbour SPA.

Cork Harbour SPA is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay, Ringabella Creek and the Rostellan and Poulnabibe inlets. Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e., > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, it supports nationally important wintering populations of 22 species, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive.

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Table 8.2 European sites and their location relative to the proposed development site

European sites name and code	Distance from site boundary (at closest point) and potential source-pathway-receptor link	Qualifying interests (QI)/ Special Conservation Interests (SCI)
Special Protection Area (SPA)		
Cork Harbour SPA (site code 004030)	11.5km east (16.9km downstream). The Lisheens Stream, a tributary of the Grange Hill and Curraheen Stream, is located at the south-eastern corner of the proposed development site. During operation, the proposed surface water drainage network will discharge to this stream. The Lisheens Stream meets the stream c.2.8km downstream of the proposed development site (via the Grange Hill Stream). The Stream meets the Glasheen River c.5.9km downstream of this and the River Glasheen flows into the Lee Estuary 3.7km downstream of this point. The Cork Harbour SPA is located 4.5km downstream of this point. Therefore, although unlikely, surface water run-off/discharges during the construction or operational phases could potentially flow into the Cork Harbour SPA via the Lisheens Stream (16.9km downstream). Wastewater from the site will ultimately discharge into River Lee via the Ballincollig Wastewater treatment plant (WWTP) approximately 14.6km upstream of Cork Harbour SPA. This could potentially impact on water quality within the Cork Harbour SPA. Although unlikely given the distance involved, surface water run-off/discharges during the construction or operational phases as well as wastewater discharges from the proposed development could potentially impact on Cork Harbour SPA via the Lisheen River and River Lee. Habitats within or near the proposed development area could also potentially provide ex-situ foraging grounds for SCI species outside the Cork Harbour SPA.	Birds A193 Common Tern (*Sterna hirundo*) A028 Grey Heron (*Ardea cinerea*) A130 Oystercatcher (*Haematopus ostralegus*) A140 Golden Plover (*Pluvialis apricaria*) A157 Bar-tailed Godwit (*Limosa lapponica*) A056 Shoveler (*Anas clypeata*) A156 Black-tailed Godwit (*Limosa limosa*) A052 Teal (*Anas crecca)* A183 Lesser Black-backed Gull (*Larus fuscus)* A054 Pintail (*Anas acuta*) A149 Dunlin (*Calidris alpina*) A017 Cormorant (*Phalacrocorax carbo*) A162 Redshank (*Tringa totanus*) A004 Little Grebe (*Tachybaptus ruficollis*) A050 Wigeon (*Anas penelope*) A160 Curlew (*Numenius arquata*) A005 Great Crested Grebe (*Podiceps cristatus*) A069 Red-breasted Merganser (*Mergus serrator*) A048 Shelduck (*Tadorna tadorna*) A142 Lapwing (*Vanellus vanellus*) A179 Black-headed Gull (*Chroicocephalus ridibundus*) A182 Common Gull (*Larus canus*) A141 Grey Plover (*Pluvialis squatarol*a) Habitats Wetlands

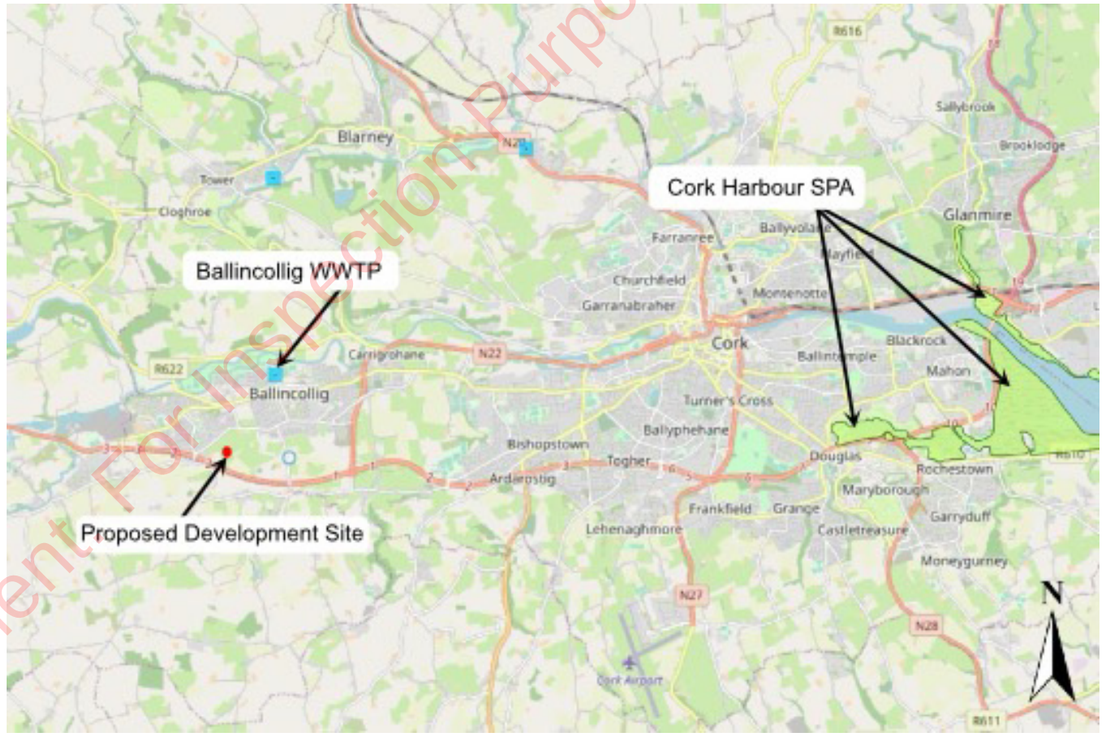

Figure 8.1 European sites within likely zone of impact of proposed development site | Source EPA Envision mapping | Not to scale

8.3.2.2 National Sites

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are national designations under the Wildlife Act 1976, as amended. A Natural Heritage Area (NHA) is designated for its wildlife value and receives statutory protection. These areas are considered nationally important for the habitats present or which holds species of plants and animals whose habitats needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

Proposed Natural Heritage Areas (pNHA) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated. These sites are also of significance for wildlife and habitats. Prior to statutory designation, pNHAs are still subject to limited protection, in the form of:

- Agri-environmental farm planning schemes support the objective of maintaining and enhancing the conservation status of pNHAs;
- There is a requirement for the Forest Service to gain NPWS approval before they will pay afforestation grants on pNHA lands; and,
- A recognition of the ecological value of pNHAs by Planning and Licensing Authorities.

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The NHAs and pNHAs located in the vicinity of the proposed development site are listed in Table 8.3 and are shown in Figure 8.2.

The proposed development site lies relatively close to the proposed Ballincollig Cave pNHA c. 390m northeast. However, no pathway for impact has been identified to the qualifying habitats for which this pNHA is proposed for designation. It is noted there are no records of Lesser Horseshoe Bat in Ballincollig caves and the closest known roost is located over 3km from the proposed development site. The value of the proposed development site for bats is discussed in detail in Section 8.3.7 of this EIAR.

Effluent from the proposed development will ultimately be conveyed to Ballincollig WWTP for treatment prior to discharging into the waters of the River Lee. Large sections of the River Lee, upstream and downstream of the primary discharge point from the Ballincollig WWTP, form part of the Lee Valley pNHA. Therefore, there is a potentially hydrological connection to this pNHA via wastewater discharges.

Table 8.3 European sites and their location relative to the proposed development site

NHAs & NHAs/pNHAs	Site Code	Overlaps with European site	Site Description	Distance at closest point and potential source-pathway-receptor link
Ballincollig Cave pNHA	001249	No	Ballincollig lies in the limestone valley of the Bride River which runs parallel to the Lee. The cave occurs under and beside the castle and is apparently short. However, it seems likely to contain some fossil material as it has a natural and accessible opening. Above ground there are several interesting features in the grassland vegetation. The occurrence of *Chelidonium majus* (greater celandine), *Veronica agrestis* (a speedwell) and Silybum marianum (milk thistle) show the long habitation of the site while, of the native species, *Calamintha ascendens* (calamint) grows near the rock outcrops, *Orobanche hederae* (ivy broomrape) on ivy roots and *Spiranthes spiralis* (lady's tresses) amongst the short grasses. Evaluation: The cave is thought to contain deposits of scientific interest though as far as is known it has not yet been excavated. The flora is also well developed though over quite a small area. Vulnerability & Recommendations: Cave exploration except by specialists should not be encouraged in this area as this could damage any remaining scientific interest."	390m northeast. No potential pathway identified.
Lee Valley pNHA	000094	No	The Lee Valley pNHA occupies five different sections of the River Lee valley and is of regional conservation importance for the diverse range of semi-natural habitats that occur. The site supports wet broadleaved woodland, wet grassland, dry broadleaved woodland, unimproved dry grassland, freshwater marsh. A number of wetland bird species are known to breed in the site including Mallard, Heron, Sedge and Grasshopper warblers and Reed bunting. Small blue and White wood butterfly, both locally distributed species also occur	950m north. A source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Lee Valley pNHA) via a potential pathway (wastewater discharges)
Shournagh Valley pNHA	000103	No	Shournagh Valley pNHA includes two sections of the Shournagh River and comprises areas of wet woodland, scrub, scrub woodland and old estate mixed woodland. Dippers (Cinclus hibernicus) and Grey wagtail (Motacilla cinerea) are known to feed along and around the river channel.	3.3km northeast. No potential pathway.
Cork Lough pNHA	001081	No		8.1km east. No potential pathway

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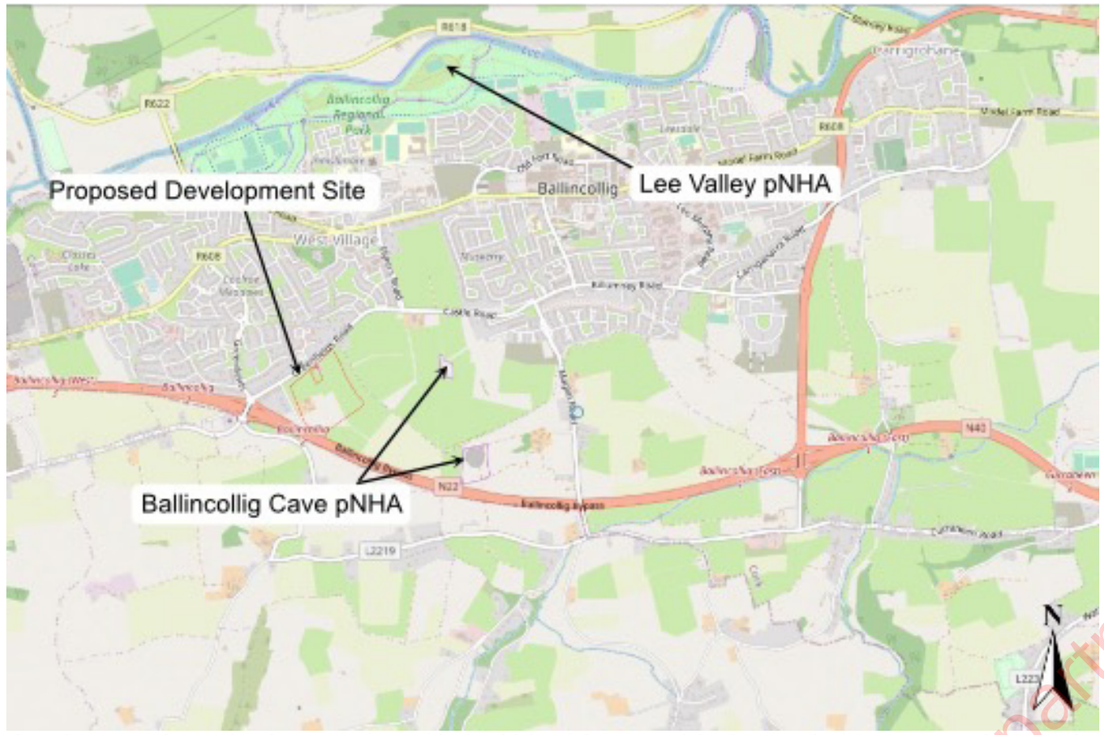

Figure 8.2 Proposed Natural Heritage Areas (pNHAs) in the vicinity of the proposed development site | Source: EPA Envision mapping https://gis.epa.ie/EPAMaps/) | Not to scale

8.3.2.3 Salmonid Waters – River Lee

The River Lee main channel from source to Cork City waterworks at Lee Road is a designated salmonid fishery under the EC (Quality of Salmonid Waters) Regulations of 1988 (SI 84 of 1988), implementing the Freshwater Fish Directive (78/659/EEC). The section of the River Lee into which the Ballincollig WWTP discharges to forms part of this designation. The River Lee and its larger tributaries are known to support Atlantic Salmon Salmo salar as well as other Annex II species such as Lamprey. The River Lee is known to contain populations of Brown Trout Salmo trutta and European Eel Anguilla anguilla.

8.3.2.4 Ramsar Sites

The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. A key commitment of Ramsar Contracting Parties is to identify and place suitable wetlands onto the List of Wetlands of International Importance. Cork Harbour is listed as a Ramsar site, which is a non-statutory designation.

8.3.2.5 Important Bird Areas – Cork Harbour

Important Bird and Biodiversity Areas (IBAs) are sites selected as important for bird conservation because they regularly hold significant populations of one or more globally or regionally threatened, endemic or congregator bird species or highly representative bird assemblages. The European IBA programme aims to identify, monitor and protect key sites for birds all over the continent. It aims to ensure that the conservation value of IBAs in Europe (now numbering more than 5,000 sites or about 40% of all IBAs identified globally to date) is maintained, and where possible enhanced. The programme aims to guide the implementation of national conservation strategies, through the promotion and development of national protected-area programmes. Through their designation they aim to form a network of sites ensuring that migratory species find suitable breeding, stop-over and wintering places along their respective flyways.

The function of the Important Bird Area (IBA) Programme is to identify, protect and manage a network of sites that are important for the long-term viability of naturally occurring bird populations, across the geographical range of those bird species for which a site-based approach is appropriate. The proposed development site has a potential hydrological connection via the River Lee and Lee Estuary to the Cork Harbour IBA (Site Code: IE088).

The site qualifies for designation under the IBA Criteria (2000) listed in Table 8.4:

- A4iii - The site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabird of one or more species.
- B1i - The site is known or thought to hold ≥ 1% of a flyway or other distinct population of a waterbird species
- B2 - The site is one of the most important in the country for a species with an unfavourable conservation status in Europe and for which the site-protection approach is thought to be appropriate.
- C3 - The site is known to regularly hold at least 1% of a flyway population or of the EU population of a species threatened at the EU level (not listed on Annex 1 of The Birds Directive).
- C4 - The site is known to regularly hold at least 20,000 migratory waterbirds and/or 10,000 pairs of migratory species of one or more species.
- C6 - The site is one of the five most important in the European region in question for a species or subspecies considered threatened in the European Union.

Table 8.4 Summary of the Cork Harbour IBA trigger species.

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Eurasian Curlew (*Numenius arquata*)	NT	winter	1995	1,669 individuals	B2
Bar-tailed Godwit (*Limosa lapponica*)	NT	winter	1996	456 individuals	B2
Black-tailed Godwit (*Limosa limosa*)	NT	winter	1996	1,399 individuals	B1i, C3
Dunlin (*Calidris alpine*)	LC	winter	1995	12,050 individuals	B1i, B2, C3
Common Redshank (*Tringa tetanus*)	LC	winter	1996	1,344 individuals	B1i, C3
Common Tern (*Sterna hirundo*)	LC	breeding	1995	102 breeding pairs	C6
A4iii Species group - waterbirds	n/a	winter	-	20,000 individuals	A4iii, C4

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8.3.3 Flora

The site of the proposed development lies within Ordnance Survey National Grid 10km square W56. The National Parks and Wildlife Service (NPWS) rare plant database does not note the presence of any protected plant species within grid square W56 (hectad).

The National Biodiversity Data Centre (NBDC) online database provides data on the distribution of mammals, birds, and invertebrates within Irish 10km grid squares. Some 185 flowering plants are listed by the NBDC as present in the grid square W56. There are no flowering plants listed by the NBDC as either threatened species or requiring designation within grid square W56.

A detailed botanical survey was carried out at the site in May 2025 and the results of this survey are included in Appendix 8.2 of this chapter. No rare, uncommon or red list species were recorded during the site survey, nor are they expected to occur given that the habitats within the proposed development site are dominated by managed agricultural habitats.

8.3.4 Habitats

Habitat surveys, were carried out the 14th of May, 23rd of May and 24th of May 2025 Habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication, Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011). The terrestrial and aquatic habitats within or adjacent to the proposed development site was classified using the classification scheme outlined in the Heritage council publication A Guide to Habitats in Ireland (Fossitt, 2000) and cross referenced with Annex I Habitats where required.

A current overview of habitats recorded within the site is shown in Figure 8.3 and the habitats recorded on site are described in Table 8.4. Photographs of the site are also included below. The ecological value of habitats has been defined using the classification scheme outlined in the Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority, 2009) which is included in Appendix 8.1. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape. Habitats that are considered to be good examples of Annex I and Priority habitats are classed as being of International or National Importance. Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance. Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value) and sites containing small areas of semi-natural habitat or maintain connectivity between habitats are considered to be of Local Importance (lower value).

Table 8.4 Habitats recorded within the proposed development site boundary and their ecological value

Habitats	Comments	Ecological value (NRA Guidelines)
Buildings And Artificial Surfaces BL3	This habitat includes the main house, stables building, two barns, the artificially surfaced areas and paths surrounding these buildings, as well as the tracks and paths connecting them. Further detail on the value of the buildings for bats, birds etc. are included later in this chapter. The house is an inhabited one-storey brick building with a tiled roof. The house was constructed in the first half of the 20th century and is shown the OS 6-inch map of 1939. It is a three bay bungalow with a hipped roof. The Stable building contains stables for 7-8 horses and is currently in use. It is constructed of brick and stone with a metal roof. There are barns to the north and south of the stable block. Both are built with bricks and corrugated iron. Some individual trees are planted within this area. Species include Sycamore *Acer pseudoplatanus*, Ash *Fraxinus excelsior*, and Beech *Fagus sylvatica*. *Plate 1. Barn with proposed development site* *Plate 2. Stables*	Local importance (Lower value)

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Habitats	Comments	Ecological value (NRA Guidelines)
Scattered trees and parkland WD5/Flower beds and borders BC4	Between the house and western access track there is an overgrown garden/ paddock and orchard with a number of Apple *Malus* sp. trees. This areas includes planted domestic shrubs and flower beds as well as a number of mature apple trees. A weeping Willow *Salix* sp. is present in the garden. A garden/orchard area is visible on the 1st edition maps (1829-1834). This is associated within the gardens of the original house onsite. Some of the original, mature Apple trees may remain onsite. *Plate 3. Paddock/garden and Orchard area adjoining farm* *Plate 4. Paddock/garden and Orchard area adjoining farm*	Local importance (Higher value)

Habitats	Comments	Ecological value (NRA Guidelines)
Hedgerows WL1 H1	A mature, native hedgerow runs along the eastern boundary of the proposed development site. This is a high value hedgerow dominated by Hawthorn Crataegus *monogyna.* A group of mature Sycamore is also present within this hedgerow. *Other species include*, Dog Rose *Rosa canina*, Spindle *Euonymus europaeus* and Bramble. The ground layer is dominated by Nettles *Urtica dioica*. At the southern section of this hedgerow, a dry drain runs along the base and species such as Alder *Alnus* sp. and Willow become more dominant. Understorey species in this wetter habitat include Willowherb *Epilobium angustifolium* and Yellow flag *Iris pseudacorus.* This hedgerow is of local importance (higher value) providing habitat and feeding suitable for bats and birds, and by providing linkages to the wider landscape. *Plate 5. Eastern hedgerow with mature native trees* *Plate 6. Mature hedgerow along eastern boundary*	Local importance (Higher value)

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Habitats	Comments	Ecological value (NRA Guidelines)
Hedgerow WL1 H2	Running along the northern boundary of the paddock/garden area there is an overgrown Hawthorn hedge with Bindweed Convolvulus arvensis, Nettle Urtica dioica, Bramble *Rubus fruticosus*, Teasel *Dipsacus fullonum*, Cleavers *Galium aparine* and immature Beech *Fagus sylvatica.* *Plate 7. Hedgerow adjoining paddock/garden area*	Local importance (lower value)

Habitats	Comments	Ecological value (NRA Guidelines)
Hedgerows WL1/ Stonewalls and other stonework BL1	A patchy hedgerow runs along the northern boundary of the site adjoining the Woodbury Road. This has some old stone wall at the base. *Plate 8. Wall running along Woodbury road/Greenfields Road* *Plate 9. View from rear of wall/hedgerow running along Woodbury road/ Greenfields Road* *Plate 10. Hedgerow has overgrown wall in some areas*	Local importance (Lower value)

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Habitats	Comments	Ecological value (NRA Guidelines)
Treeline WL2 T1	Treeline along access track to farm buildings. Treeline dominated by immature Beech *Fagus sylvatica* including Purple beech *Fagus sylvatica f. purpurea*. Dense Bramble at the base with some wooden fencing and block concrete wall (which do not support any specialist flora). Other species noted include Curled dock *Rumex crispus*, Wood avens *Geum urbanum*, Creeping buttercup *Ranunculus repens*, Teasal *Dipsacus fullonum* Ribwort plantain *Plantago lanceolata.* *Plate 11. Treeline adjoining farm access track* *Plate 12. Treeline adjoining farm access track* *Plate 13. Treeline adjoining farm access track*	Local importance (Lower value)

Habitats	Comments	Ecological value (NRA Guidelines)
Treeline WL2 T2	This boundary at the southwest edge of the site is defined by wooden fencing and an stone wall. There is woodland planted as part of the roadworks between the wooden fence and the N22 road. Hawthorn, Hazel, Bramble are quite densely planted consisting primarily of immature tree. Wild Rose *Rosa canina* immature Ash *Fraxinus excelsior*, Ivy *Hedera helix*, Beech, Cleavers and Elder *Sambucus nigra* are also present. *Plate 14. Treeline at southwestern boundary* *Plate 15. Treeline at southwestern boundary*	Local importance (higher value)

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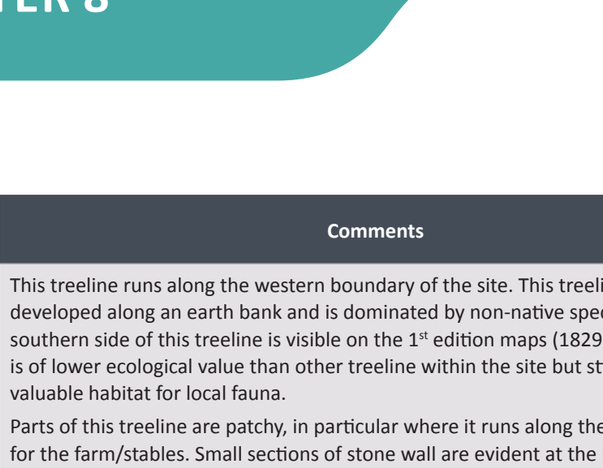
Habitats	Comments	Ecological value (NRA Guidelines)
Treeline WL2 T3	This treeline runs along the western boundary of the site. This treeline has developed along an earth bank and is dominated by non-native species. The southern side of this treeline is visible on the 1st edition maps (1829-1834) .This is of lower ecological value than other treeline within the site but still provides valuable habitat for local fauna. Parts of this treeline are patchy, in particular where it runs along the access track for the farm/stables. Small sections of stone wall are evident at the base. The understory is suppressed by the dense growth of non-native conifers in parts. The northern sections have mature trees including mature Ash and Sycamore and very large mature Beech. Species recorded include Sycamore, Ash, Beech, Larch *Larix decidua*, Scot's pine *Pinus sylvestris L.*, Hawthorn, Sitka *spruce Picea sitchensis,* Monterey cypress *Cupressus macrocarpa* and Eucalyptus *aze* Understorey species include Male fern *Dryopteris filix-mas*, Bracken *Pteridium aquilinum*, Bramble, Alexanders *Smyrnium olusatru*, Ivy, Nipplewort *Lapsana communis*, Elder, Hard shield fern *Polystichum aculeatum*, immature Beech, Remote sedge *Carex remota*, Dog violet *Viola riviniana*, Privet *Ligustrum* sp., Wild rose, Wood rush *Luzula* sp, Cow parsley *Anthriscus sylvestris*, Meadow vetchling *Lathyrus pratensis*, Germander speedwell *Veronica chamaedrys*, Wood avens, Harte's tongue fern *Asplenium scolopendrium*, Bush vetch *Vicia sepium* and Winter heliotrope *Petasites fragrans*.  *Plate 16. Western treeline*	Local importance (Higher value)

Habitats	Comments	Ecological value (NRA Guidelines)
	 Plate 17. Western treeline at access gate to farm *Plate 18. Western treeline*	

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Habitats	Comments	Ecological value (NRA Guidelines)
Treeline WL2 T4	This short, mature internal treeline runs along the track to the fields at the east of the farm/stables. This treeline is visible on the 1st edition maps (1829-1834) and part of the original treeline remains. The treeline has formed on a raised earth bank with mature Ash, Sycamore, immature Elm, Privet as well as Wild Rose, Buttercup, Primrose *Primula vulgaris,* Cleavers, Foxglove *Digitalis purpurea*, Alexanders, Creeping buttercup. A small section of Cherry Laurel *Prunus laurocerasus* adjoins this treeline. *Plate 19. Treeline along access track to farm/stables* *Plate 20. Treeline along access track to farm/stables*	Local importance (Higher value)

Habitats	Comments	Ecological value (NRA Guidelines)
Treeline WL2 T5	This is an internal treeline has developed on a raised earth bank. The high number of wood species suggest this is an older treeline and this treeline is visible on the 1st edition maps (1829-1834). This treeline becomes more patchy moving south. Species include Beech, Sycamore, Ash, Aspen *Populus tremuloides,* Hawthorn, Willow, Wild Rose, Elder, Hazel *Corylus avellana*, Blackthorn, Spindle as well as an understory of immature Elder, Ivy, Ground ivy, Dog violet, Sow thistle, Privet, Winter heliotrope, Male fern, Cleavers, Lords and ladies, Figwort. The ground flora here has low diversity due to the dominance on non-native species. The treeline is heavily grazed by Rabbits at the base. *Plate 21. Mature treeline at centre of the site* *Plate 22. Mature treeline at centre of the site* *Plate 23. Poorer quality treeline moving south*	Local importance (higher value)

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Habitats	Comments	Ecological value (NRA Guidelines)
Improved Agricultural Grassland GA1	This is the dominant habitat type within the proposed development site. Rye-grasses *Lolium* spp is the dominant grass species. Other species include White Clover *Trifolium repens*, Yorkshire Fog *Trofilium repens,* Buttercup *Ranunculus repens,* Dandelion *Taraxacum* spp, Black Medick *Medicago lupulina* and Plantains *Plantago* spp., Ribwort plantain, Dock, Creeping buttercup, Pineapple weed, Daisy. The eastern field appears to be in receipt of more fertilizer/manure. Grassland is more diverse on the margins, but overall diversity within this habitat is low. The western field which is grazed by horses is slightly more diverse. The northwest field are tightly grazed. Vegetation is taller on the southwest field. However overall, this habitat is generally species-poor. *Plate 24. Improved agricultural grassland at east of site* *Plate 25. Improved agricultural grassland at east of site*	Local importance (Lower value)

Habitats	Comments	Ecological value (NRA Guidelines)
	 Plate 26. Grassland grazed by horses at north-west of site *Plate 27. Grassland grazed by horses at southwest of site* *Plate 28. Paddock grazed area*	

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Habitats	Comments	Ecological value (NRA Guidelines)
Drainage Ditch FW4	A drainage ditch crossing east to west south of the proposed development site boundary. The southeast corner where it overlaps with the proposed development site boundary is mapped by the EPA envision mapping portal as LISHEENS 19 (River Waterbody code IE_SW_19C120740) i.e. Lisheens Stream. This meets the Grange Hill Stream c.920m downstream of the proposed development site. Flows were negligible or absent during the site surveys. Species noted include Purple Loosestrife, Meadowsweet, and Water Parsnip *Pastinaca sativa*.The drains ultimately discharge to the Grange Hill Stream which in turn discharges to the River. This watercourse in turn discharges into the Lee River. Further details on this drainage ditch are included in Appendix 8.3. Biological monitoring Plate 29. Drainage ditch at south of site Plate 30 Drainage ditch at south of site	Local importance (Lower value)

Figure 8.3 Habitats recorded within proposed development site boundary

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Figure 8.4 Treelines and hedgerows within proposed development site boundary

8.3.5 Invasive Species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and, (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and, (3) have an adverse effect on landscape quality. The NBDC lists a number of high impact invasive species which have been recorded within hectad W56 (Table 8.5).

Table 8.5 NBDC list of high impact invasive species recorded in W56

Species group	Species name
flowering plant	Japanese Knotweed (Fallopia japonica)
insect - beetle (Coleoptera)	Harlequin Ladybird (Harmonia axyridis)
terrestrial mammal	American Mink (Mustela vison)
terrestrial mammal	Chinese Muntjac (Muntiacus reevesi)
terrestrial mammal	Musk Rat (Ondatra zibethicus)
terrestrial mammal	Sika Deer (Cervus nippon)

Source: NBDC 25/05/25

The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed and Himalayan Balsam, as follows: *"any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence."*

No third schedule species were recorded within the proposed development site. Two other invasive non-native species Cherry Laurel Prunus laurocerasus and Winter Heliotrope Arctostaphylos luciana were recorded within the proposed development site. Cherry Laurel is classified as a high impact species by the NBDC. Winter Heliotrope is classified as a low-risk invasive species by the NBDC. These species are not listed in SI 477 of 2011 and therefore there is no statutory obligation to remove them. Both have been included in the NRA Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads (NRA, 2010) as they have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and are likely to be encountered during road schemes.

It is noted that invasive water fern (Azolla sp.) was recorded within the Lisheens Stream downstream of the proposed development site. This species is a Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011.

8.3.6 Non-volant Mammals

Seven non-volant mammals species which are protected by the Irish Wildlife Act (1976) as amended have been recorded within W56, namely Otter Lutra lutra Badger Meles meles, Red Squirrel Sciurus vulgaris, rish Hare Lepus timidus subsp. Hibernicus, Irish Stoat Mustela erminea subsp. hibernica, Sika Deer Cervus nippon and Hedgehog Erinaceus europaeus have been recorded within W56. It is noted that two other species (not included in the Irish Wildlife Act (1976) as amended, namely Fox Vulpes vulpes and Rabbit Oryctolagus cuniculus were recorded during site surveys.

8.3.6.1 Otters

Otters, along with their breeding and resting places are protected under the provisions of the Wildlife Act 1976, as amended by the Wildlife (Amendment) Act, 2000. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Direct which is transposed into Irish law in the European Communities (Natural Habitats) Regulations (S.I 94 of 1997), as amended. Otters are also listed as requiring strict protection in Appendix II of the Berne Convention on the Conservation of European Wildlife and Natural Habitats and are included in the Convention on International Trade of Endangered species (CITES).

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Although rare in parts of Europe they are widely distributed in the Irish countryside in both marine and freshwater habitats. Otters are solitary and nocturnal and as such are rarely seen. Thus, surveys for Otters rely on detecting signs of their presence. These include spraints (faeces), anal gland secretions, paths, slides, footprints and remains of prey items. Spraints are of particular value as they are used as territorial markers and are often found on prominent locations such as grass tussocks, stream junctions and under bridges. In addition, they are relatively straightforward to identify.

Otters occasionally dig out their own burrows but generally they make use of existing cavities as resting placing or for breeding sites. Suitable locations include eroded riverbanks, under trees along rivers, under fallen trees, within rock piles or in dry drainage pipes or culverts etc. If ground conditions are suitable the holt may consist of a complex tunnel and chamber system. Otters often lie out above ground especially within reed beds where depressions in the vegetation called "couches" are formed (NRA, 2008). Generally, holts or resting areas can be located by detecting signs such as spraints or tracks.

In contrast natal holts which are used by breeding females can be extremely difficult to locate. They are often located a considerable distance from any aquatic habitats and Otters may also use habitats adjoining small streams with minimal or no fish populations. In addition, natal holts are usually carefully hidden and without obvious spraining sites. Otters do not have a well-defined breeding season. It is noted that Otters are largely nocturnal, particularly in areas subject to high levels of disturbance as evidenced by the presence of Otters in the centre of Cork City (Sleeman and Moore 2005).

A review of existing records showed that Otter or signs of Otter have been recorded on 15 occasions within grid square W56, the most recent being in May 2017 (Source NBDC May 2025). Otter has been recorded within the Grange Hill Stream approximately 1.5km upstream of the proposed development in 1980, as part of the Otter survey of Ireland 1982 conducted by the Vincent Wildlife Trust (NBDC records). In addition, Otter has been recorded approximately 800m south of the proposed development site. There are no records of Otter on the Lisheens Stream. The drainage ditch onsite has low and/or absent flows for most of the year and will not support fish populations. No signs of amphibians were recorded on the drainage ditch and this has negligible foraging potential for Otters.

Otter territories can range between 20-30km and as noted above Otters do occur within the catchment and therefore there is the potential for Otter to commute along and feed within the Grange Hill Stream in proximity to the proposed development site. However, no signs of Otter were noted during site surveys and the Lisheen or in the immediate vicinity of the proposed development site.

8.3.6.2 Badger

Badgers and their setts are protected under the provisions of the Wildlife Act 1976, as amended, and it is an offence to intentionally, knowingly or unknowingly kill or injure a protected species, or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. Badger setts are formed by a complex group of interlinked tunnels, and therefore works in proximity to setts can potentially cause damage a protected species. Badgers are also protected under Appendix III of the Berne. Badgers are known to occur within the wider landscape (NBDC) with 61 records of Badger within W56. While the grasslands within the proposed development site could potentially provide habitat for Badger, no signs of badger were recorded during site surveys.

8.3.6.3 Irish Hare

Irish Hare is one of three lagomorphs found on the Island of Ireland and the only native lagomorph. It is listed on Appendix III of the Berne Convention, Annex V(a) of the EC Habitats Directive (92/43/EEC) and as an internationally important species in the Irish Red Data Book.

There are three records of Irish Hare in W56. DixonBrosnan have recorded hare pellets to the east of the site (2019). The grassland habitats at the site could potentially be used by Irish Hare. However this type of managed grassland habitat is not of particular value for this species and is locally common.

8.3.6.4 Hedgehog

Hedgehog is also listed on Appendix III of the Berne Convention can be found throughout Ireland, with male hedgehogs having an annual range of around 56 hectares. Hedgehogs have been recorded in W56 20 times. Generally, hedgehogs prefer edge habitat and pasture but in recent years have begun to colonize urban areas. The mature treelines and hedgerows are likely to provide breeding habitats for Hedgehog and Hedgehog was recorded near the farmyard in June 2025.

8.3.6.5 Irish Stoat

Irish Stoat is one of the species protected under regulations (Protection of Wild Animals) in 1980 which enabled Ireland to comply with the provisions of the Bern Convention of European Wildlife and Natural Habitats, which was ratified by Ireland in April 1982. It has been recorded in W56 on five occasions.

Given its broad habitat use, Irish Stoat could potentially occur in the proposed development site. Due to the habitats recorded within the proposed development site i.e. mature treelines and hedgerows, and their broad habitat use Irish Stoat is likely to occur.

8.3.6.6 Red Squirrel

Red Squirrel is also listed on Appendix III of the Berne Convention can be found throughout Ireland. Red squirrels feed mainly on tree seeds, although they can utilise fungi, fruit and buds as they become available in the woodland. They have been recorded on six occasions within W56. While there are mature treelines onsite, the absence of connectivity to woodland within this urban setting means the habitats onsite are sub-optimal for Red Squirrel and they are unlikely to occur.

8.3.6.7 Sika Deer

Sika Deer is a non-native species to Ireland. They prefer forest with dense understorey, thickets, natural woodlands and commercial plantations, but will also forage in open grassy areas with dense cover nearby. Sika Deer are highly opportunistic feeders, foraging on grasses to a range of shrubs and tree species. This species has been recorded on one occasion within W56. The surrounding road network and urban development means Sika Deer is not likely to occur within or in the vicinity of the proposed development site.

8.3.7 Volant Mammals - Bats

8.3.7.1 Bat Background Data

In Ireland, nine species of bat are currently known to be resident. These are classified into two Families: Rhinolophidae (Horseshoe bats) and Vespertilionidae (Common bats). The Lesser Horseshoe Bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: Common Pipistrellus *pipistrellus*, Soprano *Pipistrellus pygmaeus* and Nathusius' *Pipistrellus nathusii*, four Myotids: Natterer's Myotis nattereri, Daubenton's Myotis daubentonii, Whiskered Myotis mystacinus, Brandt's Myotis *brandtii*, the Brown Long-eared **Plecotus auritus** and Leisler's *Nyctalus leisleri* bats.

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A review of existing bat records within grid squares W56 (sourced NBDC) showed that seven of the nine Irish bat species have been recorded within this hectad (Table 8.6).

Table 8.6 Presence of Irish bat species within W56

Common name	Scientific name	Presence
Brown Long Eared Bat	Plecotus auritus	Present
Daubenton's Bat	Myotis daubentoniid	Present
Leisler's Bat/ Lesser Noctule	Nyctalus leisleri	Present
Lesser Horseshoe Bat	Rhinolophus hipposideros	Present
Nathusius' Pipistrelle	Pipistrellus nathusii	Present
Natterer's Bat	Myotis nattereri	Absent
Pipistrelle	Pipistrellus pipistrellus sensu lato	Present
Soprano Pipistrelle	Pipistrellus pygmaeus	Present
Whiskered Bat	Myotis mystacinus	Absent

Source: NBDC 20/05/25

The Lesser Horseshoe Bat is the only species of bat listed on Annex II of the Habitats Directive (Directive 92/43/EEC). A Lesser Horseshoe Bat roost has been recorded at Ovens, approximately 4.5km west of the proposed development site (undisclosed location). Lesser Horseshoe Bats normally forage in woodlands/scrub within 2.5km of their roosts (Bontadina et al. 2002); Consequently, in order to link roosting and foraging sites, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species, most importantly within 2.5km around each roost (Schofield, 2008). A request was made to the NPWS to identify the location of know Lesser Horseshoe Bat roosts within 5km of the proposed development site. This information in confidential and therefore, the exact location is not published in this report. However, there is a record of one small Lesser Horseshoe Roost location approximately over 3km west of the proposed development site. This roost is known to support between 2-5 individuals.

A study by Lundy et al. (2011) examined the relative importance of landscape and habitat associations across Ireland. Maximum Entropy Models (MEM) were constructed for each bat species using records from the National Bat Database from 2000-2009. This method allows species' records that have not been collected in a systematic survey to be analysed. The results help explain patterns of species' occurrence and predict where species might occur. Landcover (CORINE), topography, climate, soil pH, riparian habitat and human bias factors were incorporated into the models. The analyses provide a picture of the broad scale geographic patterns of occurrence and local roosting habitat requirements for Irish bat species. This also provides a 'habitat suitability' index. The index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats. The habitat indices for all Irish bats for the landscape around the proposed development site is shown in Table 8.7.

Table 8.7 Model Predicted Habitat suitability indices for All Irish bat species

Bat species	Common Name	Habitat indices
All Bats		26.67
Pipistrellus pygmaeus	Soprano pipistrelle	40
Plecotus auratus	Brown long-eared bat	37
Pipistrellus pipistrellus	Common pipistrelle	37
Rhinolophus hipposideros	Lesser horseshoe	1
Nyctalus leisleri	Leisler's bat	35
Myotis mystacinus	Whiskered bat	25
Myotis daubentoniid	Daubenton's bat	28
Pipistrellus nathusii	Nathusius' pipistrelle	4
Myotis nattereri	Natterer's bat	33

Source: NBDC 20/05/25

8.3.7.2 Bat tree/building survey

A preliminary roost assessment of trees within the proposed development trees found that while mature trees are present, these lack the structural elements that would provide significant roosting habitat for bats. A description of trees earmarked for removal and/or trees with potential to support roosting bats is included in Table 8.8. Although foraging activity was observed, no activity indicative of emergence or direct emergence of bats was recorded. However, bats can use trees as temporary roosts and therefore the presence of occasional bats cannot be altogether excluded. Small roosts within mature trees with dense ivy can be difficult to detect and may be used sporadically.

There are number of buildings earmarked for removal including the existing dwelling and stables/farm buildings. A preliminary roost assessment of the buildings onsite found no evidence of roosting bats. These buildings are classified as low to negligible potential for roosting bats. Further detail on the site buildings is provided in Table 8.8.

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Table 8.8 Preliminary roost assessment of trees and buildings within the site

Tag. no	Species/comments	Photograph
921	Ash Semi-mature tree. Ivy is now dead. Moderately dense ivy. Low potential for bats.	
922	Ash Spreading ash tree on field boundary multiple stems, Thick ivy although most of it is dead Low to moderate potential	
923	Beech Mature Beech with very wide stem. Negligible ivy. No obvious cracks or crevices of significant diameter, but likely to improve his age. Low potential for bats possibly low to moderate	
924	Large tree but not particularly old. Growing close to mature Beech. Negligible potential for bats	
925	Ash Multi-stemmed tree with moderate ivy cover. No obvious cracks or crevices Low potential for bats	

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Tag. no	Species/comments	Photograph
926	Sycamore Mature sycamore ivy is dead with some regrowth with thick stems. Lots of side bows Low potential for bats	
927	Ash Semi-Mature Ash with dead ivy. Multi-stemmed with relatively low diameter. Bows from approximately 15 ft. No evidence of usage. Low potential	
928	Beech Mature Beech. Spreading canopy multi-stemmed from approximately 10 ft upwards. No significant ivy. Some possible cracks or crevices. Low potential for bats	

Tag. no	Species/comments	Photograph
930	Eucalyptus Relatively immature tree. Multiple stems. Narrow diameter. No significant ivy. Negligible potential for bats	
933	Sitka spruce Sitka spruce with some dead ivy growing from base to crown. Relatively thick stemmed ivy, but now dead. Negligible potential	
934 935 936	Sitka spruce Three trees in group with some ivy. Part of ivy had dies off as has been cut at the base. Negligible potential for bats	

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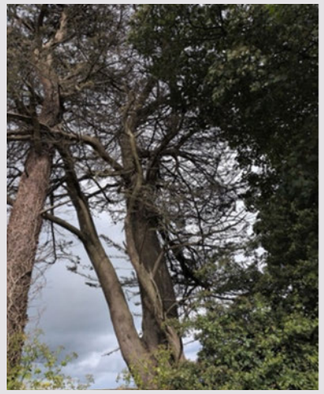
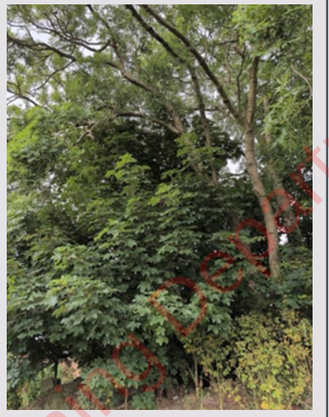
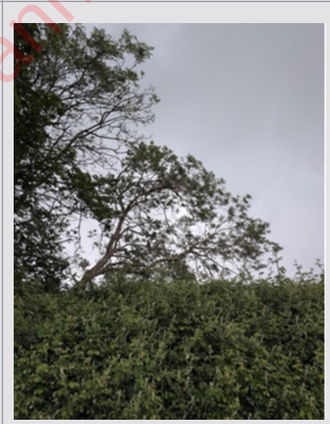
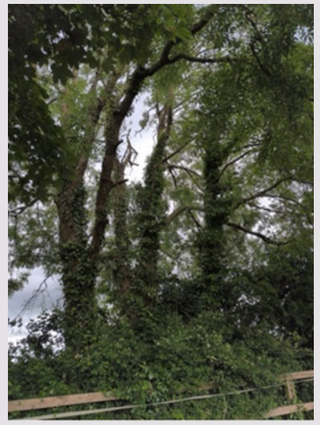
Tag. no	Species/comments	Photograph
938	Monterey cypress Mature tree relatively smooth with no significant cracks or crevices. Negligible potential for bats	
942	Sycamore Relatively young Sycamore within a group. Negligible potential for bats	
947	Ash Young tree. Negligible potential	

Tag. no	Species/comments	Photograph
949	Ash Limited ivy coverage. No cracks or crevices. Low potential	
958	Sycamore Limited ivy coverage. No cracks or crevices. Low potential	
959	Aspen Young aspen tree negligible potential for bats	

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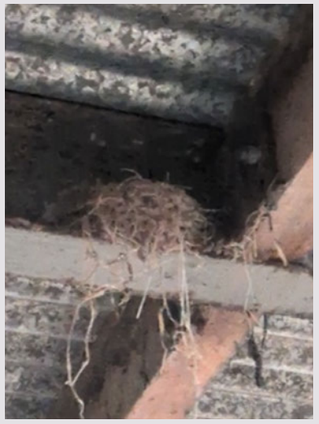
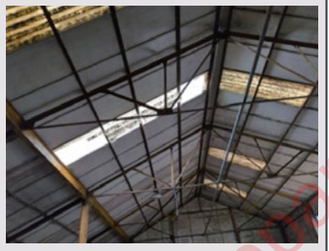
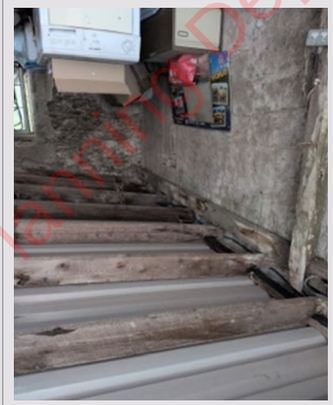
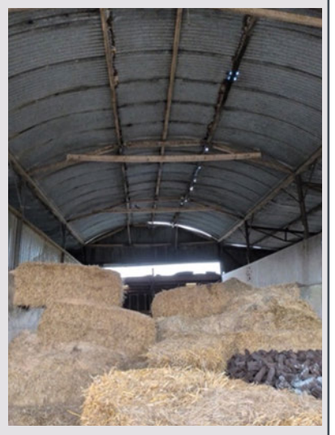
Tag. no	Species/comments	Photograph
Buildings within proposed development site Farm buildings/ stables	Signs of nesting birds were recorded within a number of the farm buildings and stables. The stables/barns are actively used for horses, machinery and straw/hay storage. No signs of bats were recorded. The farm buildings are largely open and draughty (some with damaged roofs). The buildings onsite have low to negligible potential for roosting bats.	  

Tag. no	Species/comments	Photograph
		    

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Tag. no	Species/comments	Photograph
Buildings within proposed development site Dwelling	A full search of the interior and exterior of the building was carried out. The original building dates back to the 1800's with small more modern extensions added in more recent years. Overall the building is in a good state of repair. Attic space has original roof. Some gaps in the slate letting in light but no obvious bat usage. No staining droppings etc. Windows and doors well-sealed. Some exterior wooden facias rotten and could provide roosting site for individual bats. No signs of bats recorded. Low potential for bats	

8.3.7.3 Bat Activity/Emergence Surveys

Bat activity and/or emergence surveys were completed at the site in 2021, 2022, 2024 and 2025 (See Table 8-1).

The 2021 survey focused on activity and emergence in the vicinity of the barns and stables. No emergence of bats was detected during the survey. Some bat activity was recorded including Leisler's foraging in wider landscape as well as commuting and foraging by small numbers (2-3) Common and Soprano Pipistrelle within the internal treelines as well as foraging around the open barns, farmyard and paddock. No evidence of emergence was noticed and there was no evidence such as staining, droppings, etc. To indicate that any of the buildings within the site were being utilized as bat roosts.

Activity surveys were carried out on the 12th and 13th of September 2022. The primary purpose of the survey was to determine if bats were using any of the structures within the facility for roosting and to assess general activity patterns along linear features such as hedgerows and treelines within the proposed development site. No emergence was recorded within the farmyard although forging by Common and Soprano Pipistrelle and Leisler's bat was sporadic throughout the survey. Bats were recorded foraging around the farm complex and were recorded overflying the dwelling from west to east.

This activity survey recorded relatively high levels of foraging along the treelines and hedgerows. Common pipistrelle was the most frequently recorded species with lower numbers of Soprano pipistrelle. Signals for Leisler's were sporadic and probably indicative of a relatively small number of bats over flying the site and foraging in the wider landscape. One unidentified Myotis bat was recorded along the western boundary of the site and within the internal treeline (T4/T5).

An emergence and activity survey was carried out on the 5th of September 2024 using two Elekon Batloggers and Eco touch detector and a thermal imaging camera. Two surveyors were utilized with an emphasis on determining if there was roosting activity within the existing structures, to assess activity levels and to assess for the presence of lesser horseshoe bat.

The emergent survey did not record any bats emerging from any of the structures on size and therefore it was concluded that there is no roosting habitat within the existing dwelling are associated farm buildings. In general, the farm buildings are open and drafty and considered low potential value for roosting bats. The existing dwelling is occupied and no evidence of bat emergence was recorded.

During the emergence period approximately five Common pipistrelle were recorded flying over the dwelling from west to east. Bats were observed foraging briefly in the garden/paddock before continuing eastward. Leisler's were also detected during the emergence window but were not observed. The signals were indicative of a small number of foraging Leisler's in the wider landscape.

The activity survey which covered the remainder of the land holding commenced at 20:48. Approximately five Common pipistrelle were observed foraging along the internal treeline T4 that runs east from the existing farmyard and along the internal treeline T5. These treelines supports a mixture of Sycamore and Ash and provides suitable foraging habitat for the species. Relatively high levels of foraging by approximately four Common pipistrelle and one Soprano pipistrelle was recorded along the hedgerow along the eastern boundary H1. Bats were observed continually foraging along this treeline with a preferential foraging area around the semi-mature Sycamores within this boundary.

Elsewhere there was patchy recordings for Soprano pipistrelle, Common pipistrelle and sporadic recording of Leisler's bat. Most of the detections were widely scattered.

Static detector was left in place from 24th to 27th of June 2025. The purpose of the survey was to determine if roosting bats were present within the proposed development site and assess activity patterns and determine which species use the site for foraging and commuting. A search of the buildings and emergence surveys did not indicate any usage of the site by roosting bats.

Static detector BL4 was placed at the southern edge of the stable block to assess emergence/activity within farm complex including the stables, yard, sheds and dwelling. Activity on the 24th of June commenced at 21.59 and finished at 4.48. The stables, yard and associated pasture provide sheltered foraging areas and the presence of horses, manure heaps etc may increase invertebrate numbers for bat foraging. Activity for both Common and Soprano Pipistrelle and Leisler's bat were high from the commencement of the survey until approximately 00.59. Activity levels then dropped off with sporadic recordings until activity ceased at 4.48. Occasional brief and distant signals were recorded for an unidentified Myotis bat which was probably indicative of a myotis bat foraging in the wider landscape. The most probable species is Natterer's Bat which does forage around farmyards. Similar patterns were recorded on the 25th (activity commenced at 22.00, finished at 4.53) and 26th of June (activity commenced at 21.56, finished at 4.43). The pattern of activity was broadly similar with Common Pipistrelle activity predominant and lower levels of foraging activity by Soprano Pipistrelle, Leisler's bat and Myotis bat. No Lesser Horseshoe bat activity was detected.

Static Detector BL2 was located at a small wooden play house to the west of the dwelling. Activity patterns were generally similar to BL4 with activity commencing at 21.52 when sporadic Leisler's were detected. This bat species tends to emerge

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and commence foraging relatively early. Pipistrelle activity commenced at 22.04. Common Pipistrelle was again the most common pipistrelle species with limited foraging by Soprano Pipistrelle. Sporadic foraging by myotis bat was recorded, with most activity recorded early in the survey period. Activity ceased at 4.54 for all species. Similar patterns were recorded on the 25th (activity commenced at 22.00, finished at 5.23) and 26th June (activity commenced at 212.57, finished at 4.54). The pattern of activity was broadly similar with Common Pipistrelle activity predominant and lower levels of foraging activity by Soprano Pipistrelle, Leisler's bat and Myotis bat. No Lesser Horseshoe bat activity was detected.

Static detector BL6 was located within a storage shed on the northern side of the farmyard. This complex of buildings includes a barn for straw, a horse paddock and horse stalls.

Activity patterns were generally similar to other static recordings with activity commencing at 21.52 when sporadic Leisler's were detected. Sporadic activity for Leisler's was recorded throughout the survey period. Pipistrelle activity commenced at 22.04. Common Pipistrelle was again the most frequently recorded pipistrelle species. Soprano Pipistrelle activity was less prevalent with activity for this species commencing at 22.05. Sporadic foraging by Myotis bat was recorded, with most activity recorded early in the survey period. Activity ceased at 4.58 for all species. Similar patterns were recorded on the 25th (activity commenced at (21.32, finished at 4.46) and 26th June (activity commenced at 21.28, finished at 4.54). The pattern of activity was broadly similar with Common Pipistrelle activity predominant and lower levels of foraging activity by Soprano Pipistrelle. Activity by Leisler's bat was sporadic and probably indicative of a bats foraging at height and overflying the site periodically. Myotis bat activity was sporadic and limited in extent with no prolonged periods of foraging recorded . No Lesser Horseshoe bat activity was detected.

In general the pattern of activity did not indicate roosting activity with no significant pre-dawn activity and no Lesser Horseshoe bat were detected during any of the site surveys.

Overall, no evidence of emergence was recorded for many of the structures within the proposed development site. There is moderate levels of foraging activity by Common pipistrelle, Soprano pipistrelle and Leisler's, with preferential foraging along the internal treelines and the hedgerow and section of mature hedgerow along the eastern boundary. Sporadic foraging was also recorded within the farm yards and associated garden/paddock early in the survey period. No Lesser horseshoe bat were detected during any of the site surveys.

Plate 31. Bat emergence survey 5 September 2024. Front of dwelling. Rabbit visible in foreground.

Plate 32. Front of dwelling and stables with horses visible

Plate 34. Four bats pipistrelle and Leisler's foraging along internal treeline (T4), pasture and eastern edge for farmyard

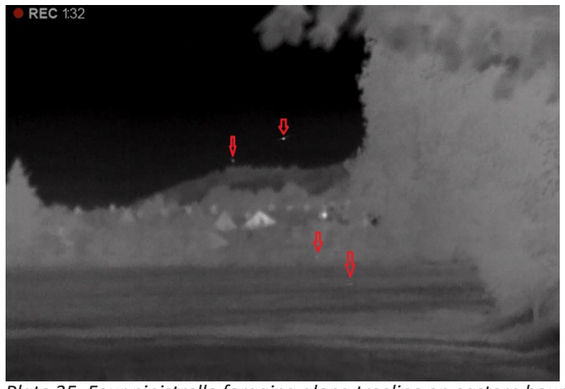

Plate 35. Four pipistrelle foraging along treeline on eastern boundary

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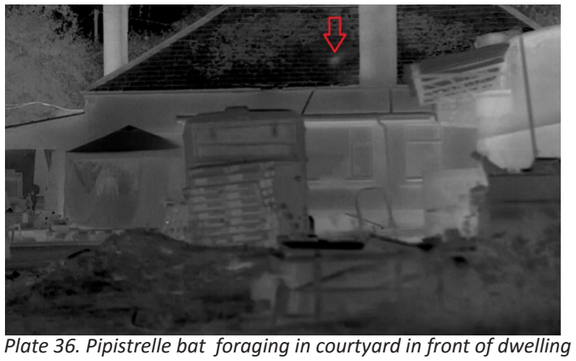

Plate 36. Pipistrelle bat foraging in courtyard in front of dwelling

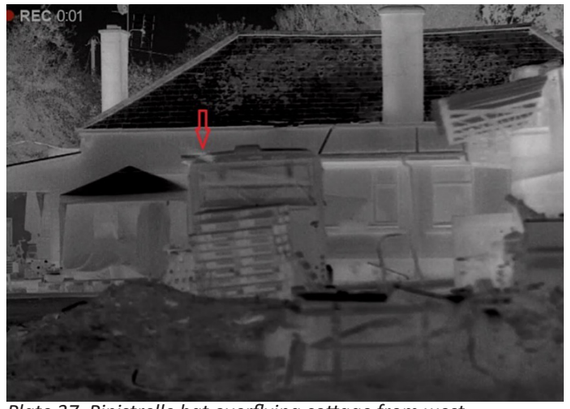

Plate 37. Pipistrelle bat overflying cottage from west

8.3.8 Amphibians and Reptiles

According to records held by the NBDC, Common Frog (Rana temporaria) is the only amphibian recorded from grid square W56.

Common Frog is listed on Annex V of the EU Habitats Directive and is protected under the Wildlife Acts. The Smooth Newt is the only member of the Urodela (the tailed amphibians) found in Ireland. While commonly encountered near water bodies, adult newts are actually terrestrial, only returning to water bodies to breed. There is no suitable habitat for this species within the site boundary. The drainage ditch onsite has signs of significant enrichment and is choked with vegetation. This lacks open areas of water where amphibians could breed and/or forage. Therefore, although flows are slow/stagnant, this does not provide habitat for Common frog (or other amphibians).

Common Lizard (Zootoca vivipara) is Ireland's only native terrestrial reptile and is so protected under the Wildlife Act. Ideal habitats for the species are south-facing, damp tussocky grassland, scrub covered hillsides, dunes or banks, and woodland tracks, and it also resides in peat bogs, dry grasslands and heathlands. The species has not been recorded in the surrounding landscape (NBDC) and it is unlikely that the species occurs within or in proximity to the proposed development site. The site of negligible value for reptiles and they have not been recorded in W56.

8.3.9 Birds

8.3.9.1 Breeding birds

The National Biodiversity Centre online data base lists 97 species of bird recorded within grid square W56. Of these 97 species, four of which are listed under Annex I of the Birds Directive, namely, Kingfisher Alcedo atthis, Peregrine Falcon Falco perigrinus, Little Egret Egretta garzetta and Whooper Swan Cygnus cygnus. There is no suitable breeding habitat for these Annex I species within the proposed development site boundary.

Breeding bird surveys were carried out in May and June 2024 based on the Common Bird Census (CBC) methodology (Balmer et al 2013 and Gilbert et al., 1998). CBS is an annual survey carried out exclusively during the breeding season. Bird counts are undertaken during two visits. The first visit is in the early part of the breeding season (April to mid-May) and the second at least four weeks later (from mid-May to the end of June). This reflects the abundance of residents and early migrants which tend to be more easily detected during the first visit, and later migrants which are more abundant during the second visit. The study area focused on terrestrial habitats within the proposed development site. The aim of the breeding bird surveys was to identify any valuable bird habitats within the Site boundary and to identify birds present within the proposed development site and surrounding landscape. This survey area encompassed terrestrial habitats along the survey route including hedgerows/ treelines woodland and agricultural fields. The site was walked so that all habitats within 50m of potential nesting features were surveyed. The surveyor slowly walked through the site, stopping at regular intervals to scan with binoculars and to listen for bird calls or song. Birds were identified by sight and song, and observations were plotted on a map. Survey visits were made in the early morning to coincide with the peak period of bird activity and all species seen or heard in the study area and immediate environs were recorded including those in flight. Visits were made during favourable weather conditions.

All species encountered during the survey were mapped and coded using standard BTO species codes and activity recorded using the BTO codes for breeding evidence. In an effort to minimise potential disturbance, no attempts were made to locate nests as such behaviours are generally sufficient to determine probable or confirmed breeding.

The results of the breeding bird survey are shown in Table 8.9.

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Table 8.9 Bird Species recorded during breeding bird surveys

Species		Breeding Status	Highest evidence of breeding	Estimated number of territories	Conservation Status: Annex I of Birds Directive or Red/Amber List*
Blackbird	Turdus merula	Probable	Pair observed	3	
Blue tit	Cyanistes caeruleus	Possible	Singing male	1	
Buzzard	*Buteo buteo*	Non-breeding	Flying over		
Chaffinch	*Fringilla coelebs*	Possible	Singing male	2	
Chiffchaff	*Phylloscopus collybita*	Possible	Singing male	1	
Collared dove	*Streptopelia decaocto*	Probable	Pair observed	1	
Dunnock	*Prunella modularis*	Possible	Singing male	2	
Feral pigeon	*Columba livia domestica*	Possible	Species observed in breeding season	1	
Goldfinch	*Carduelis carduelis*	Confirmed	Recently fledged young	2	
Great tit	*Parus major*	Possible	Singing male	1	
Hooded crow	*Corvus cornix*	Non-breeding	Flying over		
House martin	*Delichon urbicum*	Non-breeding	Flying over		Amber List
House sparrow	*Passer domesticus*	Possible	Singing male	1	Amber List
Jackdaw	*Corvus monedula*	Probable	Pair observed	1	
Lesser black-backed gull	*Larus fuscus*	Non-breeding	Flying over		Amber list
Long-tailed tit	*Aegithalos caudatus*	Non-breeding	Flying over		
Linnet	*Linaria cannabina*	Possible	Singing male	2	Amber List
Magpie	*Pica pica*	Possible	Singing male	1	
Meadow pipit	*Anthus pratensis*	Possible	Species observed in breeding season	1	Red list
Reed bunting	*Emberiza schoeniclus*	Possible	Singing male	1	
Robin	*Erithacus rubecula*	Confirmed (nesting in farm building)	Recently fledged young	2	
Rook	*Corvus frugilegus*	Non-breeding	Flying over	NA	
Skylark	*Alauda arvensis*	Possible	Singing male	1	Amber List
Sedge warbler	*Acrocephalus schoenobaenus*	Confirmed	Recently fledged young	1	
Song thrush	*Turdus philomelos*	Possible	Singing male	1	
Starling	*Sturnus vulgaris*	Possible	Species observed in breeding season	2	Amber List
Stonechat	*Saxicola rubicola*	Possible	Singing male	1	
Swallow	*Hirundo rustica*	Confirmed (nesting in farm building and dwelling (garage))	Recently fledged young	1	Amber list
Woodpigeon	*Columba palumbus*	Possible	Singing male		
Wren	*Troglodytes troglodytes*	Confirmed	Recently fledged young	3	

No Annex I bird species were recorded during the site survey. A total of 30 species were recorded during the breeding bird surveys. The majority of birds recorded as considered common, woodland edge species which will nest in the mature treelines and hedgerow onsite. The proposed development site is dominated by agricultural grassland with good quality, mature treelines/hedgerow. Native hedgerow provide valuable feeding/nesting resources for birds i.e. Hawthorn, Elder, Blackthorn, Willow.

Eight species of conservation concern (Amber list) were recorded during the breeding birds surveys i.e. House martin Delichon urbicum, House sparrow Passer domesticus, Lesser black-backed gull Larus fuscus, Linnet Linaria cannabina, Skylark Alauda arvensis, Starling Sturnus vulgaris, Swallow Hirundo rustica and Meadow pipit Anthus pratensis. Several of these species i.e. Lesser Black-backed Gull Larus fuscus, House martin Delichon urbicum and Starling were recorded overflying the site and not breeding. It is noted that Swallow and Robin were recorded breeding within the stable buildings. Feral pigeon and Jackdaw were recorded roosting in the farm buildings, but no nests were recorded.

Skylark and Meadow pipit were recorded during the breeding bird surveys. However, they are unlikely to breed within the proposed development site as the grassland is too short and heavily grazed to support ground nesting. It is likely that these species are nesting in longer, less intensively manged grassland to the south of the site. Linnet are likely to be breeding within the mature hedgerows at the site.

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While grassland habitats within the proposed developments site can potentially provide terrestrial foraging habitat for wading birds, there is nothing to differentiate this area from other grasslands in the vicinity. It noted that a flock of Lesser black-backed gull were recorded foraging in a recently ploughed field to the south of the proposed development site. Gulls, in particular Lesser black-backed Gulls, will forage opportunistically on recently ploughed fields.

8.3.9.2 Wintering Birds

Winter Bird surveys were carried out in the period in 2024 and 2025. The primary purpose of the study was to assess usage of pasture land within the proposed development site by birds listed as SCI species for the Cork Harbour SPA.

The lands within the proposed development site are used for grazing horses and is laid out in a series of individual fields and paddocks. Grazing pressure varies during the year and electric fencing is used to strip graze the site on an rotating basis.

The more southerly fields on the site, which is located on flatter found, have more dense tussocky grass which is not favoured by wading birds and/or SCI species. The northern fields at the site are more intensely grazed and are dominated by improved agricultural grassland could potentially be used by species such as Curlew, Golden Plover, gulls etc. However, there is nothing the differentiate this grassland from other similar grassland habitat in the immediate vicinity and wider landscape.

Birds recorded during winter bird surveys are listed in Table 8.10. Most species recorded during the winter bird surveys were common, Green List (Gilbert et al. 2021), passerine species such as Wren, Robin, Blackbird, Stonechat etc. These species were recorded within the grassland and hedgerow/treelines within the proposed development site. No red list species were recorded during the winter surveys. Gulls were occasionally recorded overflying the site. However, no wading birds or waterfowl were recorded within the proposed development site.

Table 8.10 Birds recorded during winter bird survey

Species		SCI Species Cork Harbour SPA	Birds Directive Annex	BOCCI		Notes
			I	Red List	Amber List	
Hooded Crow	Corvus cornix					
Robin	Erithacus rubecula					
Blackbird	Turdus merula					
Blue Tit	*Cyanistes caeruleus*					
Black-headed Gull	*Chroicocephalus ridibundus*	X			X	Overflying
Rook	*Corvus frugilegus*					
Jackdaw	*Corvus monedula*					
Lesser black-backed gull	*Larus marinus*				X	Overflying

No SCI species were recorded during the winter surveys. There is no habitat within the red line boundary which would be considered of particularly high value for wintering birds.

8.3.10 Other Species

A search of the NBDC database was carried out to determine if any protected, rare or notable species of invertebrates within 2km of the proposed development site (W56Z).

There are no records of rare or threatened invertebrates within W56Z. Whilst no site is without invertebrate interest, it is considered unlikely, given the managed agricultural grassland which dominates the site, that the proposed development site would provide valuable habitat for protected invertebrate species.

The Grange Hill Stream is located approximately 920m east of the proposed development site and is connected to the site via the Lisheens Stream. The Grange Hill Stream is a small watercourse of 2-4m wide and up to 1m deep, which supports stickleback and has the potential to support small numbers of Brown trout and European eel.

The Lisheens Stream, which runs is located at the south-eastern corner of the proposed development site has characteristics of a drainage ditch and could potentially dry up in dry weather. This watercourse does not have the potential to support permanent fish populations. An aquatic survey of the Lisheens Stream was carried out on the on 24th of June 2025. Full details of this survey are included in Appendix 8.3 of this chapter.

It is noted that the Lisheens Stream is generally considered as unsuitable for biological monitoring using EPA methodology as it is a depositing watercourse with deep fine sediment, minimal flows with an absence of riffle habitat and with dense macrophyte growth which clogs the channel.

The species recorded such as Asellus aquatica (water louse) and Chironomidae (fly larvae) are generally recorded where there is low oxygen levels and decaying vegetation. However, in this instance this is due to morphological conditions rather than being indicative of nutrient levels. Morphologically the watercourse is characterised by a straightened channel and an absence of riffle habitat with dense mud. Whilst some increase in nutrient levels associated with run-off from intensive pasture in proximity to the site - which will the exacerbated by sluggish flows and minimal dilution - may occur, the nutrient status of the watercourse could not be assessed via an analysis of macroinvertebrate populations. Overall, therefore this watercourse is not considered suitable for assessment via the EPA Q value methodology and Q values could not be assigned.

Stickleback were recorded in the kick sample downstream of the proposed development site and this species is expected to occur within more open sections of the channel. Flows are considered too sluggish to support salmonids and there are only very small sections of open water. The mud substrate precludes salmonid spawning. No suitable habitat for lamprey was recorded. European Eel could potentially occur downstream however the habitat is considered suboptimal for this species.

The drainage ditch is open where it passes through (and to the south) of the proposed development site. The drainage channel is densely overgrown with aquatic/emergent vegetation. Of note is the presence of the invasive water fern (Azolla sp.) downstream of the proposed development site. However, this species was not recorded within the drain to the south of the proposed development site (or within the proposed development site).

As described in Section 8.4, this habitat has been classified as of local importance (lower value).

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8.4 Potential Impacts

Annex III of the amended Directive 2014/52/EU requires that the EIAR should assess:

- The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected)
- The nature of the impact
- The transboundary nature of the impact
- The intensity and complexity of the impact
- The probability of the impact
- The expected onset, duration, frequency and reversibility of the impact
- The cumulation of the impact with the impacts of other existing and/or approved projects and
- The possibility of effectively reducing the impact.

Potential effects of the construction, operational and decommissioning phases of proposed development on terrestrial and aquatic biodiversity include:

- Potential effects on habitats
- Potential effects on Badgers
- Potential effects on bats
- Potential effects on Otter
- Potential effects on other mammals
- Potential effects on birds (breeding and wintering)
- Potential effects on amphibians and reptiles
- Potential effects on other species
- Potential effects from non-native invasive species.

When describing changes/activities and impacts on ecosystem structure and function, important elements to consider include positive/negative, extent, magnitude, duration, frequency and timing, and reversibility.

Section 3.7 of the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports', (EPA 2022) provides standard definitions which have been used to classify the effects in respect of ecology. This classification scheme is outlined in Chapter 1 Table 1.1.

8.4.1 Do-nothing Scenario

Most of the habitats to be affected have been significantly modified from the natural state by human activity. Grassland habitats are managed, through grazing and cutting and have low ecological value. If grassland habitats were left unmanaged a general pattern of succession from grassland to scrub would be expected to occur. If sufficient time elapsed without development, the unused areas of the proposed development area would be expected to develop a covering of woodland with a mix of native and introduced species. However, in the absence of development, agricultural use would continue and the grassland habitats would continue to be of low ecological value.

Mature hedgerows and treelines (dating back to 1st edition 1829 to 1834) are present at the site and these provide valuable local habitat for local fauna. In the absence of development, these habitats would continue to provide locally valuable habitat for a flora and fauna.

8.4.2 Construction Phase

8.4.2.1 Designated sites

DixonBrosnan prepared a screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) report (which accompanies this planning application). This report investigated the potential for the proposed development to have significant effects on Natura 2000 sites (SAC/cSAC/SPA) either alone or in combination with other plans or projects. The screening report identified the potential for significant effects on Cork Harbour SPA arising from the proposed development in the absence of mitigation via impacts on water quality during construction.

No pathway for construction effects on NHAs or pNHAs have been identified.

8.4.2.2 Habitats/Flora

Direct impacts on habitats as a result of construction works are described in Table 8.11. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape. The classification scheme below for the value of habitats and the impacts on them, is detailed in the NRA publication Guidelines for assessment of ecological impacts of National Road Schemes (See Appendix 8.1).

The floral species recorded during the botanical survey (See Appendix 8.2) are common species which are typical of managed grassland and the mature treeline/hedgerow present at the site. No rare species were recorded. The habitats earmarked for removal do not contain specialist flora.

It is noted the construction phase of the Greenfield LRD will be carried out on a phased basis over a period of 8-10 years.

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Table 8.11 Potential impacts on habitats during construction

Habitats	Ecological value (NRA Guidelines)	Potential impacts (in absence of mitigation measures)
Buildings and Artificial Surfaces BL3	Local importance (Lower value)	The farm buildings, house, stables etc. will be demolished to facilitate the development. No roosting bats were recorded within this habitat. However, a number of nesting bird species were recorded in the farm buildings/stables. This is a low value habitat. Potential impacts on fauna are discussed below. **Negative, slight, long-term**
Scattered trees and parkland WD5/Flower beds and borders BC4	Local importance (Higher value)	This includes a paddock and orchard area adjoining the farm buildings with mature apple trees. A garden/orchard area is visible on the 1st edition maps (1829-1834). This is associated within the gardens of the original house onsite. Some of the original, mature Apple trees may remain onsite. This will be removed to facilitate development. **Negative, moderate, long-term**
Hedgerows WL1 H1	Local importance (Higher value)	This hedgerow will be retained. In the absence of mitigation measures, construction works may damage retained trees and/or their roots. **Neutral, slight, long-term**
Hedgerow WL1 H2	Local importance (lower value)	This is a small section of lower value hedgerow on the boundary of the orchard/paddock area. This habitat will be removed to facilitate development. **Negative, slight, long-term**
Hedgerows WL1/ Stonewalls and other stonework BL1	Local importance (Lower value)	This includes a stone wall and hedgerow along the northern boundary of the site. This is a low value habitat. Part of this habitat will be removed to facilitate development. **Negative, imperceptible, long-term**
Treeline WL2 T1	Local importance (Lower value)	This treeline will be removed to facilitate development. This is an immature, non-native treeline of lower ecological value. **Negative, imperceptible, long-term**
Treeline WL2 T2	Local importance (higher value)	This treeline will be retained as outlined in the landscape design drawings (Source SRLA). In the absence of mitigation measures, construction works may damage retained trees and/or their roots. **Neutral, slight, long-term**
Treeline WL2 T3	Local importance (Higher value)	This treeline and understorey will be largely retained as outlined in landscape design drawings (Source SRLA). but some trees will be removed to facilitate a Greenway along the western boundary. The majority of trees to removed are non-native i.e. Sitka spruce, Monterey pine, Eucalyptus, but some native trees with be removed i.e. Ash. In the absence of mitigation measures, construction works may damage retained trees and/or their roots. **Negative, slight, long term**
Treeline WL2 T4	Local importance (Higher value)	The western extent of this treeline will be removed as outlined in landscape design drawings (Source SRLA). The remainder of this treeline and understory will be retained. In the absence of mitigation measures, construction works may damage retained trees and/or their roots. **Negative, slight, long term**
Treeline WL2 T5	Local importance (higher value)	This treeline will be largely retained as outlined in the landscape design drawings (Source SRLA). Two Aspen will be removed to facilitate to new internal road and a small section of the understory will be removed to facilitate a path. The understorey will be trimmed back but will be retained. All other mature trees within this treeline will be retained. In the absence of mitigation measures, construction works may damage retained trees and/or their roots. **Negative, slight, long term**
Improved Agricultural Grassland GA1	Local importance (Lower value)	This habitat will be removed to facilitate development. **Negative, slight, long-term.**
Drainage Ditch FW4	Local importance (Lower value)	Minor works to the banks of the drainage ditch will be carried out to facilitate to surface water outfall for the site. This is a low value habitat with limited bankside vegetation. The area will quickly recolonize following construction. In the absence of biosecurity measures, construction works could spread the invasive species *Azolla* sp. **Negative, slight, short-term**

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8.4.2.3 Invasive species

No third schedule invasive species were recorded within the proposed development site boundary. Two other invasive species i.e. Winter heliotrope and Cherry Laurel were recorded at the site. While these species are not listed in SI 477 of 2011 and therefore there is no statutory obligation to remove them, they have been shown to have an adverse impact on landscape quality and native biodiversity.

A short section of planted Cherry Laurel is present along the T4 treeline. Cherry laurel, which is classified as a high impact species by the ND is a dense thicket forming invasive ever-green shrub of gardens, parks and woodlands from South West Asia. Cherry laurel is an extremely invasive plant species, particularly in the more humid western parts of Ireland, forming dense impenetrable thickets. It is unpalatable and likely toxic to mammals and probably invertebrates due to the presence of cyanide. It is avoided by grazing animals, thus giving them significant advantages over native species.

Winter heliotrope was recorded within the T3 and T5 treelines onsite. Winter heliotrope forms dense colonies in disturbed habitats and roadside verges, successfully outcompeting native species through shading and monopolising below ground space and resources. In the absence of mitigation this could potentially impact on ground flora within these mature treelines.

The area of Cherry Laurel hedging is earmarked for removal to facilitate development. However, in the absence of mitigation, this could potentially spread to nearby retained treelines. In the absence of management/removal, Winter heliotrope will continue to spread within the site and negatively impact native ground flora.

It is noted that invasive water fern (Azolla sp.) was recorded within the Lisheens Stream downstream of the proposed development site. Azolla sp. was not recorded in the drainage ditch during the 2024 or 2025 surveys. This species is a Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. This non-native species poses a moderate to major risk to native biodiversity, native ecosystems and conservation goals as well as having the potential to cause negative socio-economic impacts in slow-flowing or still waters due to its capacity to spread rapidly and establish dense infestations.

8.4.2.4 Non-volant mammals

Otter

No signs of Otter activity were recorded within 150m of the proposed development site. The drainage ditch onsite will not support fish or amphibians and does not provide foraging habitat for Otter. The closest records of Otter are c.800m from the site. Although unlikely, Otter could potentially pass through the site while travelling between feeding grounds, the site is surrounded by a busy road network and urban development and is of negligible value for Otter. Therefore, no disturbance effects on Otter have been identified.

Construction works could potentially indirectly affect fish stocks and aquatic invertebrates within watercourses downstream, which could potentially provide a food source for Otter. Potential impacts on surface water and aquatic species are discussed in further in Chapter 7 of this EIAR, Water (Hydrology & Hydrogeology).

The impact on Otter from construction works is predicted to be neutral, imperceptible and medium-term at a local geographic level due to construction works.

Other non-volant Mammals

Hedgehog was recorded at the site. It is noted that Fox and Rabbit were also recorded. No other mammal species were recorded within the proposed development site. While there were no confirmed field signs of Irish Stoat or Pygmy Shrew, these species are largely nocturnal, and field signs are less frequently observed than for other mammals. Given the habitats onsite these species are likely to occur within the proposed development site. No signs of Badger were recorded and there is no evidence that this species uses the site.

The habitats to be affected are common and there is no evidence to indicate that the proposed development areas are of particular value for these species in the context of the surrounding countryside. It is noted that higher value habitats onsite, i.e. treelines and hedgerows, will be retained within the site. However, construction works could potentially impact on mammal commuting routes around the site. Effects on these species during construction due to loss of habitat, habitat fragmentation and increased noise and disturbance are predicted to be negative, slight and medium to long-term at a local geographic level in the absence of mitigation.

8.4.2.5 Volant Mammals (Bats)

No buildings with significant potential to support bats were recorded within the proposed development site boundary and activity surveys did not indicate that any bats are using the buildings at the site.

No trees with potential to support bat roosts were recorded within the site boundary. Whilst no bat roosts were detected, the presence of occasional bats in semi-mature trees and buildings earmarked for removal cannot altogether be excluded and in the absence of mitigation and therefore direct impacts on bats cannot be ruled out.

Linear features within the proposed development site boundary, including treelines and hedgerow have moderate local value as bat foraging/commuting areas, linking roost sites outside the site to foraging areas and facilitating the dispersal of bats into the wider landscape. Treelines in particular are an important linear landscape features for commuting bats, as bats prefer to travel in the shelter of such features to reduce predation. Loss of such habitats affects the ability of bats to travel safely from roosting sites to foraging areas.

During construction, some areas of internal treeline will be removed (T1 and part of T4). All other treelines and hedgerows will be retained. The results of the bat survey indicate that low to moderate numbers of bats forage along T4. In the absence of mitigation, the construction phase of the proposed development will result in the long-term loss of moderate value bat foraging and commuting habitat. Habitat fragmentation due to the loss of the foraging and commuting habitat has the potential to impact local bat populations. However, as higher value habitat within the site will largely be retained, only slight impacts are predicted to occur.

Construction works will be largely carried out during daylight hours and therefore no significant disturbance impacts from lighting during construction works have been identified. During the winter months, where lighting may be required during daytime hours, bats will be in hibernation and no impact is predicted to occur.

Overall, the loss of a small area of foraging/commuting habitat for bats will reduce the foraging/commuting habitats available for bats. The impact on foraging bats will be negative, slight and medium to long term at a local geographic level.

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8.4.2.6 Amphibians and reptiles

The drainage ditch onsite lacks open areas of water where amphibians could breed and/or forage. There is no wetland habitat within the proposed development site which could provide habitat for Common frogs or other amphibians.

There is no suitable habitat for reptiles onsite

No impact on amphibians and reptiles have been identified.

8.4.2.7 Birds

Breeding birds

The most significant impacts on breeding birds will be the potential for direct impacts during the construction phase through habitat loss, fragmentation and modification. As noted above, mature treelines and hedgerows onsite, which provide the most valuable habitat onsite for breeding birds, will be largely retained. No ground nesting birds were recorded within the proposed development site and the grassland onsite is largely unsuitable for ground nesting species. However, buildings which currently hold a number of breeding birds (including the amber list BOCCI species Swallow, Robin and Starling) will be removed. A number of trees and understorey vegetation will be removed. In the absence of mitigation, potential impacts include disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites habitat.

During the construction phase increased noise and disturbance is likely to disturb and/or displace some breeding birds from the site. The duration of works (on a phased basis over c.8 years) means that works will overlap with several breeding bird seasons. During construction works, noise levels will fall off quickly outside the site boundary. The majority of species recorded within the site are woodland edge species which are typically recorded on this urban fringe habitat. These species are likely to continue to breed and/or forage within the retained treeline/hedgerow habitats. Many of these species may be habituated to human activity and disturbance. Given the mobile nature of birds, the common nature of habitats within the site and the availability of alternative foraging habitat in the immediate vicinity, the impact from disturbance will be slight during the construction phase at a local level.

In the absence of mitigation, potential impacts on breeding birds include medium-term disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites and foraging habitat. The impact on breeding birds will be negative, slight and medium-term at a local level.

Wintering birds

Based on surveys conducted during 2024 and 2025, the proposed development site does not provide significant habitat for wintering wading birds or waterbirds.

Common resident birds, such as Blackbird, Robin and Wren, which use habitats within the proposed development site during the winter months are already subject to disturbance from urban development in the vicinity and are likely to be habituated to low levels of human disturbance. During the construction stage, there may be short-medium term increases in disturbance, but these will be confined to the proposed development site and will not cause significant disturbance in the surrounding area. However, there will be a short-medium term disturbance of wintering habitat for these common bird species during construction works.

Impacts on wintering birds (resident birds) during construction will be negative, slight and medium-term at a local level.

8.4.2.8 Other species

During construction, there is potential for siltation and pollution of the onsite drainage ditch, from runoff during construction works in the absence of mitigation. This could result in impacts on water quality and aquatic ecology downstream of the proposed development site. However, the drainage ditch onsite has no negligible potential to support fish and no direct impacts on fish is predicted to occur.

Given the types of habitats earmarked for removal, i.e., improved agricultural grassland, buildings, artificial surfaces, no significant impact on terrestrial invertebrates is predicted to occur from habitat removal during construction works. The native and non-native treelines and hedgerows at the site will be largely retained during construction works and the impacts on terrestrial invertebrates will be neutral, imperceptible and medium-term at a local level.

8.4.3 Operational Phase

8.4.3.1 Designated sites

DixonBrosnan prepared a screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) report (which accompanies this planning application). This report investigated the potential for the proposed development to have significant effects on Natura 2000 sites (SAC/cSAC/SPA) either alone or in combination with other plans or projects. The screening report identified the potential for significant effects on Cork Harbour SPA arising from the proposed development in the absence of mitigation via impacts on water quality during operation.

No significant effects from wastewater discharges have been identified (See AA/NIS) and therefore, there is no potential for adverse effects on the Lee Valley pNHA.

8.4.3.2 Habitats/Flora

A landscape masterplan has been prepared regarding the proposed development and is included as Appendix 2-6 of this EIAR, which includes details on native planting alongside retained mature habitats onsite to enhance biodiversity in the medium to long term. Biodiversity net gain occurs where a development leaves biodiversity in a better state than before. The principles for biodiversity net gain as outlined in CIEEM (2016) and CIEEM (2019) have been followed throughout the ecology surveys, project design and mitigation measures to ensure that the best outcomes for biodiversity are achieved. The proposed development has been designed to avoid removing higher value habitats.

Where higher value habitats cannot be avoided the impact on these habitats has been minimised and the loss of these habitats has been compensated for through focused landscape design. While 100m of linear native hedgerow will be removed, 1,213m will be retained and 435m of native hedgerow will be planted. The majority of mature/semi-mature trees at the site will be retained i.e. 40, with 14 trees earmarked for removal. Tree removal is largely non-native species such as Sitka spruce, Monterey cypress and Eucalyptus, with a small number of Ash. Native planting will include 778 trees at the site and the landscape scheme has been designed to enhance connectivity with the existing linear features onsite as well as the wider landscape in the long-term.

Areas of new and replacement habitat has been created, considering the local flora and fauna, to provide biodiversity gain that is valuable locally as well as making important contributions towards regional and national priorities for nature conservation. Overall, the project will enhance ecological connectivity within and outside the proposed development site boundary.

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8.4.3.3 Invasive species

No operational impacts identified.

8.4.3.4 Non-volant mammals

Increased activity and human presence and additional lighting has the potential to disturb or displace other mammal species such as Hedgehog, Pygmy Shrew and Irish Stoat from favoured foraging habitats during the operational phases. However, given the retention of more valuable habitats i.e. treelines, hedgerows and understorey vegetation cover at the site, mammal species are likely to continue to use this area during operation of the proposed development. The landscape scheme, including extensive tree planting, meadows and pollinator friendly plants, which will create additional areas of cover for small mammal species. Impacts on other mammals during operation are predicted to be negative, slight and long-term at a local level.

8.4.3.5 Volant mammals

Habitat fragmentation due to the loss of the foraging and commuting habitat has the potential to impact local bat populations during the operational phase of the proposed development. The landscape plan is an integral part of the project design and has followed ecological best practice to prevent habitat fragmentation and create connectivity with the wider landscape. This has focused on maintaining and enhancing locally valuable bat foraging/commuting habitat identified within the proposed development site, including internal treelines and boundary hedgerows/treelines. The tree planting strategy, which includes , 747 trees (including Quercus robur, Pinus sylvestris, Tilia Cordata, Sorbus aucuparia and Betula pendula) will enhance retained habitats, create additional linear foraging habitats within the site and enhance connectivity with the wider landscape.

Lighting deters some bat species in particular Myotis species such as Daubenton's Bat, from foraging (Azam et al. 2018). Studies have shown that illumination levels as low as 0.06 lux can influence the behaviour of bats. Even a full moon night (0.02 lux) can reduce bat activity within more sheltered, darker wildlife corridors and foraging areas (e.g., woodlands). It is noted that Pipistrelle species appear to be more tolerant of light and disturbance (Speakman 1991; Stones et al. 2009; Haffner 1986). Leisler's Bats will also opportunistically feed on such insect gatherings in lit areas (Bat Conservation Ireland 2010). However, it is noted that more recently research suggests that even in light opportunistic foraging species, foraging activity may be impacted by increased lighting (Hooker et al. 2022).

The lighting scheme for the proposed development (Appendix 5-3 of this EIAR), has considered best practice, as published by the UK Bat Conservation Trust (2018) to minimise the impact of outdoor lighting upon bat populations. However, lighting requirements for this development will mean that light spillage along internal habitats in particular, will reduce their habitat value for foraging and roosting bats. The lighting scheme has been designed to retain dark areas around the external boundaries.

Overall, the loss of a small area of internal habitats within the site will not have a significant impact on local bat populations. However, increases in lighting may affect the rates of bat foraging at the site. The impact on bats during the operational phase is predicted to be negative, slight and long-term at a local level.

8.4.3.6 Amphibians and Reptiles

No operational impacts on amphibian or reptiles have been identified.

8.4.3.7 Birds

The landscape plan is an integral part of the project design and has followed ecological best practice to prevent habitat fragmentation, create connectivity with the wider landscape and retain breeding and foraging habitat for a range of bird species. The tree planting strategy, which includes Oak, Scots pine, Birch, Hawthorn, Blackthorn, Holly, will enhance and create nesting and foraging areas for breeding birds. New habitats within the proposed development site are likely to increase breeding bird diversity at the site in the medium to long term. However, in the short term, there will be a slight loss of habitat with the removal of some trees and understory vegetation.

Increased activity and human presence and additional lighting has the potential to disturb or displace other birds from retained habitats during the operational phases, in particular BOCCI species such as Meadow pipit, Skylark and Linnet which are less likely to be found within urban areas. However, the majority of species recorded during the site surveys are typical of the urban landscape e.g. Robin, Blackbird, Chaffinch, House sparrow etc. These species are likely to habituate to the residential setting and continue to use habitats within the proposed development site.

Based on winter surveys the proposed development site does not provide significant habitat for wintering wading birds and waterbirds. No SCI birds were recorded during the site surveys.

Operational impacts on birds are predicted to be a negative, slight and long-term at a local level.

8.4.3.8 Other Species

SuDS measures as outlined in Chapter 7 Water have been designed to ensure that there will be no change in runoff rates to the local watercourses. During operation, any hydrocarbons released from site will pass through a hydrocarbon interceptor before being discharged to the Lisheens Stream. Silt control measures will also be implemented during operation. The surface-water drainage network will include the installation of dedicated attenuation facilities upstream of the proposed outfall to the Lisheens Stream, to attenuate discharges to the undeveloped Greenfield run-off rates with the operation of proprietary hydro-brake flow-control devices. The attenuation facility is sized on the basis of a design storm with a 100-year return period and an additional 20% allowance for the effect of climate change.

The drainage ditch and Lisheens Stream are of negligible value for fish species. However the operational design measures, will ensure the impacts on fish and aquatic invertebrate species downstream are neutral, imperceptible and long-term at a local level.

No significant impact on terrestrial invertebrates has been identified during operation. However, new habitats created in the landscape design will have a positive, slight and long-term impact at a local level.

8.4.4 Mitigation

8.4.4.1 Construction Phase

The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts. The following mitigation measures will be implemented.

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Water protection

Water protection measures are included in Chapter 6 Lands, Soils and Geology and in Chapter 7 Water (Hydrology and Hydrogeology).

Lighting

Lighting associated with the site works could cause disturbance/displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success.

Lighting mitigation measures will follow Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting:

Lighting will be provided with the minimum luminosity necessary for safety and security purposes. Where possible, lighting will be restricted to the working area and using the cowl and angling noted above, will minimise overspill and shadows on sensitive habitats outside the construction area

During construction, lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on the retained treelines and hedgerows

Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Where possible, construction lights will be switched off when not in use; and
- Lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on the retained treelines and hedgerows. There will be no directional lighting focused towards these sensitive habitats and cowling and focusing lights downwards will minimise light spillage.

Works will primarily take place during hours of daylight to minimise disturbance to any nocturnal mammal species.

Protection of habitats

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 1st March to the 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided.

The Lisheens Stream is located at the southeast corner of the proposed development site and it is important that construction activities do not result in pollution of this watercourse, either through siltation, which interferes with water flow, vegetation growth and aquatic fauna, or pollution (e.g. chemical). Refer to Chapter 7 Water for further details on mitigation measures for water.

To prevent incidental damage by machinery or by the deposition of spoil during site works, treelines and hedgerows which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. Detailed tree protection measures are included in Tree Survey (County Tree Care Ltd) which accompanies this application. All tree protection measures will be installed prior to the commencement of any construction works.

Bats

During the site works, general mitigation measures for bats will follow Marnell et al. (2022), Kelleher and Marnell (2006) and NRA (2005c). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats or prevent avoidable effects resulting from significant alterations to the immediate landscape. All mitigation measures including detailed method statements will be agreed with the NPWS prior to commencement of works, which could affect any bat populations on site.

All buildings onsite will require demolition to facilitate the development. No signs of bats were recorded within these buildings. However, as a precautionary measure, the following measures will be implemented prior to and/or during demolition. Mitigation measures will be agreed with the NPWS prior to any demolition works and will include the following:

- In all cases immediately in advance of demolition a bat specialist will undertake an examination of the building. If bats are present at the time of examination it is essential to determine the nature of the roost (i.e., number, species, whether it is a breeding population) as well as its exact location.
- If bats are recorded in buildings earmarked for demolition, special mitigation measures to protect bats will be put in place and a license to derogate from the conservation legislation will be sought from the NPWS.
- The contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary.
- If roosting habitat for bats is removed, replacement habitat will be provided.

A number of trees will be removed prior to construction. While it is noted that mature/semi-mature trees with the potential to be of significant value as bat roosts are absent from the site, it is noted that small roosts within mature trees with dense ivy can be difficult to detect and may be used sporadically. Bats can use trees as temporary roosts and therefore the presence of occasional bats cannot be altogether excluded. Therefore, the following measures will be implemented during the removal of semi-mature and mature trees.

- The project ecologist will work with the contractor to ensure that trees earmarked for retention are adequately protected.
- Tree-felling will ideally be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.
- Tree will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety.
- Treelines outside the proposed development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage.

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- During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused towards watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage.
- If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS.

As noted in Section 8.4.3.5, lighting mitigation measures will follow recommendations outlined in Bat Conservation Ireland (2010) and Bat Conservation Trust (2018).

Birds

As noted previously, where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the proposed development site boundary. If works are carried out during the breeding season, a pre-construction survey will be carried out by the project ecologist and if birds are detected appropriate mitigation measures will be implemented. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the proposed development site boundary.

8.4.4.2 Biodiversity Enhancement Measures

Bats

Although there are mature trees within the proposed development site, generally they lack the structural elements that would make them suitable for roosting bats. Therefore, the provision of bat boxes suitable for the species recorded within the site are recommended. Examples of same are listed below. The boxes have been selected to provide a range of roosting opportunities for different species and colony sizes. They can be sited on existing trees, however the pole mounted bat boxes will be used where necessary. The boxes will be installed by the project ecologist considering relevant factors including foraging resources, commuting routes, future landscape development, and lighting and will be regularly checked for usage as part of an ongoing ecological monitoring programme.

Vincent Pro Bat Box

Two Vincent Pro bat boxes will be provided. This box features three vertical chambers of different sizes, providing ideal roosting space for a variety of species. Beneath the crevice entrances is a ladder which provides a rough surface for bats to land. Limited cleaning is required for these boxes as the droppings will fall out of the bottom of the chambers. The front and top of the box are black which helps the box to absorb heat. This bat box can be used by Leisler's, Common Pipistrelle, Soprano Pipistrelle, Brown long-eared, Natterer's and Whiskered Bat.

Vincent pro bat box

Improved Roost-Maternity Bat Box

Bat Box 1FD

Bat Colony Box 1FS universal

Hedgehog dome

Example of installed Swift bricks in use.

Hedgehog highway example

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Improved Roost-Maternity Bat Box

Two improved Roost-Maternity Bat Box will be provided. This box is suitable for larger roosts or maternity groups of the small crevice-dwelling bats such as pipistrelles. This has three separate crevices, each with different temperature characteristics and a wide entrance with accurately sized opening. Ideal for Pipistrelles and deters unwelcome birds etc. Internal ceramic heat sinks ensure improved temperature stability in crevices.

Bat Box 1FD

Two Bat Box 1FD will be provided. Suitable for Pipistrelle and Nathusius' Pipistrelle Bats as well as Daubenton's Bats and Long-Eared Bats. This is especially in mixed bat zones and for initial settlement attempts. The front panel can be removed for inspection and cleaning.

Bat Colony Box 1FS universal

Two Bat Colony Boxes (1FS Universal) will be provided. This type of box is readily used for forming large colonies, by Daubenton's Bats and Brown Long-Eared Bats. Nursery roosts with between 70 and 100 animals are common. Thanks to the large interior and the integrated clinging options, for large numbers of individuals, this type of box is very attractive for forming nursery roosts and for rearing young. The box is suitable as a summer and temporary roost.

Other Mammals

Hedgehog boxes/highways.

Hedgehog highways will be provided between the properties to allow free movement of small mammals through the gardens/ development. This requires a small hole (c. 13cm by 13cm square) to be included at the base of garden fencing to provide passage for Hedgehogs along the boundary of development site.

Four SCHWEGLER Hedgehog Dome (or similar) will be provided. These will be located under the retained hedgerow habitat the east of the site and the retained treeline at the west. This dome encourages Hedgehogs to settle in a particular area and provides year-round shelter, including during the winter months. This will be located somewhere protected from wind and rain. Ideally this will be filled with hay (supplied with the dome) but alternatively use dry leaves and straw, as well as cut up newspaper and wood shavings.

These will be located adjacent or within suitable habitat but will not be situated near internal or external roads.

Birds

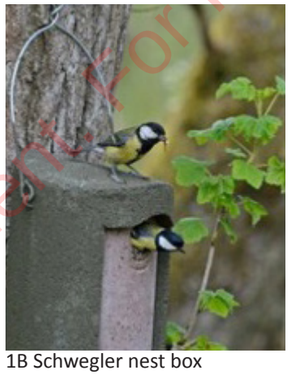
Swift

The swift is a Red List bird of conservation concern in Ireland because its population has declined by over 40% in the last 15 years. Conservation actions across the country are helping to recover populations. Swifts are faithful to their nest sites. Nest box projects, especially built-in nest boxes, can provide safe long-term homes for new breeding pairs of Swifts.

Commercial Swift nest bricks are made from hollow brick or concrete composite designed to allow access by Swifts and manufactured to modern building regulation standards. They can be integrated into the walls of buildings during the construction phase.

Twenty Swift bricks (Manthorpe Swift Brick or similar) will be installed on the apartment blocks at the southeast of the site under the guidance of the supervising ecologist. These will be installed following the Swift Conservation Ireland Guidelines (2019). These will be placed at least 5m above ground level with an open area of the building i.e., free of overhanging ledges, vegetation, and other obstacles. There will be no directional lighting in the vicinity of this area. Bricks will be positioned in rows to encourage colonial nesting. It is noted that Swift bricks will not overheat in the way that externally fitted boxes do and therefore they can be placed on any aspect of the building.

Swifts look for nest sites at locations with established colonies. Swifts are known to occur in the Ballincollig area (Source NBDC), although none were recorded during the site surveys. To increase the chances of attracting Swifts to a new nest location, a recording of a Swift call should be played. Swift calls can be broadcast from a small speaker placed as close as possible to the nest box or brick. New nest box sites where no lures are played are less likely to be successful in attracting nesting Swifts. This will be carried out under licence of the National Parks and Wildlife Service (NPWS).



1B Schwegler nest box

1ZA Schwegler wren roundhouses

Treecreeper FSC Nest Box

Log pile example

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Examples of insect hotels

Examples of insect hotels

Other breeding birds

In order to enhance the site for nesting birds eight nesting bird boxes (a range of bird box types) will be installed at the proposed development site. Three 1B Schwegler nest box will be installed high on retained trees. The 1B nest boxes will be installed at a height of 1.5 metres whilst the large bird nest boxes should be positioned at least 3m in height. Three 1ZA Schwegler wren roundhouses will be located in hedgerows, thickets and overgrown areas. The 1ZA will be hung in hedgerows along the northern and western boundaries.

Treecreepers like to nest in narrow gaps or clefts such as behind the bark in mature trees. Many woodlands and gardens do not possess suitable habitats such as these due to changes in woodland management, so the addition of a specialist nest box such as this Treecreeper FSC Nest Box provides an excellent alternative. Two Treecreeper FSC Nest Box will be provided. This box is manufactured from FSC certified wood and has a hinged lid for inspection or cleaning. The shape of the box is specially designed to be suitable for this particular bird, fitting snugly against a tree trunk with an entrance right next to the bark.

Four Swallow nest cups will be installed to provide alternative nest sites for swallows. These will be installed on the new site buildings under ecological supervision.

Log Piles/Loggeries

Building invertebrate habitats can provide shelter to many beneficial insects and offer a great foraging habitat for birds and other mammals.

Dead wood is one of the most valuable habitats for urban wildlife. The decline of the availability of deadwood is linked to the decline of many woodland birds due to the loss of foraging opportunities provided by this habitat.

Key points

- Install the logs vertically
- Site the loggery in a shaded part of a site
- Do not use concrete to bed the logs in. The beetles require the logs to be in contact with the soil
- Do not use well-rotted logs as they will have little wood left as food

Four log piles will be installed under retained hedgerow and treeline habitats. Log piles are suitable for invertebrates, small mammals and birds and can be easily installed in wooded areas of parks or open spaces. They are really just stacks of logs piled up and allowed to rot down. Left undisturbed they will support a good range of biodiversity.

Insect hotels

Three insect hotels will be installed on meadow grassland areas. Insect hotels are excellent for attracting a wide range of invertebrate species. Perforations allow for insect access and a chamber with bamboo below for solitary bees. This can be positioned anywhere in the site where pollination is to be encouraged. The nesting tubes are ideal for solitary bees to build their nests in, the vertical slots are designed to encourage butterflies, other refuge holes are perfect for ladybirds and lacewings and the pinecones offer an excellent habitat for a range of other species.

Invasive species

Cherry Laurel

There is no statutory obligation to remove Cherry Laurel. Cherry Laurel should be removed with great care given its location in proximity to tree earmarked for retention..

Treatment programmes can be divided into 3 main stages: initial removal, control of stems and roots, and follow up. The following treatment options have been widely tested and measured for effectiveness across Ireland. In almost all cases, failures can be accredited to poor application of a particular technique and/or logistical difficulties, rather than the control method itself. Care should be taken when embarking on a control programme and resources should be identified and allocated for repeated treatments.

Cut and remove stems by hand or chainsaw, cutting as close to the ground as possible to remove above ground growth. Chip or remove the cut material from the area to allow for effective follow-up work and prevent regrowth. Chipped material can provide good weed barrier around ornamental garden areas. Flailing has also been effectively used in Ireland to treat young or immature growth. Although not suitable on all sites and locations, especially steeply sloping or wet sites, it is very effective as it breaks up woody stems upon contact.

The removal of above ground growth will not prevent regrowth as Cherry Laurel will regrow from cut stems and stumps. There are four recommended methods to achieve successful management after the initial cut and removal:

1. Digging the stumps out. The effectiveness of this technique is increased by removing all viable roots. This can be done manually or with a tractor and plough. To avoid regrowth, stumps should be turned upside down and soil should be brushed off roots.

2. Direct stump treatment by painting or spot spraying freshly cut low stumps with a herbicide immediately after been cut. Glyphosate (20% solution), tryclopyr (8% solution) or ammonium sulphate (40% solution) are known to be effective during suitable weather conditions i.e. dry weather. The herbicide concentrations used and timings of applications vary according to which chemical is used. Use of a vegetable dye is recommended to mark treated stumps and all stumps should be targeted. A handheld applicator will help avoid spray drift onto surrounding non-target species. Always read the label and follow the manufacturers guidelines when using herbicides. Remember that using

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3. A variation on the stump treatment method is stem injection, using a 'drill and drop' methodology, whereby, if the main stem is cut and is large enough for a hole to be drilled into it, the hole can be used to facilitate the targeted application of glyphosate (25% solution).

4. Stump regrowth and seedlings can be effectively killed by spraying regrowth with a suitable herbicide, usually glyphosate. Best practice spraying protocols should be carefully followed. General broadcast spraying is not as effective as stump spot treatment and has the potential to impact on surrounding non-target species. Cherry Laurel leaves are thick and waxy. For herbicide treatment to be effective each individual leaf needs be thoroughly wetted with herbicide to kill the plant.

Winter Heliotrope

There is no statutory obligation to remove Winter Heliotrope. Winter heliotrope (Petasites fragrans), a member of the Asteraceae family, is a low-growing herbaceous plant originating in North Africa. It is established widely in Ireland being frequent along roadsides, hedgerows, woodland edges and waste ground. As apparently only the male plant that is present in Ireland, its spread is confined to vegetative means. Winter heliotrope should be removed with great care given its location within treeline, woodland and scrub habitats. Where it is concluded that Winter Heliotrope at the proposed development site should be removed, the following treatment methods are recommended.

- Physical Control

Due to the extensive rhizome network, physical removal of winter heliotrope is really only practical on a limited scale. Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from fragments of roots, it may be best to tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant. Other means of disposal include burial of material at a depth of at least 2m, incineration or disposal to licensed landfill. There is no evidence that the material would withstand composting though this approach would probably only be suitable for limited infestations.

- Chemical Control

An application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008), though the Royal Horticultural Society (2008) recommends spraying in mid- summer or later but before the foliage begins to die back.

Azolla sp.

This species was not recorded within the proposed development site boundary. However, this is present on the Lisheens Stream downstream of the proposed development site. Biosecurity protocols will be followed on any works to the adjoining drainage ditch to ensure this invasive species is not spread further outside the proposed development site.

8.4.4.3 Operational Mitigation

Lighting

The primary lighting mitigation which will be implemented for this project relates to bats, as these are considered the most sensitive species in relation to night-time lighting. It is noted however that the mitigation proposed will also lessen in the impact in relation other nocturnal species such as Badger and Otter. The lighting scheme has considered best practice, as published by the UK Bat Conservation Trust (2018), in respect of mitigation strategies, to minimise the impact of outdoor lighting upon bat populations. The external lighting design concept is to illuminate lighting levels outlined within BS EN 17037:2018 external lighting. The following mitigation measures have been incorporated into the site lighting plan as specified in DOSA lighting plan.

- The location of lighting within the greenfield area has been confined to internal roads and footpaths
- Warm White type, have been specified, with a Colour Temperature of 2,700 kelvin, as is considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations.;
- LED luminaires have been specified due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights have been carefully considered to minimise light spill. Specialist bollard and ground recessed lighting have been included where possible;
- Lanterns are of the fully cut off type with no light output above the horizontal plane;
- Screening by existing trees and newly planted trees will prevent light spillage onto boundary habitats; and
- Exterior lighting will be controlled from a timeclock, daylight sensor and manual switching that will be located within the external mini pillars.

8.4.5 Cumulative impacts

A search of the Cork County Council and An Bord Pleanála planning databases was carried out to identify any potential cumulative effects on biodiversity. The proposed development site is located on the edge of Ballincollig town. Outside the site, lands are dominated by improved agricultural grasslands with a largely rural landscape.

The cumulative impacts of the planned, proposed development and nearby consented projects are discussed in Table 8.11. Based on this, no significant cumulative impacts with the proposed development have been identified.

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Table 8.11 Cumulative Projects

Project title	Project details	Potentail cumulative effects
Cork Luas	Emerging preferred routes	In the event that the construction phase of the proposed development was to overlap with these schemes, potential cumulative impacts could arise. Cumulative noise/ visual disturbance impacts to local fauna. Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in this EIAR chapter and the CEMP which accompanies this application. These measures will ensure that no significant cumulative noise/ disturbance effects will occur during construction works. No significant adverse impacts from changes in water or air quality were identified during the operational phase of the proposed development. Therefore, no cumulative impacts for water or air have been identified. Following the implementation of mitigation measures, no significant cumulative effects have been identified.
Bus Connects Project	Public Consultation.	
Coleman Homes 24/43308	Creche permitted 07/10/2024	
Coleman Homes 23/42446	Large scale residential development (LRD) of 162 units, landscaping and all ancillary site works. Maglin Road, Ballincollig Development permitted and under construction	
MOS Homes Limited 22/41611	Construction of 98 dwellings at Heathfield, Ballincollig Development permitted and under construction	
Stonecrest Construction Limited ABP-308111-20	Strategic Housing Development Application for the construction of 113 no. residential units (59 no. houses, 54 no. apartments), childcare facility and associated site works at Maglin Road, Ballincollig, Cork. Development largely constructed. Apartment building with 54 no. units and creche to be completed.	

The potential cumulative impacts of the relevant plan for the area was assessed, which is considered to be the Cork City Development Plan 2022. The assessment of the potential impacts on the environment of the Cork City Development Plan 2022 was undertaken utilising the Strategic Environmental Objectives (SEOs) which are detailed in Table 5.1 of the CDP's Strategic Environmental Assessment. The potential cumulative impacts of the Plan were assessed having regard to these SEO's. Table 5.1 of the SEA identifies the SEO's for 'Biodiversity, Flora and Fauna' as being to.

- To preserve, protect, maintain and, where appropriate, enhance the terrestrial, aquatic and soil biodiversity, particularly EU designated sites and protected species.
- Ensure no adverse effects on the integrity of any European site, with regard to its qualifying interests, associated conservation status, structure and function.
- Safeguard national, regional and local designated sites and supporting features which function as stepping stones for migration, dispersal and genetic exchange of wild species
- Enhance biodiversity in line with the National Biodiversity Action Plan and its targets.
- To protect, maintain and conserve the City's natural capital.

Table 7.5 of the CDP's Strategic Environmental Assessment, 'Comparative Assessment of each of the Alternatives against Strategic Environmental Objectives' indicates that Alternative/Scenario 3 'Compact Liveable Growth', the 'Selected Scenario' has positive interactions with the status of the SEO's for 'Biodiversity, Flora and Fauna'.

8.4.6 Residual Effects

8.4.6.1 Designated sites

Potential impacts on designated Natura 2000 sites (SAC/cSAC/SPA) are specifically addressed in a Report for Screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) which has been submitted as part of this application. This report concluded the following:

It has been objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the proposed development and with the implementation of the mitigation measures proposed, that the construction, operation and decommissioning of the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects. There is no reasonable scientific doubt in relation to this conclusion. The competent authority will make the final determination in this regard.

Similarly, following the implementation of mitigation measures, no adverse effects on NHAs/pNHAs will occur.

8.4.6.2 Habitats/Flora

Biodiversity net gain occurs where a development leaves biodiversity in a better state than before. The principles for biodiversity net gain as outlined in CIEEM (2016) and CIEEM (2019) have been followed throughout the ecology surveys, project design and mitigation measures to ensure that the best outcomes for biodiversity are achieved. The proposed development has avoided removing higher value habitats. Where higher value habitats cannot be avoided the impact on these habitats has been minimised and the loss of these habitats has been compensated for through focused landscape design and mitigation measures.

Where higher value habitats cannot be avoided the impact on these habitats has been minimised and the loss of these habitats has been compensated for through focused landscape design. While 100m of linear native hedgerow will be removed, 1,213m will be retained and 435m of native hedgerow will be planted. The majority of mature/semi-mature trees at the site will be retained i.e. 40, with 14 trees earmarked for removal. Tree removal is largely non-native species such as Sitka spruce, Monterey cypress and Eucalyptus, with a small number of Ash. Native planting will include 778 trees at the site (Quercus robur, Pinus sylvestris, Tilia Cordata, Sorbus aucuparia and Betula pendula) and the landscape scheme has been designed to enhance connectivity with the existing linear features onsite as well as the wider landscape in the long-term.

A range of biodiversity enhancements have been specified to provide replacement habitat for existing species e.g. Hedgehog, Robin, Swallow etc and new habitats for other species e.g. Swift, bats etc.

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Areas of new and replacement habitat has been created, considering the local flora and fauna, to provide biodiversity gain that is valuable locally as well as making important contributions towards regional and national priorities for nature conservation. Overall, the project will enhance ecological connectivity within and outside the proposed development site boundary.

Mitigation measures, outlined in Section 8.4.4 will be implemented and inspected by a suitably qualified and experienced project ecologist to ensure that no adverse impacts on aquatic habitats during construction works.

8.4.6.3 Invasive species

No residual impacts have been identified.

8.4.6.4 Non-volant mammals

Small areas of locally valuable habitat will be removed. While there is no evidence to indicate that the proposed development is of particular value for mammal species in the context of the surrounding countryside, the loss of habitat combined with increased operational disturbance from occupied dwellings is likely to reduce the value of the site for mammal. During the construction phase, disturbance and site clearance works are predicted to have a negative, slight and medium to long-term impact on other mammal species.

Mammals are generally nocturnal in habit and in many circumstances can tolerate high levels of human presence and disturbance.

The retention and enhancement of significant areas of valuable habitats such as treelines and hedgerows will mean that small mammal species such as Hedgehog and Pygmy Shrew are likely to quickly recolonise the area following construction works. The creation of new semi-natural habitats, including retention of understorey habitats alongside additional planting will continue to provide areas of cover for small mammals.

Overall, the residual impact on other mammals is predicted to be negative, not significant and long-term at a local level.

8.4.6.5 Volant Mammals

In the short to medium term there will be a slight impact on bat foraging and commuting habitat at the proposed development site with the removal of small areas of internal treeline. However, tree protection measures, alongside the landscape plan, will ensure that the majority of treelines and hedgerow habitat at the site is retained.

The landscape plan provides considerable areas of enhanced and new linear foraging habitat (747 new planted trees) on internal and external boundary habitats. As these habitats mature, there are likely to provide high value foraging and commuting habitats for local bat populations and provide connectivity to the wider landscape. Biodiversity enhancements, including a range of bat boxes, will create roosting opportunities for bats within the proposed development site, where roosting habitat is currently largely absent.

Lighting plans for the site have been designed in line with Bat Conservation Guidelines. However, light levels will increase at the site during operation. It is noted that the bat species which currently use the site are more common and/or light tolerant species which are likely to continue to forage along retained habitats.

Overall, the residual impact of the proposed development will be negative, slight and long-term at a local level.

8.4.6.6 Amphibians and reptiles

No residual effects.

8.4.6.7 Birds

Winter birds

The grassland area of the proposed development site is of low value for wintering wading birds and waterbirds. Residual impacts on SCI birds will be imperceptible.

In the short to medium term, the loss of common habitats associated with site clearance works and disturbance will have a slight, negative impact on wintering passerines which use the proposed development site. However, as newly planted and enhanced habitats within the proposed development site mature, this impact will be reduced.

The landscape plan includes newly planted hedgerows and treelines and native meadow. Native berry producing plants, such as Holly have been included in the planting scheme to ensure that foraging opportunities for birds continue throughout the winter period. Residual impacts on resident winter birds will be positive, slight and long-term at a local level.

Breeding birds

In the short to medium term, the loss of common habitats associated with site clearance works and disturbance will have a slight, negative impact on breeding birds. However, as newly planted and enhanced habitats within the proposed development site mature, this impact will be reduced.

The landscape plan will provide additional breeding and foraging habitat for red list, amber list species and other common bird species. New habitats within the proposed development site are likely to increase breeding bird diversity at the site. Biodiversity enhancements have been designed to attract new species to the site, such as Swift as well as providing nesting opportunities for existing species such as Treecreeper and Swallow. Native berry producing plants, such as Blackthorn and Hawthorn, have been included in the planting scheme to provide additional foraging habitat for breeding birds.

Residual impacts on breeding birds will be positive, slight and long-term at a local level.

8.4.6.8 Other species

Following construction mitigation and operational design measures, residual impacts on fish and aquatic invertebrates will be neutral, imperceptible and long-term at a local level.

Additional habitats, both natural and artificial, will be created for terrestrial invertebrates. Native wildflower meadow and native tree planting will provide considerable areas of new habitat for terrestrial invertebrates. SuDS areas will also provide new habits for a range of terrestrial invertebrates. Biodiversity enhancements including insect hotels and loggeries will create breeding sites for a range of terrestrial invertebrates.

Residual impacts will be positive, slight and long-term at a local level.

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8.4.8 Chapter Appendices

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CHAPTER NINE

CULTURAL HERITAGE

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CHAPTER NINE

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CHAPTER 9 | Cultural Heritage

9.1 Introduction

This chapter comprises an assessment of the likely effects the proposed development, as detailed in Chapter 2 Description of the Proposed Development, will have on the archaeological, architectural and cultural heritage environment.

9.1.1 Author Competency and Information

Musetta O'Leary has over 20 years of experience in all aspects of archaeological consultancy. She specialises in managing the archaeological and cultural heritage components of developments at the pre-planning stage. Musetta has coordinated and authored the Cultural Heritage sections of Environmental Impact Assessment Reports (EIARs) for a wide range of development types, including residential, infrastructure (roads and utilities), industrial, energy, and extractive industries. She has presented expert witness evidence at numerous oral hearings.

Avril Purcell is the director of Lane Purcell Archaeology (LPA) and is a licensed archaeologist with 30 years of experience in research, consultancy, surveying and excavation. She has contributed to a wide range of EIAR projects across the country, often from the initial constraint study stage through pre-development investigations, resolution and construction-phase monitoring. Avril has presented expert witness evidence at An Bord Pleanála oral hearings.

9.1.2 Some terms used in this chapter are explained hereunder:

Archaeological Heritage

Archaeological heritage can be described as the study of past human societies through their material remains and artefactual assemblages. The Valetta Treaty (or the European Convention on the Protection of the Archaeological Heritage, 1992) defines archaeological heritage as "all remains and objects and any other traces of humankind from past times". This includes "structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water".

Cultural heritage

Cultural heritage is understood as the inherited expressions of community life passed down through generations. It includes customs, traditions, places, objects, artistic practices, and values. The Environmental Protection Agency (EPA) Guidelines (2003) define cultural heritage as encompassing archaeological heritage, architecture, history, landscape and garden design, folklore and tradition, geological features, language and dialect, religion, settlements, inland waterways (e.g., rivers), and place names. The more recent EPA Guidelines (2022) consolidate these into three main categories: archaeology, architectural heritage, and folklore and history.

In this assessment cultural heritage encompasses the following; the history of the site, part of which was once occupied by Greenfield House and gardens (as evident on the OS 6-inch map of 1841); the history of Ballincollig, the closest settlement. It also encompasses the placenames and history of the proposed development site and study area.

Architectural Heritage

Architectural heritage is defined in the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 as structures and buildings together with their settings and attendant grounds, fixtures and fittings, groups of such structures and buildings, and sites, which are of architectural, historic, archaeological, artistic, cultural, scientific, social or technical interest.

The assessment includes an appraisal of all buildings of architectural, historical and social interest within or adjacent to the proposed development site.

Study Area

To obtain a comprehensive assessment of the Archaeological, Architectural and Cultural Heritage Environment, a study area within a 1.5km offset of the proposed development site boundary was chosen. The study area includes the following townlands: Greenfield, Ballincollig, Maglin, Kilnaglory, Lisheens, Classes and Coolroe.

9.2 Methodology

The methodology used to compile the archaeological, architectural, and cultural heritage section of the EIAR includes the following components:

- A review of the relevant legislation and guidelines;
- A desktop study of the proposed development site and Study Area;
- A review of two Geophysical Surveys of the proposed development site. carried out in 2021 (Leigh, 2021) and in 2024 (Leigh, 2024) (Fig. 9.2b; see Section 9.3.5). A summary of the results of both surveys is provided in Section 9.3.6, while the full reports are included in Appendix 9.1, Volume 3;
- Archaeological Testing: Following the results of the geophysical surveys and in consultation with the City Archaeologist, targeted archaeological testing was undertaken in April 2025 (Purcell, 2025). A summary of the testing results is provided in Section 9.3.7, with the full report included in Appendix 9.2, Volume 3;
- A walkover inspection of the proposed development site in November 2021 and April 2025. The results of these are given in Section 9.3.8. Photographs of the walkover survey are provided in Appendix 9.3; Volume 3;
- An evaluation of the likely impacts of the proposed development on the archaeological, architectural and cultural heritage of the proposed development site. Impacts are assessed in accordance with Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022);
- Proposed mitigation measures to be undertaken to prevent or reduce any potential impacts on the archaeological, architectural and cultural heritage - Section 9.5, while Residual Impacts are provided in Section 9.6.
- References and Sources - Section 9.7.

9.2.1 Relevant Legislation and Guidelines

In Ireland, the principal legislative measures protecting cultural heritage assets are the National Monument (Amendments) Acts 1930 to 2014, the Heritage Act 1995, the relevant provisions of the National Cultural Institutions Act 1997, the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 and the Planning and Development Act 2000. Moreover, policies for both the archaeological and architectural heritage are relayed in a series of specific published guidelines.

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In Ireland, the primary means of protecting Cultural Heritage are the National Monument (Amendments) Acts 1930 to 2014, The Heritage Act 1995, the relevant provisions of the National Cultural Institutions Act 1997, The Architectural Heritage (National Inventory) and Historic Monument (Misc. Provisions) Act 1999 and the Local Government (Planning and Development) Act 2000. The government's policies for both the archaeological and architectural heritage are relayed in a series of specific published guidelines.

A new Heritage Bill, sponsored by the Minister for Housing, Local Government and Heritage was enacted by both Seanad Éireann and Dáil Éireann on October 13th, 2023. The Act encompasses laws and provisions aimed at preserving, protecting, and managing sites of historical, cultural, and archaeological significance. The Historical and Archaeological Heritage and Miscellaneous Provisions Act 2023 will replace the National Monuments Acts 1930 to 2014 and other related legislation with provision for the protection of heritage. It will introduce new measures to protect archaeological structures and sites including; the establishment of a single Register of Monuments, a statutory reporting scheme for newly discovered monuments and provisions to prevent the illicit import and possession of stolen cultural property. The Act is all encompassing covering licensing, a reporting system, and a single Register of Monuments and will strengthen the protection of archaeological and built heritage. In the meantime, the existing legislation will remain in place while the new act is implemented through a series of commencements over the coming years.

This chapter is prepared having regard to the following guidelines:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports, 2022 (Environmental Protection Agency);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, 2003 (Environmental Protection Agency);
- Framework & Principles for the Protection of the Archaeological Heritage, 1999 (Department of Arts, Heritage, Gaeltacht & the Islands).
- Policy & Guidelines on Archaeological Excavation, 1999 (Department of Arts, Heritage, Gaeltacht & the Islands).
- Architectural Heritage Protection, Guidelines for Planning Authorities, 2004 (Department of the Environment, Heritage, and Local Government).

The proposed development is located within the administrative boundary of Cork City Council and is subject to the archaeological heritage policies outlined in the Cork City Development Plan 2022–2028. The plan demonstrates a strong commitment to the protection, preservation, and appropriate management of both designated and undesignated archaeological resources, guided by 29 specific objectives. Key objectives relevant to this proposal include:

- Objective 8.1 - Strategic Archaeology Objective

To protect and preserve archaeological monuments as listed in the Sites and Monuments Record (SMR), Record of Monuments and Places (RMP) and the Wreck Inventory of Ireland Database (WIID). All sites can be accessed on the Historic Environment Viewer (www.archaeology.ie). The National Monuments Service will be informed of all development proposals which relate to Sites and Zones of Archaeological Interest. Cork City Council will have regard to the relevant national statutory policies and guidelines, including Frameworks and Principles for the Protection of the Archaeological Heritage and to best practice guidance documents published by the Heritage Council and the Institute of Archaeologists of Ireland.

- Objective 8.2 - Protection of the Archaeological Resource

Cork City Council will protect and enhance the archaeological value of the site (and their settings) listed in the RMP and the Historic Environment Viewer.

Cork City Council will ensure that development proposals will protect and preserve archaeological discovered since the publication of the RMP.

To ensure the preservation of archaeological remains in-situ, in accordance with national policy (and in the interest of sustainability), impacts on the buried archaeological environment should be avoided where possible.

- Objective 8.3 - The Value of Archaeological Knowledge

To require that all appropriate archaeological excavation should be undertaken to the highest possible standards and the information made publicly available. The acquisition and dissemination of knowledge is a core principle for the protection of the archaeological heritage of the city. Cork City Council will endeavour to ensure public dissemination through publications and public lectures.

- Objective 8.8 - Underwater Archaeology

Cork City Council requires that all development proposals which will impact on marine, riverine, lacustrine, intertidal/ sub-tidal environments, and areas of former reclaimed land, shall be subject to appropriate archaeological assessment.

- Objective 8.9 - Preservation of Archaeology within Open Space in Developments

In development proposals where archaeology is to be retained in-situ the archaeological remains will be protected, safeguarded and, where suitable, be interpreted in an accessible manner. Where the archaeology being preserved is located in open space, then this will be in addition to the overall open space provisions.

9.2.2 Desktop Study

The desktop study aims to provide a thorough understanding of the archaeological, architectural, and cultural heritage environment of the proposed development site and Study Area by utilising the following sources;

Record of Monuments and Places (RMP)

This record was established under Section 12 (1) of the National Monuments (Amendment) Act 1994. It lists all monuments and places believed to be of archaeological importance in the County. The numbering system consists of two parts: the first part is the county code (CO for Cork) followed by the Ordnance Survey map number (six inch to the mile scale); the second part is the number of a circle surrounding the site on the RMP map, e.g. (CO073-061) refers to circle 061 on OS sheet 073 for County Cork. The area within the circle is referred to as the Zone of Archaeological Potential (ZAP) or zone of notification for that site. Its diameter can vary depending on the size and shape of the site but it averages out at approximately 180m. The RMP for County Cork was published in 1998. All RMP sites within the Study Area are listed in Table 9.1 below.

Sites and Monuments Record (SMR) Database of the Archaeological Survey of Ireland (ASI)

The purpose of the ASI is to compile a base-line inventory of the known archaeological monuments in the State - the SMR. It contains details of all monuments and places or sites known to the ASI which pre-date AD 1700, and a selection of monuments which post-date 1700. The large record archive and databases resulting from the survey are continually updated. Archaeological sites which are added to the database are proposed to be included in the next published edition of the RMP and will then be afforded its protection. This database, complete with maps, is available for consultation via the National monuments Service (NMS) website. All SMR sites within the Study Area are listed in Table 9.1 below.

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Archaeological Inventory

The inventories for each county are follow-ons by the ASI, to the RMPs. They give a written description of each archaeological site in the county. The archaeological inventory for Mid Cork, Volume 3 (Power, Byrne, Egan, Lane & Sleeman, 1997) was published in 1994 and a follow up volume, Volume 5 (Ronan, Egan & Byrne, 2009), was published in 2009.

Consultations

During the compilation of the EIAR consultation was held with Ms. Ciara Brett, Cork City Archaeologist. Her recommendations are detailed and incorporated in the mitigation measures in Section 9.5 below.

Protection and Designation of Monuments

Information relating to the protection and designation of archaeological monuments was sourced from the National Monuments Service (NMS) website (www.archaeology.ie). These records were consulted to identify any Recorded Monuments (RMP sites) within the study area that have been afforded additional statutory protection. This includes:

- National Monuments in the ownership or guardianship of the state – None in the Study Area
- National Monuments in the ownership or guardianship of the local authority – None in the Study Area
- Monuments subject to Preservation Orders and Temporary Preservation Orders – None in the Study Area
- Monuments listed in the Register of Historic Monuments –None in the Study Area

Files of the National Museum of Ireland (NMI)

The topographical files of the NMI contain the reports, including correspondence, present location and occasionally illustrations, of archaeological material recovered throughout the country. No finds are recorded for the townlands within the study area up to and including 2025.

Database of Irish Excavation Reports (www.excavations.ie)

This website provides a database of summary accounts of archaeological excavations and investigations in Ireland undertaken between 1970 and 2025. The database was queried for any investigations undertaken in any of the townlands in the Study Area and are listed in Table 9.2 below.

National Inventory of Architectural Heritage (NIAH)

The NIAH was set up under the Convention for the Protection of the Architectural Heritage of Europe or the Granada Convention of 1985. It was established on a statutory basis under Section 2 of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from 1700 to the present day, in a systematic and consistent manner. It is divided into two parts; The Building Survey and Historic Garden Survey (www.buildingsofireland.ie). The main function of both is to identify and evaluate the State's architectural heritage in a uniform and consistent manner, so as to aid its protection and conservation. The NIAH carried out a survey of the buildings of County Cork between 2006 and 2011. Under Section 53 of the Planning and Development Act 2000, all structures considered of regional, national or international Importance within the survey are recommended for inclusion in the Record of Protected Structures (RPS) by the Minister for Arts Heritage and the Gaeltacht. If this is not adopted by the local authority, the reasons must be communicated to the Department. The Building and Historic Garden Survey for County Cork is available online. The NIAH for County Cork includes approximately 6,500 items of architectural importance in the County. All PS in the Study Area are listed in Table 9.3 below.

Aerial photographs

The Ordnance Survey of Ireland (OSI) and Google maps have posted several online aerial photographs dating from 1995 (OSI; 1995, 1996-2000, 2001-2005, 2006-2012, 2011-2013, 2013-2018 and 2024/25). These were examined to identify any previously unrecorded features of archaeological/cultural heritage significance that may only be visible from the air. No potential archaeological features were noted in the photographs.

LiDAR

LiDAR (Light Detection and Ranging) is a remote sensing survey method that uses laser pulses to generate high-resolution, three-dimensional models of the earth's surface and its topography. This technique is particularly useful in archaeology for revealing subtle earthworks and landscape features that may be obscured by vegetation or modern land use.

LiDAR data for the proposed development site was analysed to identify potential archaeological features. The resulting digital terrain models (DTMs) clearly reveal prominent structures with notable surface relief, including the existing modern house, associated outbuildings, and surrounding grounds. This area corresponds to the location of Greenfield House as depicted on the 1841 OS 6-inch map, although the structure is no longer present on the later 1902 edition. These features generate distinct topographic signatures — elevations and textures — that are readily discernible in the LiDAR-derived DTMs. More subtle or levelled archaeological features, however, (such as the fulacht fia (CO073-061), located approximately 135 m southeast of the proposed development site) do not produce discernible topographic signatures in the LiDAR data. These low-relief or partially subsurface features often fall below the detection threshold of LiDAR resolution or are indistinguishable from natural surface variation in the digital terrain model. As a result, while LiDAR offers valuable landscape-scale insight and is effective in identifying prominent features, it may not reliably detect smaller or more ephemeral archaeological remains. This limitation highlights the necessity of integrating LiDAR analysis with complementary methods, including geophysical survey and targeted archaeological excavation.

Cartographic Sources

OS 6-inch maps; the three editions of the 6-inch to one mile scale maps were consulted, the first edition published in 1841-1842, the second edition published in 1897-1904 and the third edition published in 1938 and the OS 25-inch to one mile scale map, from which the second edition 6-inch map was derived in 1902.

9.2.3 Geophysical Survey

A pre-planning geophysical survey, commissioned by Murnane & O'Shea Group, was undertaken by J.M. Leigh Surveys Ltd. in July 2021 under licence number 21R0175 (Leigh 2021). The survey was carried out across seven agricultural fields (Areas A to G) (Fig. 9.6a; see Section 9.3.6) of which the proposed development site forms the northern portion (Areas A, A1 and almost all of Areas D and E). The northwestern field was unavailable for survey. Various trends and anomalies were archaeologically interpreted as 'cautious' and 'tentative', due to the widespread presence of amorphous spreads of modern magnetic material across significant portions of all seven surveyed fields. In February 2024 a second geophysical survey was carried out by J.M. Leigh Surveys Ltd. to examine the northwestern field which had not been surveyed in 2021(Fig. 9.6b; see Section 9.3.6) (Leigh, 2024). This survey identified a trackway, considered to be likely of modern origin although with some potential archaeological interest. Additionally, numerous responses were interpreted as possible pit-type features were recorded, however, the presence of widespread modern ferrous interference rendered an archaeological origin uncertain. The full survey reports are included in Appendix 9.1.

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9.2.4 Archaeological Testing

Licenced archaeological testing was conducted on the proposed development site on the 1st and 3rd of April 2025, in dry and sunny weather conditions, under licence number 24E0390, and in consultation with the Cork City Archaeologist (Purcell, 2025). A total of twenty-eight test trenches were excavated across the site. Trenches 1–14 were located in the northwestern field surveyed in 2024 (Leigh, 2024), while Trenches 15–28 were excavated in Areas A, A1, C, D, and E, which had been surveyed in 2021 (Leigh, 2021).

Eight small, probable pit features were identified during testing, broadly corresponding with the isolated geophysical anomalies (including Anomaly 3 and Anomaly 8 from Leigh, 2024). A detailed discussion of the testing results is presented in Section 9.3.7, with the full testing report provided in Appendix 9.2; Volume 3.

11.2.4 Walkover Site Inspection

The primary purpose of the walkover survey was to assess the physical environment of the proposed development site and to identify any potential archaeological features, Areas of Archaeological Potential (AAP), or other elements of cultural heritage interest. The survey included an assessment of current land use, local topography, and environmental conditions to develop a comprehensive understanding of the site's character.

Walkover inspections were carried out in November 2021 and April 2025, both under dry and bright weather conditions. For consistency, the field numbers initially assigned during the geophysical surveys (Leigh 2021 and 2024) were retained in the walkover assessment. The findings from the walkover survey are presented in Section 9.3.8, with accompanying photographic plates included in Appendix 9.3; Volume 3.

9.3 Existing Environment

9.3.1 Cultural Landscape Context

The pace of landscape change in Ireland accelerated significantly during the second half of the 20th century. As a result, many archaeological sites have been levelled or obscured by modern development activities, including agriculture, industry, and infrastructural works. Consequently, the present-day archaeological landscape does not fully reflect the long span of human occupation of this island, which extends back approximately ten thousand years.

While numerous archaeological sites survive as partially upstanding features — such as earthworks, enclosures, and stone monuments — many more remain only as subsurface traces, long forgotten and concealed from view. The physical evidence of past societies is frequently modified or overwritten by subsequent communities, each leaving its own imprint on the landscape. These buried features are often identified only through archaeological investigation in advance of development. Typically, they represent discrete locations where past human interaction with the landscape has survived in some form, now framed within a modern environmental context.

At a broader scale, historic patterns of land use and organisation remain visible across the landscape. These can be identified through analysis of cartographic sources (such as early OS maps), as well as through large-scale LiDAR and geophysical surveys and aerial photography. Considered together, these sources provide a composite, layered view of past landscapes preserved within the present one.

As population levels increased over time, the human impact on the landscape became more visible and lasting. In contrast, the small-scale, often mobile nature of early prehistoric communities left only faint and often imperceptible archaeological traces.

The proposed development site is located in a fertile lowland valley where the surrounding land remains predominantly in mainly arable agricultural use. Aerial photography from 1995 to the present (www.osi.ie) indicates that the site itself has primarily been under pasture, with some tillage activity evident at the northwestern end. The underlying limestone geology of the area has supported long-standing quarrying activity, traceable to at least the mid-19th century. Several small-scale quarries are depicted in the surrounding landscape on the OS 6-inch (1841) and 25-inch (1903) maps. Today, limestone extraction continues on an industrial scale at the Roadstone Quarry located approximately 1.7 km northwest of the proposed development site, in the townlands of Classis and Barnagore.

Limestone also supported lime production in the past, as evidenced by the presence of several limekilns in the region. A number of these are shown on the OS 25-inch map and one, recorded in the RMP (CO073-064), is located approximately 1.2km east of the proposed development site in Maglin.

The proposed development site itself lies in the townland of Greenfield, in the parish of Kilnaglory and the barony of East Muskerry, southeast of Ballincollig village.

9.3.2 Baseline Environment

There are no known registered archaeological sites on the proposed development site. The two closest recorded monuments are both fulachtaí fia, in the townland of Greenfield: one (CO073-087) is located approximately 110m to the southwest, and the other (CO073-061) approximately 150m to the southeast.

In total, thirty six registered archaeological sites are recorded within a 1.5km radius of the proposed development site (the Study Area) (see Table 9.1 and Fig. 9.1). These sites provide substantial evidence of human activity and settlement in the area from as early as the Late Neolithic/Beaker period (circa 2500 BC), highlighting the archaeological potential of the proposed development site.

A significant number of these sites were uncovered and excavated during the construction of the Ballincollig Bypass (N22) in the early 2000s, which runs along the southwestern boundary of the proposed development site (Hanley and Hurley, 2013). Additional archaeological discoveries have been made in more recent years, reflecting the ongoing urban development and expansion of Ballincollig town.

Distances to both registered and unregistered archaeological sites, as listed in Table 9.1, are approximate and have been measured from the nearest boundary point of the proposed residential development area.

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Table 9.1 RMP/SMR within a 1.5km radius of the proposed development site

RMP/SMR	SITE TYPE	TOWNLAND	DISTANCE
CO073-038	Inniscarra Bridge	Coolroe	1.4km to NW
CO073-043	Gunpowder Mills	Great Island, Ballincollig	1.4km to the N and NE
CO073-057	Souterrain	Lisheens	1.4km to SW
CO073-059	Quarry	Kilnaglory	800m to SW
CO073-060001	Graveyard	Kilnaglory	550m to SW
CO073-060002	Church	Kilnaglory	550m to SW
CO073-061	Fulacht fia	Greenfield	150m to SE
CO073-062	Castle	Ballincollig	400m to NE
CO073-06201	Bawn	Ballincollig	400m to NE
CO073-06202	Cave	Ballincollig	400m to NE
CO073-063	Bridge	Ballynora/Maglin	1.4km to SE
CO073-064	Limekiln	Maglin	1.4km to E
CO073-074	Standing stone	Ballincollig	900m to NE
CO073-087	Fulacht fia	Greenfield	110m to SW
CO073-088	Fulacht fia	Kilnaglory	1km to SW
CO073-089	Fulacht fia	Coolroe	1.4km to NW
CO073-097	Country house	Maglin	1.5km to E
CO073-100	Fulacht fia	Maglin	1.4kn to NE
CO073-101	Fulacht fia	Maglin	1.3km to NE
CO073-103	Standing stone	Carrigrohane	1.4km NE
CO073-126	Enclosure	Greenfield	550m to W
CO073-127	Hearth	Greenfield	550m to W
CO073-128	Hearth	Greenfield	550m to W
CO073-129	Hearth	Lisheens	1.4km to W
CO073-130	Fulacht fia	Maglin	1.6km to SE
CO073-131	Fulacht fia	Maglin	850m to SE
CO073-144	Misc excavations	Greenfield	800m to W
CO073-145	Pit burial	Greenfield	280m to SE
CO073-161	Burnt spread	Ballincollig	800m to NE
CO085-024	Ringfort	Kilnaglory	640m to SW
CO085-025	Ringfort	Ballyburden More	1.15km to S
CO085-026	Castle	Ballyburden More	1.3km to SE
CO085-028	Ringfort	Maglin	1.2km SE
CO085-117	Fulacht fia	Kilnaglory	1km to SW
CO085-124	Fulacht fia	Ballinguilly	1.2km to SW
CO085-127	Fulacht fia	Maglin	1.3km to SE

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Figure 9.1 Proposed development site outlined on aerial photograph, with RMP sites within a 1.5km radius www.googlemaps.ie

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The following account of the archaeological and cultural heritage of the Study Area is chronological. The archaeological timescale can be divided into three major periods, each with a few sub-sections:

- The prehistoric period: Mesolithic - (circa 8000 to 4000 BC); Neolithic - (circa 4000 to 2400 BC); Chalcolithic c. 2450-2200; Bronze Age (circa 2200 to 700 BC) – Iron Age (circa 700 BC to AD 400).
- The medieval period: Early medieval 5th – 12th century; high medieval 12th century – circa 1400; late medieval circa 1400 – 16th century.
- Post medieval period: 17th century onwards

Information on all the recorded archaeological sites in the Study Area is taken from the ASI database which derives its data from the Archaeological Inventories of County Cork, Volume 3: Mid Cork (Power et al. 1997) and Volume 5 (Ronan et al. 2009) with some entries updated because of more recent research.

Prehistoric Period

The earliest evidence for human colonisation and settlement in Cork can be dated to 8000 BC, the Mesolithic Period. People of this era were hunter-gatherers, entirely dependent on what food could be obtained through hunting, fishing and foraging, including edible plants, and shellfish. The transition of these early settlers from hunter/gatherers to a farming way of life in the Neolithic Period brought about more permanent settlements and a more complex and structured social hierarchy. The Neolithic period is particularly noted for the construction of megalithic tombs, reflecting increased social complexity and the growing importance of communal ritual activities. The Chalcolithic, meaning the 'Copper and Stone Age' represents a transitional phase between the Neolithic and Bronze Age in Rieland. It is characterised by the gradual adoption of copper metallurgy prior to the widespread use of bronze. This period is often identified archaeologically by the widespread appearance of Beaker Ware, a distinct form of pottery associated with this cultural phase.

During archaeological investigations carried out in advance of the construction of the N22 Ballincollig Bypass in Greenfield townland, several features were identified, dating from the Neolithic through to the Iron Age (500 BC to AD 400) (Murphy 2001, Hanley & Hurley 2013). These included two hearths (CO073-127 and CO073-128), a pit (CO073-144) and an oval, post-built enclosure (CO073-126) located to the west of the proposed development site. Radiocarbon dating revealed one of the hearths to be from the latter to the Neolithic/Bronze Age (2920-2560 and 2520-2500 cal BC) and the former to the Iron Age (AD 250-580 cal) (Ronan et al. 2009). The pit was a small feature (1m by 0.9 x 0.17m deep) that contained burnt material but there was no evidence it functioned as a hearth (Danagher 2002). The enclosure measured 7.8m by 6.3m and consisted of thirteen circular post holes. No dateable material was found from the enclosure but a flint thumbnail scraper was found nearby and it is assumed it dates to the Bronze Age (Murphy, 2001 and Hanley, 2013).

In the townland of Ballincollig, approximately 730m northeast of the proposed development site, an isolated pit was discovered during pre-development works in 2019. The pit measured 0.8m × 0.75m and 0.29m deep and was radiocarbon dated to the Chalcolithic period (2450–2300 BC) (Purcell and O'Leary 2019b). It contained eight sherds of prehistoric Beaker-type pottery, along with charred environmental remains (Helen Roche, pers. comm.).

The Irish Bronze Age is characterised by the widespread use of bronze, the emergence of distinctive pottery styles, changing burial traditions, and increasing population. Burial practices became simpler than the elaborate megalithic tombs of the Neolithic, though such tombs were sometimes reused. Most Bronze Age burials, whether cremations or inhumations, were placed in stone-lined cists or simple earth-cut pits, often accompanied by grave goods. Some were marked by stone cairns or earthen barrows.

The majority of the known archaeological sites in the Study Area are fulachtaí fia, 11 in total, along with one burnt spread, many of which are located close to the banks of the Maglin River and its tributaries. Fulachtaí fia are generally interpreted as ancient cooking sites, but could have been used for any purpose that required large quantities of hot or boiling water. They survive as a spread, or mound, of heat-shattered and burnt stone. The burnt stone generally fills and covers one or more troughs or pits cut into the ground. The trough, which was often lined with timber, wattle or stone, would have been excavated below the water table, near a spring or stream and allowed to fill with water. A fire was set adjacent to the trough, to heat stones, and the water was then heated or boiled by immersing the fire-heated stones in it. Experiments have shown that large quantities of water can be boiled in this way in about twenty minutes and joints of meat wrapped in straw can be cooked over several hours. After each use the burnt and heat-shattered stones would have to be cleaned out of the trough. Over time this material accumulated to form a crescent shaped mound of burnt material around the trough. Fulachtaí fia are usually dated to the Bronze Age (2400-500BC). Although they are generally interpreted as cooking sites they were also used for bathing, processing textiles, tanning, brewing, extraction of fats from meat, and soap making, or even a combination of these functions (Ó Drisceoil, 1988; Monk 2007; Quinn & Moore 2007). Burnt mounds and spreads are usually the levelled remains of ploughed out fulachtaí fia.

The closest fulacht fia (CO073-061) to the proposed development site, situated 150m to the southeast, is described in the ASI as follows; 'In pasture, c. 15m E of 'the boiling well'. Hartnett (1939, 257) noted that 'the bank of blackened stones is crescentic in shape, about 40 feet in overall diameter and has the opening in the direction of the well'. Mound levelled c. 1978; spread of burnt material noted' In 2002, the proposed development site was subject to pre-development archaeological investigations in advance of construction of the N22 Ballincollig Bypass which borders it to the south. Four test trenches were excavated around the fulacht fia (CO073-061) and heat-shattered stones and charcoal flecks were identified in three of these trenches. The trenches were excavated to the edge of the fulacht fia material and the extent of the site was established (Danaher, 2002).

Two standing stones are recorded in the study area (CO073-103 and CO073-074), although neither remains extant. These monuments likely date to the Bronze Age, though some may originate from the Iron Age or later periods. Prehistoric examples typically feature a NE–SW alignment. Standing stones served varied functions in the past, including marking routeways, tribal boundaries, or burial sites, and may also have had ceremonial or ritual purposes. Some later stones may have been used more practically, such as scratching posts for livestock.

In the townland of Greenfield, a pit burial (CO073-145) was identified approximately 280m southeast of the proposed development site. During archaeological monitoring of topsoil stripping in advance of the N22 Ballincollig Bypass construction, a subcircular pit measuring 0.4m by 0.3m and 0.09m deep was uncovered. The pit sustained damage during topsoil removal. Within the northeast quadrant of the pit, two possible stake-holes were observed. The pit's fill was black and charcoal-stained, containing three sherds of prehistoric pottery alongside fragments of crushed cremated human bone, attributed to at least one adult male. Radiocarbon analysis of charcoal from the pit yielded a date range of 1750–1490 BC (Danaher 2004, 10).

Also in Greenfield, during 2001 test-trenching for the same bypass project, two adjacent pits (CO073-127) were uncovered. The first was circular and bowl-shaped (0.4m in diameter, 0.1m deep) and filled with black charcoal. The second, just 0.05m east, was oval (0.8m north–south by 0.5m east–west, 0.1m deep), filled with red-brown burnt clay and charcoal flecks. The surrounding natural clay was reddened by heat. Both pits were interpreted as hearths, with radiocarbon dates of 2920–2560 cal BC and 2520–2500 cal BC (Murphy 2001b, 16–17).

Another nearby feature in Greenfield, CO073-128, consisted of a compact grey-brown clay deposit with a high charcoal content, interpreted as a hearth. This feature was a bowl-shaped pit (approx. 0.6m diameter, 0.4m deep) filled with charcoal in a clay matrix and was dated to AD 250–580 (Murphy 2001, 17).

In the townland of Lisheens, a spread of dark brown/black sandy silt with charcoal was uncovered, measuring about 1.4m in diameter and 0.03m deep, overlying a smaller deposit of red-brown silty clay (approx. 1.2m diameter, 0.05m deep) (Murphy 2003f, 47).

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Early Medieval Period

A small number of recorded archaeological sites in the study area date to the early medieval period including three ringforts (CO085-024, CO085-025 and CO85-028) in the townlands of Kilnaglory, Ballyburden More and Maglin, respectively. This period is also known as the Early Christian period (5th to the 12th century AD), when Christianity was introduced to the country. Ringforts (also known by the names rath, lios, cathair or caiseal/cashel) are defended farmsteads and are the most characteristic monument of this period. Their main phase of construction and occupation dates from the beginning of the 7th century AD to the end of the 9th century. They are generally circular or oval in plan, defined by an earthen bank with an external ditch or fosse. Some ringforts have associated souterrains and others have associated corn-drying kilns and sometimes external structures. Generally, it has been speculated that the elite of society occupied ringforts and that the less wealthy lived in undefended settlements scattered across the landscape. In more recent archaeological investigations, particularly on road infrastructure projects in Co. Cork, the number and type of unenclosed medieval settlements identified has been growing, suggesting more diversity in contemporary settlement patterns (Monk 2019) and challenging the perceived importance of ringforts within the early medieval landscape.

The ringfort in Kilnaglory (CO085-024), 640m to the southwest, is depicted as a hachured circular enclosure (diam. 30m) on the OS 6-inch map of 1842 and is marked Glebe. According to Hartnett (1939), the ringfort was 'completely erased' and now lies within the glebe of Kilnaglory Church (Power et al. 1997). The site in Ballyburden More, comprised a circular enclosure approximately 50m in diameter and is shown as a hachured feature on the 1842 OS 6-inch map, and similarly on the 1903 and 1940 maps. The site has since been levelled, leaving a circular platform measuring 33.5m in diameter. According to Hartnett (1939), local accounts report that the enclosure originally had two ramparts (ibid.).

The ringfort (CO085-028) in Maglin, situated 1.2km to the southeast of the proposed development site is levelled with no surface trace. The site is depicted on the OS map of 1842 with a diameter of approximately 25m (Power et al. ., 1994).

Approximately 700m northeast of the proposed development site, in advance of the construction of a large residential development to the west of Maglin Road (Cois Caislean), a geophysical survey identified a circular enclosure (defined by a double ditch, approx. 50m in diameter), a semi-circular enclosure (approx. 32m in diameter), and several ancillary features (Hogan, Davis, and Gimson, 2017). Subsequent archaeological testing confirmed the presence of the circular enclosure along with additional features. However, as no artefacts were recovered, the date of these deposits remains uncertain (Purcell, 2022). Further archaeological investigations are planned in advance of construction at this location.

Medieval Period

Ballincollig Castle (CO073-062), along with its associated bawn (CO073-062001) and cave (CO073-062002), occupies a steep-sided limestone outcrop (c. 40m E-W; c. 55m N-S) in the Maglin Valley. It consists of a tall rectangular 4-storey tower (4.5m N-S; 5.3m E-W) standing on the eastern side of an area enclosed by a high bawn wall that is intact except for a 20m gap mid-way along the eastern side (Power et al, 1997). The area enclosed within the bawn wall contains a visible break in slope down to the south resulting in the bawn wall being at a higher level (H. c. 5.5m) to the south than to the north (H. c. 3.5m), though the top of the wall is roughly level throughout. The 4-storey rectangular tower is situated in the southeastern corner of the bawn wall. A mural tower stood inside the northeast corner of the bawn and another stood along the south, both of which are missing inside walls. The tower was repaired by the Wyse family in the 19th century and there is a stone plaque on the east wall inscribed ‘W 1857’ (ibid.).

A modern house and farmyard now occupy or are located near the site of another castle (CO085-026) in Ballyburden More, approximately 1.3km southeast of the proposed development site. According to Healy (1988), the castle seems to have been associated with the Barrett family (Power et al. 1997).

At the centre of a graveyard (CO073-060001-) lie the fragmentary, ivy-covered remains of Kilnaglory parish church (CO073-060002), a rectangular structure measuring approximately 8m north-south by 18m east-west (Henchion 1969b, 186). Surviving elements include portions of the south and east walls and the east end of the north wall. Large gaps in the east and south walls indicate the locations of former windows. Part of a window embrasure remains near the east end of the south wall, while a doorway embrasure is visible near the west end. Beneath and slightly east of the south wall window is a piscina recess with a chamfered pointed arch; its basin now lies below ground level. The church underwent partial repairs in 1615 and again between 1699 and 1704, but it had fallen out of use by 1745 (Brunicardi 1913, 49–50). The surviving architectural features are characteristic of the late medieval period.

Post Medieval Period

Recorded post-medieval sites within the study area include Maglin House (CO073-097), located 1.5km to the east; a lime kiln (CO073-064), 1.5km also to the east; and Maglin Bridge (CO073-063), approximately 1.4km to the southeast in the townland of Maglin.

Maglin House is a late 18th- or early 19th-century two-storey, L-shaped residence. The house features a four-bay front (south) elevation with an off-centre porch entrance. The side (west) bay includes Wyatt windows, while the remaining windows are sash. A gabled rear addition on the west side creates the L-shaped plan, further complemented by a shallow central gabled stairway projection to the rear. Farm buildings and a cobbled yard are situated behind the house, with a walled garden to the south (Power et al., 1997).

The lime kiln appears on all three editions of the Ordnance Survey maps as part of a quarry complex. According to Power et al. (1997), the kiln is a well-preserved rectangular structure, measuring 7m (N–S) by approximately 5.5m (E–W), built into a break in the slope. The site is heavily overgrown with vegetation.

Lime kilns were common features in the Irish rural landscape from the 18th to the 20th centuries. They produced lime by burning limestone at temperatures between 900°C and 1000°C. Lime had a variety of agricultural uses — as a fertiliser, soil improver, disinfectant wash for farmyards, and as a natural repellent against slugs, snails, and ants. It was also used to protect stored potatoes from frost and in the production of mortar. Today, many lime kilns have become overgrown, dilapidated, or destroyed, making them difficult to identify in the landscape.

Maglin Bridge, located between the townlands of Maglin and Ballynora, is described by Power et al. (1997) as a road bridge spanning 7.33 metres over the Maglin River. It features two semicircular arches that have been repaired. On the upstream side, a bluntly pointed breakwater is present. Niches at the base of the piers likely served as supports for centring during construction. The area beneath the bridge is paved (ibid.).

Archaeological investigations undertaken in proximity to the proposed development site are summarised in Table 9-2 below (www.excavations.ie).

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Table 9.2 Archaeological investigations undertaken in proximity to the proposed development site

Reference	Townland	Details
2001:178	Greenfield, Cork	The site consisted of three spreads of dark brown/black charcoal-stained clay containing substantial quantities of heat-cracked stone. The spreads would have been united originally but have been reduced by post-medieval ditches and more modern ploughing. The maximum depth of the deposit was c. 0.2m. A probable trough was excavated to the west of the fulacht spreads. This consisted of a pit measuring c. 2.16m north–south by c. 2.2m, with a depth of c. 0.75m. The sides were near-vertical and the base was uneven. The pit was filled with fulacht material. An area of pink staining onto the natural may indicate the position of an associated hearth (Murphy 2001a).
2001:179	Greenfield (2), Greenfield, Cork	Test-trenching was undertaken in advance of construction of the N22 Ballincollig Bypass which identified a number of features. 1. An oval, post-built enclosure measuring c. 7.8m north–south by 6.3m. The enclosure consisted of thirteen circular post-holes measuring, on average, c. 0.25m in diameter by c. 0.2m in depth. No finds or datable samples were obtained from the fills of the post-holes and no associated features were identified. A single unstratified flint object, a thumbnail scraper, came from the close vicinity. 2. A number of hearths were identified. Some of these were probably the result of tree-burning during land clearance, whilst others were probably of recent date. Two hearths were of more interest and of similar form. These consisted of two adjacent bowl-shaped pits, one larger than the other. The results of analysis of soil samples for both dating and usage are awaited. 3. Various pits, all of which existed in isolation and provided no dating evidence. Only one, a bowl-shaped pit containing part of the articulated skeleton of a sheep/goat, provided any evidence of purpose; however, the survival of bone probably indicates a recent date for the pit (Murphy 200b).
2001:180	Greenfield, Cork	Test-trenching in advance of construction of the N22 Ballincollig Bypass revealed a series of significant sites. Amongst these was a small area of limestone slabs and tiles. An area around these was stripped and cleaned. Excavation uncovered a series of interconnecting drains feeding into a shallow pond. A number of subsidiary features, a masonry platform, post-hole, hearth, etc., were associated but defied a logical interpretation. The associated finds, including quality glassware and ceramics, would appear to provide a date in the mid-18th century for activity on the site. The features and associated finds must be associated with activity which lay outside the area of the road-take. The nature of the finds would suggest high-status domestic occupation in the close vicinity of the excavated features (Murphy 2001c).
2002:0309	Greenfield 4, Cork	A pit cutting boulder clay was identified during construction of the N22. It was subcircular, measuring 1m north–south by 0.9m, with a maximum depth of 0.17m. Although it contained a charcoal-enriched and heat-shattered stone fill, there was no evidence that this pit may have functioned as a hearth. The primary and predominant fill was a loose, black, charcoal-stained, clayey silt containing c. 45% heat-shattered stones. These stones were mainly sandstone, with the occasional inclusion of quartz, and all had diameters of less than 0.06m. The deposit measured 0.9m east–west, with a maximum depth of just under 0.17m. The secondary fill was revealed at the east of the feature and consisted of a small pocket of redeposited subsoil. This deposit had become slightly mixed with the topsoil, resulting in a brownish-orange colour, and contained occasional heat-shattered stones of up to 0.1m in diameter (Danagher 2002).
2002:0332	Maglin 3, Cork	During work associated with the construction of the N22 archaeological testing was carried out in adjoining land in advance of establishing a permanent soil dump. Four trenches were excavated in a large flat field all of which revealed burnt mound material. Once this material was identified, the trenches were not continued. After these deposits were photographed and recorded, the trenches were backfilled. The maximum measurements of the fulacht fiadh was 19m east–west by 18m. On completion of the testing, a buffer zone was established to protect the site. This was done by excavating four trenches around the site at a distance of 6m from its perimeter (Danaher 2002).
2008:159	Ballincollig, Cork	Ten test-trenches were excavated to subsoil levels on the footprint of a proposed nursing unit to the north of Ballincollig town centre and south of the National Monument Ballincollig Gunpowder Mills (CO073–043). No archaeological features or finds were recorded (Ní Loingsigh, 2008).
2010:108	Ballincollig	Four test trenches were excavated on the site of a proposed medical centre. No features or finds were revealed (Lane 2010).
2017:288	Maglin, Ballincollig, Cork	Fifteen test trenches were mechanically excavated across the site following geophysical survey. No features or finds of archaeological significance were revealed (Purcell 2017).
2017:290	Lisheens, Ovens, Cork	Monitoring was undertaken on ground works associated with a residential development on the site. No features or finds of archaeological significance were revealed (Purcell 2017).

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Reference	Townland	Details
2018:495	Ballincollig (adjoining Maglin Estate)	Two phases of testing were carried out across two adjoining fields following geophysical survey. A total of twenty-three trenches were excavated. A spread of burnt mound material (CO073-161) was revealed measuring 8m north-south by 3.5m. Its eastern extent was not determined as it extended into a field boundary adjoining a stream along the eastern site boundary. It is proposed to preserve the burnt spread in situ within a buffer zone (Purcell 2018).
2019:354	Ballincollig(Adjoining Maglin Estate), Cork	Monitoring was carried out on a residential development which was tested in 2017. A small isolated pit measuring 0.8m by 0.75m by 0.29m deep was found which contained 8 sherds of prehistoric pottery, probably of Beaker type (Helen Roche pers. comm.) Charred apple pips and hazel nut shell fragments were also found. No other features were revealed (Purcell 2019).
2022:709	Ballincollig Maglin Road	Fourteen trenches were mechanically excavated across a circular enclosure and adjoining ground identified in a geophysical survey undertaken in 2017. The enclosure appears to be defined by a pair of slot trenches set on a limestone outcrop. A small number of additional features were identified in adjoining ground including possible pits and deposits. No finds were revealed. Outcropping bedrock and drainage features were also identified in the trenches. (Purcell 2022)
2023:723	Maglin Road, Ballincollig, Cork	Fifteen trenches were excavated across two fields to the east and south of an enclosure identified in 2022. No archaeological features or finds were identified (Purcell 2023).

9.3.3 Cultural Heritage of the Study Area

9.3.3.1 Townland Names

The proposed development site is situated in the townland of Greenfield in the parish of Kilnaglory and barony of East Muskerry. The economy of past societies was tightly bound to the productive capacity of the land combined with environmental, societal and political factors. The enclosing of the landscape is one of the most effective ways in which land organisation may be assessed. Townland boundaries are an integral part of this land division and are often aligned on natural topographic features such as streams and rivers. The proposed development site is situated in the townland of Greenfields. The Irish landscape is divided into over 62,000 townlands and this system of landholding is unique in Western Europe for its scale and antiquity. Many townlands are pre-Anglo/Norman in origin and Irish historical documents consistently use townland names throughout the historic period to describe areas and locate events accurately in their geographical context.

The townland names and boundaries were standardised across the country in the nineteenth century when the Ordnance Survey began to produce large-scale maps of the country. Townlands existed long before the parishes and counties. The original Irish names were eventually written down in anglicised form as they sounded to English court scribes. The social customs or history of the people who have lived in a particular place can also be reflected in the name of the townland. Many townlands throughout Ireland took their names from early habitation sites, both ecclesiastical and secular while others are descriptive of the surrounding landscape.

The townland name Greenfield is in Irish 'An Pháirc Ghlas' (www.loganim.ie). The Irish forms of other townland names in the Study Area are as follows; Maglin appears in two Irish forms: Maigh Lainne, meaning 'plain of the enclosure' and Maigh an Ghiolla Fhinn, meaning 'plain of the fair-haired lad'. Ballincollig, in Irish 'Baile an Chollaigh' meaning town of An Collach, from the surname Coll or Baile an Cholaig meaning town of the boar. Kilnaglory, in Irish 'Cill na Gluaire', meaning church of the glory. Lisheens, in Irish 'Na Lisíní', meaning small fort. Classes, in Irish 'Chlais an Ghainimh', meaning trenches or furrows. Coolroe, in Irish 'An Chúil Rua' meaning the red corner or angle.

9.3.3.2 Railway line

The former Cork and Macroom Direct Railway (CMDR), later incorporated into the Great Southern and Western Railway (GS&WR), once ran directly southeast of the proposed development site. Its former route now forms part of the modern N22. Constructed during the 19th century, the CMDR played a key role in improving communication, reducing travel times, and supporting regional trade and commerce.

The CMDR was a 24-mile (39 km) railway line that operated in County Cork between Cork City and the market town of Macroom. It opened on 12 May 1866, offering a more direct route to Macroom than those operated by competing railway companies (Shepherd, 1994). Though initially independently operated, the line functioned closely with the GS&WR, which supplied rolling stock and operational support.

Running westward from Cork Capwell Station, the line crossed the River Lee and passed through Ballincollig, Crookstown, and other intermediate stops en route to Macroom. Despite moderate use for both passengers and freight, the CMDR struggled financially throughout its history. It was absorbed into the Great Southern Railways (GSR) in 1925 as part of a broader consolidation of Irish rail companies and later came under the control of Córas Iompair Éireann (CIÉ) in 1945. Passenger services ceased in 1935, and the line was fully closed by 1953.

Today, remnants of the railway — such as embankments, cuttings, bridges, and station buildings — remain visible in the landscape, contributing to the area's industrial and historical heritage. Some sections of the former track bed have been repurposed as walking trails or incorporated into modern infrastructure, including road networks.

9.3.3.2 The town of Ballincollig

The name Ballincollig derives from Baile an Chollaigh, interpreted as either 'town of An Collach' (a personal name) or 'town of the boar' (www.loganim.ie). The earliest known reference to Ballincollig dates back to the 14th century, when the Colla family, Anglo-Norman settlers, established a castle at the site. Ballincollig Castle, which remains partially standing today, was likely built around 1468 by the Barrett family, a prominent Norman lineage. Over the centuries, the castle and its surrounding lands passed through several owners, including the Coppingers and Colthursts (O'Brien, 1909).

Ballincollig remained a small rural settlement until the late 18th century, when a significant transformation occurred with the establishment of the Ballincollig Royal Gunpowder Mills in 1794 by Charles Henry Leslie. The British Government purchased the mills in 1805, developing them into one of the largest gunpowder manufacturing facilities in the British Isles. At their peak, the mills employed hundreds of workers and played a crucial role in military and industrial supply chains during the Napoleonic Wars and subsequent conflicts (Power, 1987).

By 1837, Ballincollig, located approximately 1 km to the south of the gunpowder mills, was described by Lewis (1837) as 'chiefly distinguished as a military depot and for its extensive gunpowder mills… the artillery barracks form an extensive quadrangular pile of buildings… which contain accommodation for 18 officers and 242 non-commissioned officers and

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privates…. Immediately adjoining the barracks, and occupying a space of nearly four miles in extent, are the gunpowder mills, 16 in number' (ibid.).

During this period, Ballincollig evolved into a company town, with housing, shops, and schools developed to support the workforce. The mills continued operations until 1903, after which the site fell into decline. Today, the remnants of this industrial heritage site are preserved in the Ballincollig Regional Park.

Throughout much of the 20th century, Ballincollig remained a relatively quiet village until substantial urban development began in the 1970s and 1980s, transforming it into a major suburb of Cork City. In 2019, the town officially became part of the Cork City Council administrative area, reflecting its integration into the wider metropolitan region.

The Ballincollig Gunpowder Mills, now under the care of Cork City Council, represent the second largest gunpowder mills in Britain and Ireland. Situated in the Ballincollig Regional Park, the site spans approximately 130 acres and contains the remains of around 100 buildings associated with the gunpowder manufacturing process. It is considered Ireland's largest and most significant industrial archaeological site (CCCDP).

The mills were originally developed in 1794 by Charles Leslie of Wilton and his partner John Travers. By 1801, the enterprise was highly productive and, at its height, employed up to 500 people, supplying gunpowder for use in railways, mining and quarrying. The site was acquired by Cork County Council in 1974 and subsequently developed into a regional park.

9.3.4 Cartographic Information

Three editions of the OS maps were examined to assist in understanding the development of the area since the mid-19th century. The 1842 OS 6-inch map (Fig. 9.2) shows the area of the proposed development site as comprising Greenfield House and its demesne along with a small extra section of land to the south. The site and demesne boundaries are defined to the north by what is now the Greenfields Road, to the west by a small local road and to the east by field boundaries which are also the townland boundary. The southern boundary runs a short distance south of the tree-lined demesne boundary, in an arbitrary fashion across four fields. Greenfield House lies south of centre of the proposed development site accessed by an avenue running southwest through the demesne from a gate lodge on Greenfields Road. A number of outbuildings and yards to the rear of the house may have been accessed from the road to the west and a lane running east from these buildings provides direct access to the fields of the demesne. A number of trees are scattered throughout the demesne and the fields are tree-lined. To the southwest of the gate lodge a small unnamed building with a yard to its east (part of the demesne) opens onto Greenfields Road.

Substantial changes have been made to the area of the proposed development site by the turn of the 20th century when the 25-inch OS map (1897-1903) (Fig. 9.3) was compiled. Greenfield House and its demesne have been removed. The field boundaries have been substantially changed and the associated tree cover removed. The line of the Cork & Macroom Direct Railway has been constructed along the southeastern site boundary. The small unnamed building on Greenfields Road is the only surviving feature from the 1842 OS map. Further to the southwest on the south side of Greenfields Road a disused limekiln and small quarry are shown. The OS 6-inch map of 1939 (Fig. 9.4) shows the area as largely unchanged other than the removal of the building and lime kiln on Greenfields Road and the addition of a small rectangular building in the area of the outbuildings of Greenfield House. This is a dwelling house that remains extant.

Figure 9.2: Extract from OS 6-inch map (1842) showing proposed development site (www.archaeology.ie)

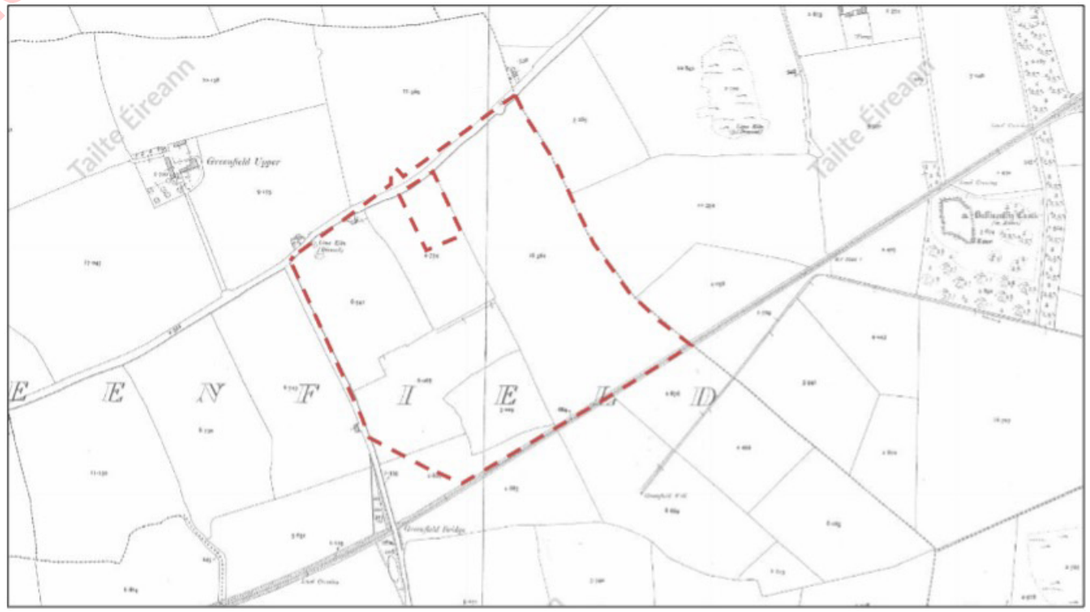

Figure 9.3: Extract from OS 25-inch map (1903) showing proposed development site www.archaeology.ie

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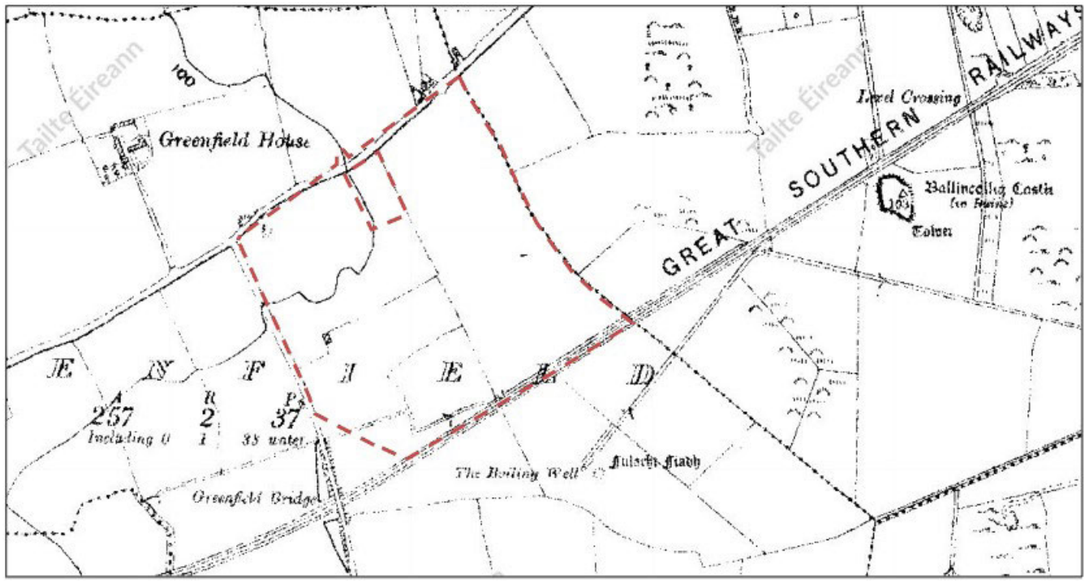

Figure 9.4: Extract from OS 6-inch map (1939) showing proposed development site www.archaeology.ie

Figure 9.4: Extract from OS 6-inch map (1939) showing proposed development site www.archaeology.ie

9.3.5 Architectural Heritage

There are no Protected Structures or architectural heritage features located on the proposed development site. There is a complex of farm buildings west of centre on the site, on the former location of the outbuildings of Greenfield House, which is depicted on the 1841 OS 6-inch map (Fig. 9.2) but is absent from the 1903 OS 25-inch map (Fig. 9.3). By the 1939 OS map there is a small rectangular building in the area of the outbuildings. This building remains extant and is a three-bay bungalow with a hipped roof. It occupies the western side of the farm complex and is accessed via a tarmacked driveway off a minor road bordering the western perimeter of the proposed development site.

The nearest Protected Structure is Ballincollig Castle (PS1225), situated approximately 400 metres to the northeast (Fig. 9.5). This 15th-century medieval tower house, constructed on elevated ground overlooking the River Lee, is a prominent and historically significant landmark near the town. Originally built by the Barrett family, of Norman-Irish lineage who settled in Munster following the Anglo-Norman invasion, the castle functioned as a fortified residence and symbol of feudal power.

The structure comprises a rectangular keep, remnants of a bawn wall, and ancillary buildings typical of late medieval defensive architecture in Ireland. It was later occupied by the McCarthy Clan, one of Munster's most powerful Gaelic families, before passing to the Earls of Clancarty in the 17th century. By the 18th century, the castle had fallen into ruin, though the keep remains a dominant feature in the local landscape.

Ballincollig Castle is listed in the RMP (CO073-060001-) and is included in the RPS (PS1225) in recognition of its archaeological, architectural, and historical significance. The site offers important insight into medieval settlement patterns, landholding, and defensive strategies, and continues to contribute meaningfully to the historic character and cultural identity of Ballincollig.

Adjacent to the town centre, the Ballincollig Gunpowder Mills complex (now part of Ballincollig Regional Park) is among the largest and most important industrial archaeological sites in Ireland and the second largest gunpowder mill complex in Britain and Ireland. The site extends across approximately 52 hectares (130 acres), following 2.4 km of the River Lee, and contains the ruins of around 100 structures associated with historic gunpowder production. The mills were established in 1794 by Charles Leslie and John Travers, later sold to the British Board of Ordnance in 1805, which greatly expanded the site to meet wartime demand during the Napoleonic Wars.

As part of this expansion, Ballincollig Cavalry Barracks (PS1232) and Oriel House (PS1224) were constructed to support security and management functions. The NIAH (Ref. 20842004) describes the Gunpowder Mills as follows:

"While now in ruins, many of the buildings retain their original and varied forms. Most of the original buildings remain upstanding, which allows a sense of the scale of the industry to remain discernible. The extensive canal systems, built to provide both hydro power and transportation, are a particularly interesting feature. Due to the importance of this complex, a military barracks was constructed close by to improve security, and together with these surviving barrack buildings and Oriel House, is a reminder of the military and industrial history of the area."

After a decline post-1815, the mills were revived in 1834 by Liverpool entrepreneurs Thomas Tobin and Charles Horsefall. By the mid-19th century, the site employed up to 500 workers, with gunpowder exported for use in African trade (notably in exchange for palm oil) and for industrial applications such as railway and mining operations. The mills remained operational until 1903 and are now a key feature of Ballincollig's designated heritage landscape under the Cork City Development Plan (www.corkcity.ie).

Located approximately 920 metres northeast of the proposed development site, Oriel House (PS1224, NIAH Ref. 20842001) is a distinguished 19th-century residence associated with the gunpowder mills' managerial class. The house features period detailing, a formal layout, and historically significant gardens, contributing both architectural and historic interest to the area.

Also within 1.5 km of the proposed development site is the Cavalry Barracks (PS1232), a fine example of 19th-century military architecture, comprising barrack blocks, a parade ground, and ancillary buildings constructed as part of the gunpowder mills' broader infrastructure. St Mary and St John's Catholic Church (PS1233), also located nearby, represents the religious and social fabric of Ballincollig in the 19th century.

Additional heritage assets in the study area include Inniscarra Bridge (PS1222) and Coolroe Weir (PS1223), which illustrate early engineering solutions in transport and water management, as well as a range of limekilns, historic houses, and gate lodges, all of which contribute to the area's rural and industrial heritage character.

While none of these heritage structures are situated on or immediately adjacent to the proposed development site, their presence in the wider landscape reinforces the historical context of Ballincollig and the proposed development site.

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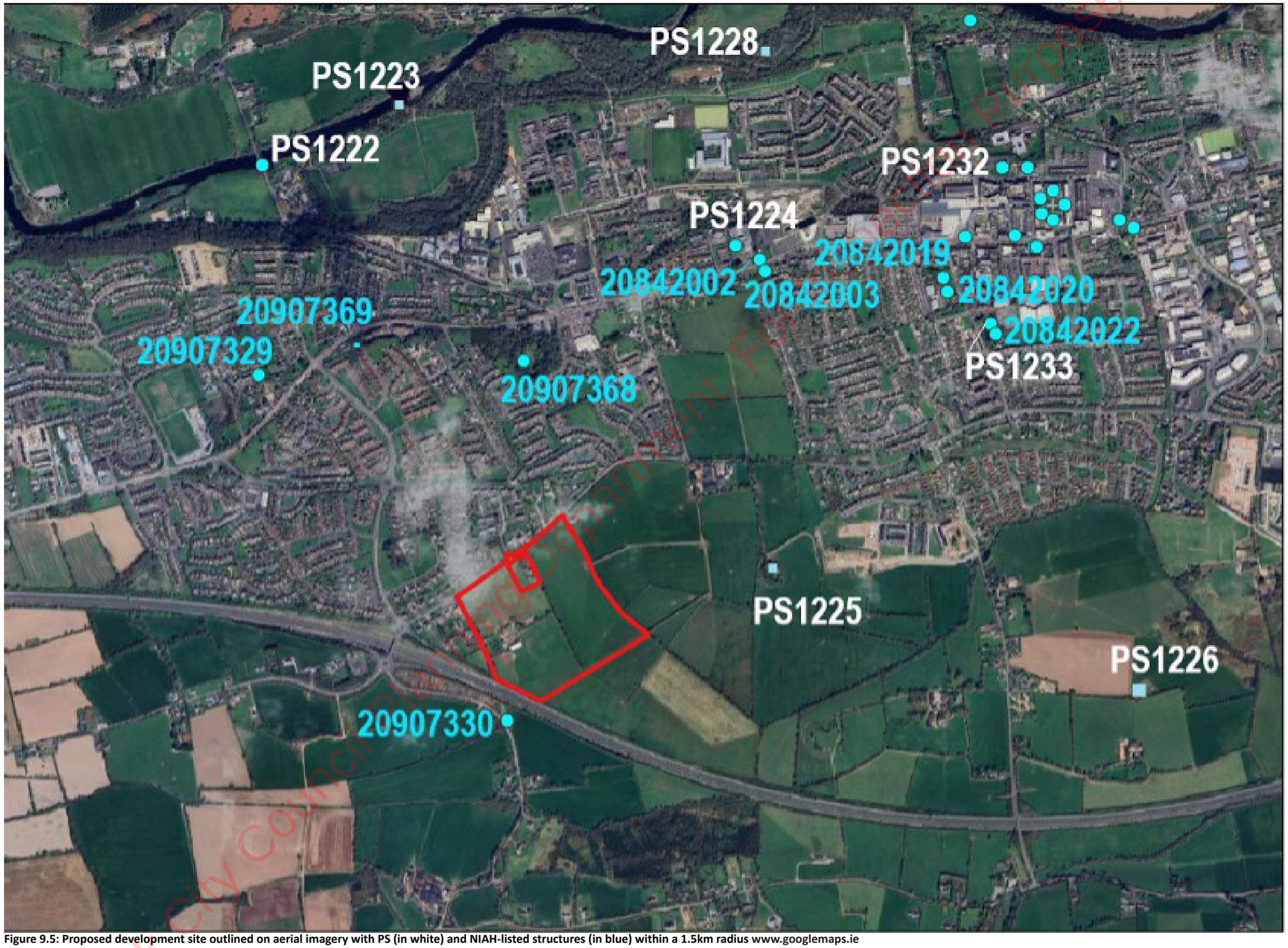

Figure 9.5: Proposed development site outlined on aerial imagery with PS (in white) and NIAH-listed structures (in blue) within a 1.5km radius www.googlemaps.ie

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Table 9.3 PS/NIAH within a 1.5km radius of the proposed development site

PS, NIAH	SITE TYPE	TOWNLAND	DISTANCE
PS1222 20907328	Inniscarra Bridge	Coolroe	1.3km to N
PS1223	Weir	Coolroe	1.3km to N
PS1224 20842001	Oriel House	Ballincollig	920m to NE
PS1225	Ballincollig Castle	Ballincollig	400m to NE
PS1226	Limekiln	Maglin	1.2km to E
PS1232 20842005	Cavalry Barracks	Ballincollig	1.5km to NE
PS1233 20842021	St Mary & St John's Catholic Church	Ballincollig	1.3km to NE
20907330	Railway Bridge	Greenfield	90m to SW
20907329	Coolroe House	Coolroe	860m to NW
20907368	Parknamore House	Ballincollig	450m to N
20907369	Limekiln	Coolroe	770m to N
20842002	Gate house	Ballincollig	950m to NE
20842003	House	Ballincollig	950m to NE
20842019	House	Ballincollig	1.3km to NE
20842020	House	Ballincollig	1.3km to NE
20842022	Ballincollig Presbytery	Ballincollig	1.3km to NE

9.3.6 Geophysical Survey

The proposed development site was subject to geophysical survey in 2021 when a large landholding (of which the proposed development site forms the northern part) was surveyed under licence 21R0175 (Leigh, 2021). A second survey was carried out in 2024 when the northwestern area (Field 1) was surveyed under licence 24R0039 (Leigh, 2024). In both cases, the areas were subject to detailed gradiometer survey with the aim of identifying and locating any responses of potential archaeological interest. The 2021 survey extended across four areas (Areas A, A1, and the larger parts of Areas D and E) (Fig. 9.6a) while the 2024 survey covered Field 1 which was not available in 2021 (Fig. 9.6b).

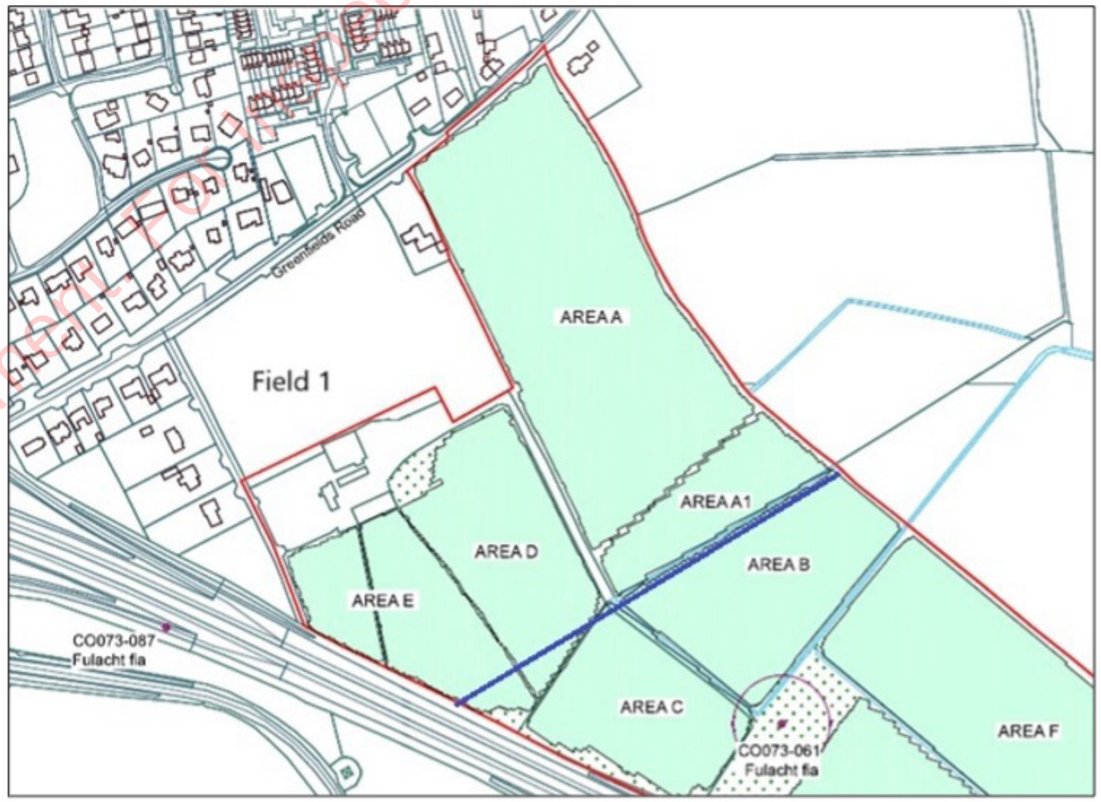

Figure 9.6a: Land included in the 2021 geophysical survey. Southeastern boundary of the proposed development site shown in blue (after Leigh, 2021)

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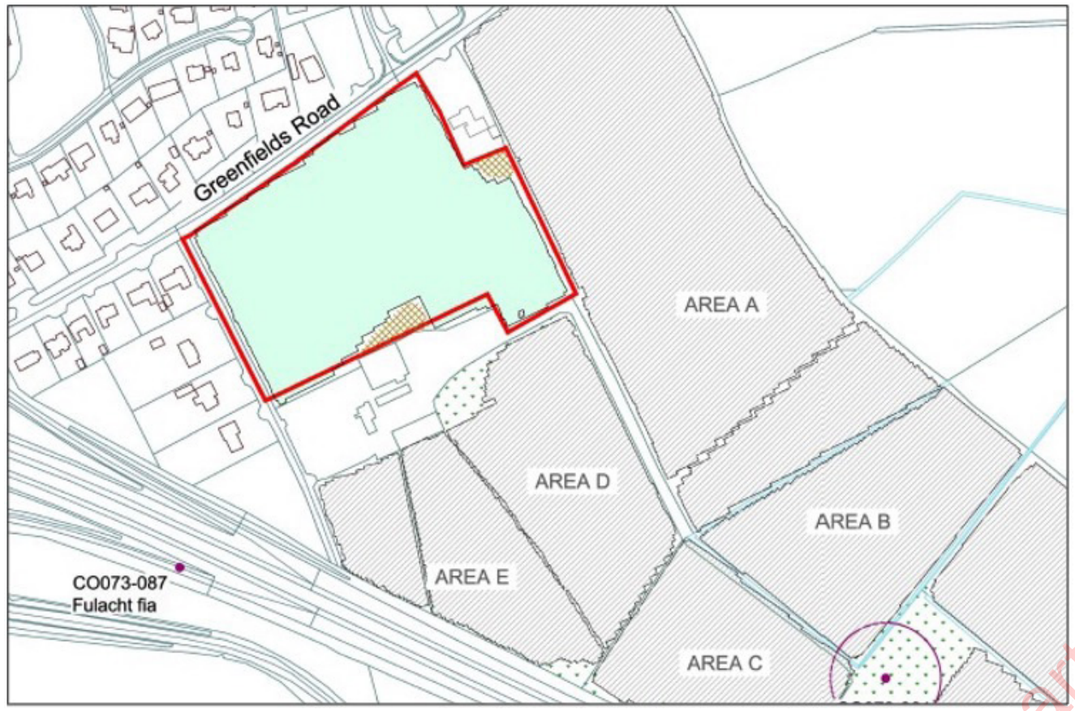

Figure 9.6b: Field 1 included in 2024 geophysical survey (after Leigh, 2024)

9.3.6.1 Summary

Geophysical surveys conducted in 2021 and 2024 revealed that the study area is extensively affected by modern magnetic disturbance, primarily from ferrous materials which hampers clear archaeological interpretation.

2021 Survey

- Areas A & A1: Linear trends and isolated pit-like responses were recorded but lacked coherent patterns; features likely reflect natural subsoil variation or field boundaries. Archaeological potential is low.
- Area B: Ferrous responses align with the former Great Southern Railway; other responses likely geological.
- Area C: Continuation of railway-related ferrous responses; rest of the area is heavily disturbed.
- Area D: Modern ferrous interference dominates; a northern zone shows increased magnetic activity that may suggest archaeology, but interpretation is hindered.
- Area E: Magnetic interference from nearby buildings and motorway; no archaeological potential.

2024 Survey (Field 1):

- A broad north–south trend likely represents a former farm access track, not an archaeological trackway.
- Magnetic disturbance near stables further obscures results.
- A short linear response and nearby trends could indicate a rectilinear feature or former field boundaries, but this is uncertain.
- Curvilinear trends likely reflect natural subsoil variation.
- Linear ferrous responses in the southeast are linked to temporary fencing.
- Numerous isolated responses resemble pits but may be buried debris.

Overall, archaeological potential is limited, and modern interference dominates the data.

9.3.7 Archaeological Testing

Archaeological testing was carried out under licence (24E0390) on the 1st and 3rd of April 2025 in dry, sunny conditions. The testing strategy was developed to investigate geophysical anomalies identified in 2021 and 2024 (Leigh 2021, 2024), with trench locations agreed in consultation with Cork City Archaeologist, Ciara Brett.

A total of 28 test trenches were excavated: 27 on the proposed development site and one in adjacent land to the east. The site layout generally corresponded with historic aerial imagery, divided into five fields and partially enclosed by hedgerows and fencing.

9.3.7.1 Key Results

Field 1 (Trenches 1-14) (Fig. 9.7a):

Five archaeological features (F2–F6) were identified, consisting of small pits and possible roasting pits, each c. 1m in diameter. These features produced charcoal-rich fills, oxidised clay, and burnt stone. All corresponded with Geophysical Anomaly 8 (positive geophysical responses). However, other areas where Anomaly 8 was tested (Trenches 4, 5, 6, 8, 11, 13) yielded no archaeological material.

Areas A & A1 (Trenches 15-23) (Fig. 9.7b):

Two features (F7, F8) of archaeological interest were found in Trench 20. Both were charcoal-rich pits matching Anomaly 3. The same anomaly tested in other trenches produced no further archaeological evidence.

Areas D & E (Trenches 24-27):

No archaeological features were identified. The area showed signs of heavy disturbance due to drainage and ground-raising activity associated with the construction of the N22 Ballincollig Bypass (early 2000s).

Area C (Trench 28):

Located east of the proposed development site, this trench confirmed a large deposit of stoney clay fill (up to 1m deep), correlating with modern magnetic disturbance. The underlying humic layer likely represented the original pre-fill surface sloping toward the Maglin River valley. No archaeological material was identified.

Conclusions and Recommendations:

Seven archaeological features of significance (F2–F8) were identified corresponding to geophysical anomalies. These will require preservation by record, involving full archaeological excavation to national standards before development begins. This work will be developer-funded.

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Archaeological monitoring of topsoil removal across the site was also recommended with particular attention paid to the southern end of the site, where modern fill was previously deposited. Monitoring here should be undertaken at the discretion of the site archaeologist, in consultation with the Cork City Archaeologist.

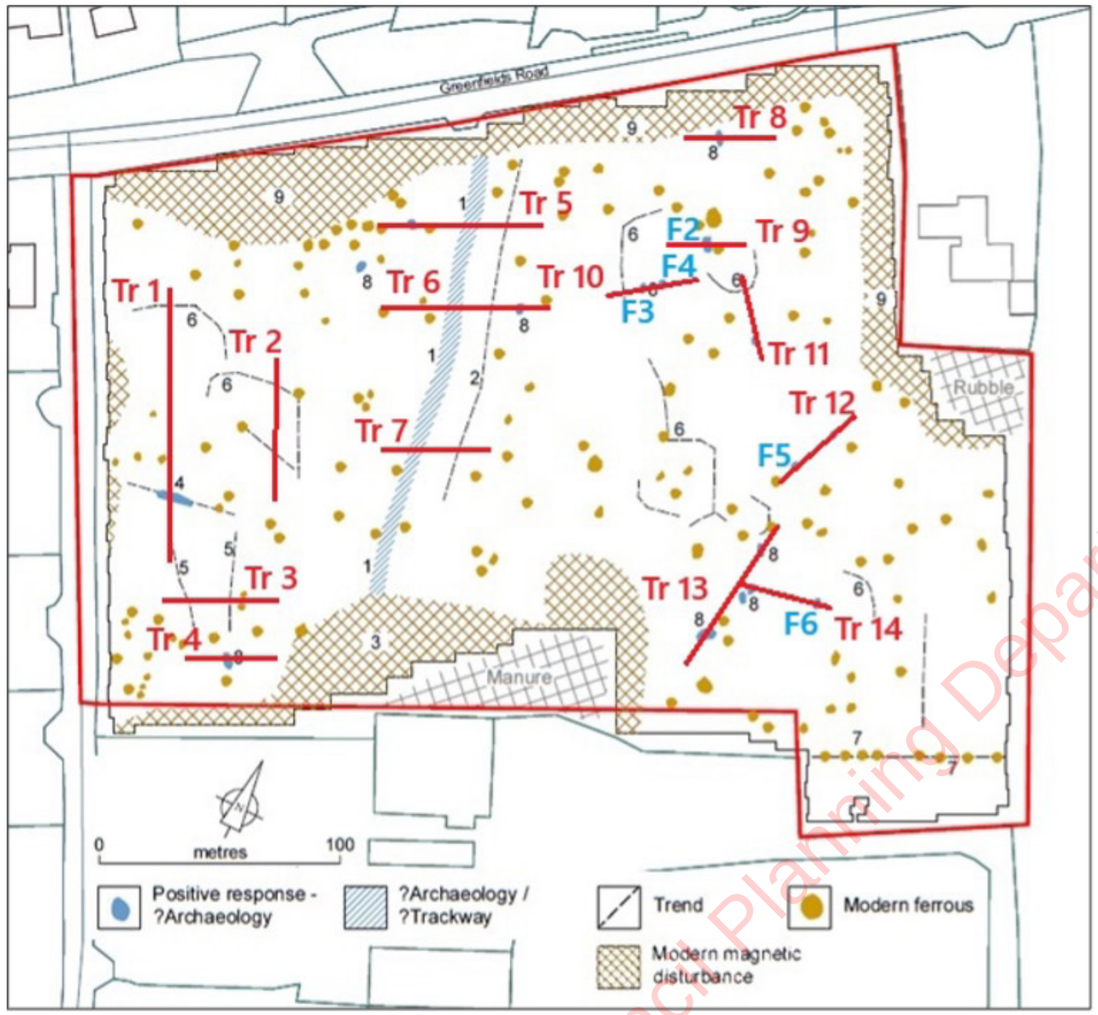

Figure 9.7a: Trenches 1-14 excavated in Field 1, showing potential archaeological features in blue

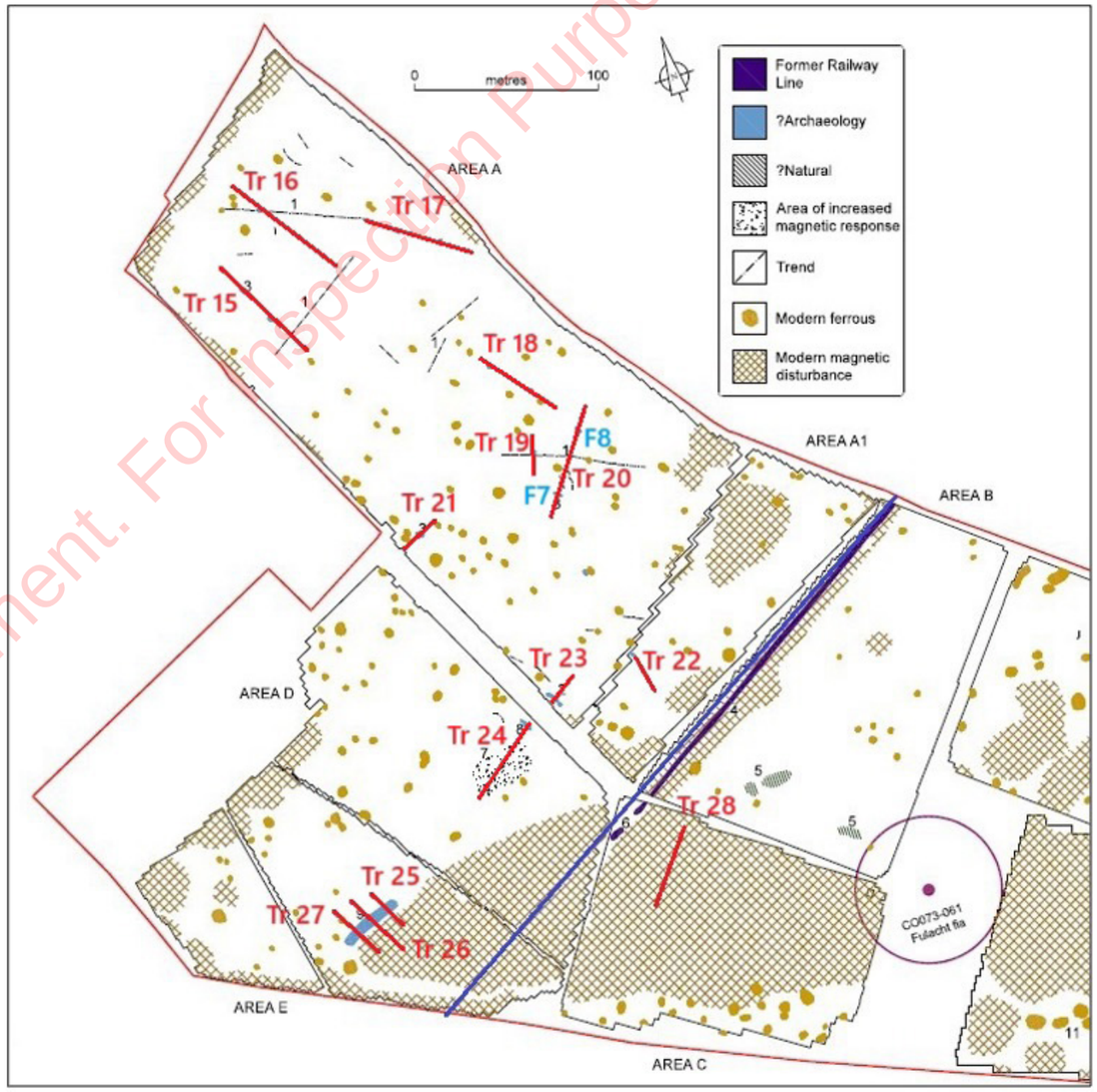

Figure 9.7b: Trenches 15-28 excavated in Areas A, A1, C, D and E showing potential archaeological features in blue

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9.3.8 Walkover Survey

The proposed development site was inspected in November 2021 and in April, 2025 in dry, bright weather conditions. The primary purpose of a site inspection is to assess the physical environment in which the development will be undertaken and to identify any possible features of cultural heritage significance which have not been previously recorded. Current land use, local topography and environmental conditions are assessed to gain an overall picture of the area. The proposed development site is outlined on the aerial photograph below (Fig. 9.8) while photos taken in the course of the site inspection are provided in Appendix 9.3. The five fields which make up the proposed development site are designated as Fields 1 and A, A1, D and E to correspond to field labels used in the Geophysical Survey.

The proposed development site is accessed from Greenfield Road, which borders the northwestern portion of the site. The N22, constructed in 2004, forms the southern boundary, while agricultural land lies to the north and east. A house, visible on the 1939 OS map and modern farm buildings occupy a portion of the western part of the site, with the remainder of the area comprising pastureland. No finds or features of archaeological potential were identified during the walkover survey.

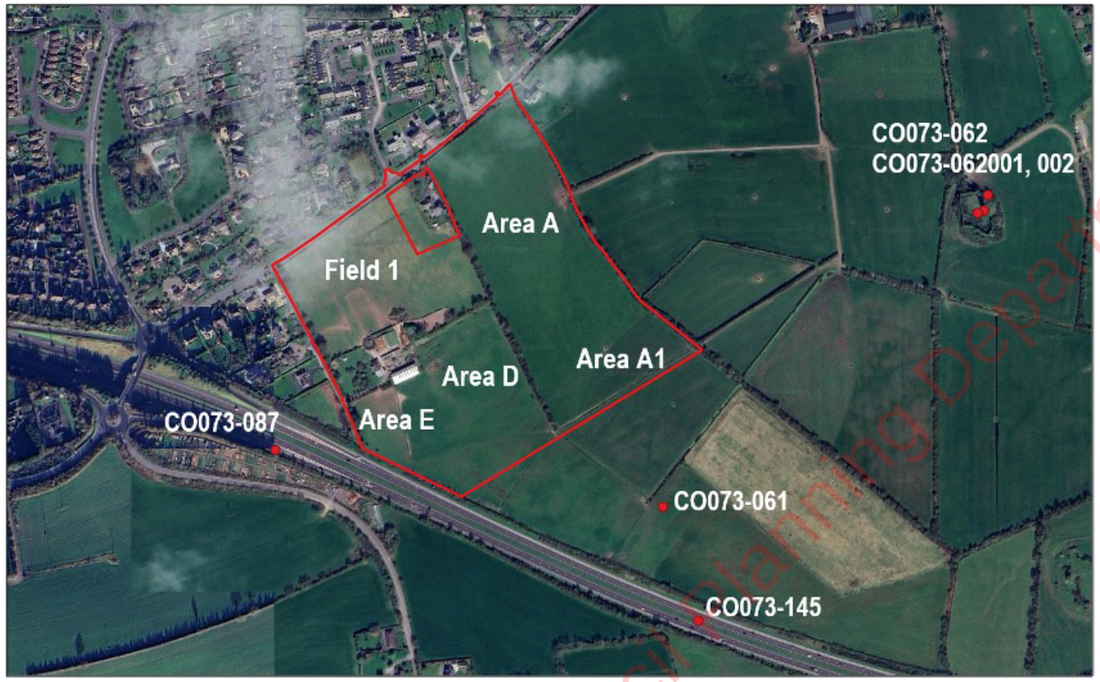

Figure 9.8: Proposed development site outlined on OS aerial imagery (google maps:2025)

9.4 Assessment of Impacts

The assessment of potential impacts, both direct and indirect, during the construction and operational phases of the proposed development has been carried out in accordance with Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022).

9.4.1 Do-Nothing Impacts

Should the proposed development not proceed, the existing landscape would remain in its current condition. Any potential subsurface archaeological features would remain undisturbed, with no alteration to the setting or visual character of the site.

9.4.1 Construction Phase Impacts

Archaeology - Registered Archaeological Monuments

There are no recorded archaeological sites on the footprint of the proposed development. Consequently, there will be no significant direct or indirect impacts on any registered archaeological monuments.

Potential for Previously Unknown Archaeological Sites or Features

Given that a significant portion of Ireland's archaeological resource survives as subsurface remains, there remains a moderate potential for the presence of previously unknown archaeological features. Extensive topsoil stripping and groundworks during the construction phase could result in direct, negative impacts on any such features.

To assess this risk, two phases of geophysical survey were undertaken on the proposed development site and adjacent lands in 2021 and 2024 (Leigh 2021; Leigh 2024). While no significant archaeological deposits were identified, a number of isolated magnetic anomalies (Anomalies 3 and 8) were detected and interpreted as either possible pit-type features or deeply buried ferrous material.

Targeted archaeological testing followed, involving the excavation of 27 trenches on the site and one trench on adjacent lands. This confirmed the presence of seven archaeologically significant features:

Five features (F2–F6) in Field 1, each approximately 1 metre in diameter, were identified as small charcoal-rich pits or roasting pits, associated with Anomaly 8.

Two features (F7–F8) in Trench 20 of Area A were also charcoal-rich pits corresponding to Anomaly 3.

Other trenches investigating the same anomalies yielded no archaeological remains, indicating that these features were isolated and not part of a broader archaeological complex.

Conclusion:

There is moderate potential for the discovery of additional, previously unknown archaeological features during construction, especially in areas not covered by testing or where anomalies remain ambiguous.

Architecture

There are no Protected Structures listed in the CCDP or structures included in the NIAH on the proposed development site.

A house, depicted on the 1939 OS map, along with associated modern farm outbuildings, occupies part of the western portion of the site. These structures are not shown on earlier editions of historical OS mapping, including the 1903 edition, and are not considered to be of architectural or historical significance. The existing house and farm buildings will be demolished to facilitate the proposed development.

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No structures of architectural merit or significance were identified on the proposed development site during field inspection. As such, the proposed development will not give rise to any significant direct or indirect impacts on Protected Structures, NIAH-listed structures, or any buildings of architectural or historical interest.

9.4.2 Operational Phase Impacts

During the operational phase, no significant direct or indirect effects on archaeological/architectural effects are anticipated. The proposed development will not introduce visual intrusion or disturbance that would impact the setting or appreciation of nearby heritage features.

9.4.3 Visual Impact Assessment

There are no Recorded Monuments or registered architectural sites on the footprint of the proposed development. The closest known archaeological features are a previously excavated fulacht fia (CO073-087), which has been removed from the landscape, and a subsurface fulacht fia (CO073-061), which has no above-ground expression and does not contribute to the existing visual environment.

Ballincollig Castle

The most visually prominent heritage site in the area is Ballincollig Castle (CO073-062, CO073-062001), its enclosing bawn, and an associated cave (CO073-062002), located approximately 400m northeast of the development site. A Landscape and Visual Impact Assessment conducted by Model Works Ltd and detailed in Chapter 3 of this EIAR, concluded the following;

- Views of the site from the castle are very limited due to the enclosing western wall and intervening hedgerow vegetation.
- The proposed development may be just discernible, but only through foreground hedgerows or from a distance in the wider landscape.
- The visual effect is assessed as “Not Significant Neutral”, based on

Distance and screening by multiple hedgerows.

Existing urban development closer to the castle in other directions

Protective zoning (open space) around the castle preventing further encroachment

Other registered archaeological monuments in the Study Area

There are a total of 31 other registered archaeological monuments in the study area. Of these, 10 sites were excavated and preserved by record in advance of the N22 construction, and no longer form part of the visible cultural landscape. Of the remaining 21 monuments:

- Thirteen sites, including eight fulachtai fia, three ringforts, one castle site, and one standing stone, are entirely subsurface with no visible surface expression.
- One site, a quarry (CO073-059), is listed in the RMP but is not considered an archaeological site in the ASI database.
- Five sites — a church (CO073-060002), graveyard (CO073-060001), Maglin Bridge (CO073-063), a limekiln (CO073-064), and a standing stone (CO073-103) — exhibit only subtle surface expression and are located at a sufficient distance from the proposed development site to warrant no visual impact.
- Two sites - Inniscarra Bridge (CO073-038) and Ballincollig gunpowder mills (CO073-043) are located at a sufficient distance from the proposed development site to warrant no visual impact.

None of these monuments are intervisible with the proposed development area. Their views are effectively screened by topography, mature vegetation, and surrounding built form, including recent residential development.

Conclusion

The proposed development will not result in any significant visual impact on the archaeological or architectural heritage of the area for the following reasons:

- The subsurface or removed nature of nearby archaeological features;
- The lack of visual connectivity between the site and significant heritage assets;
- The effective screening provided by topography, vegetation, and existing built form;

9.4.3 Worst Case Scenario

In the absence of effective mitigation measures, the worst-case scenario would involve the accidental disturbance, damage, or destruction of archaeological features identified during testing and any other previously unrecorded archaeological features during construction activities.

Such impacts would constitute a significant adverse effect on the archaeological and cultural heritage resource, resulting in the permanent loss of irreplaceable historical material and a diminished understanding of the area’s historical development and past land use.

9.4.4 Cumulative Impacts

There are no registered archaeological monuments or protected architectural structures within the proposed development site. However, targeted archaeological testing confirmed the presence of seven archaeologically significant features within the site boundary. Additionally, there remains a moderate potential for the discovery of previously unknown archaeological features during the construction phase.

Cumulative effects may arise from the proposed development in combination with:

- The Maglin Sustainable Access Corridor;
- The Link Road project;
- Other nearby residential or infrastructural developments.

When assessed cumulatively with these developments, the proposed LRD scheme contributes to the ongoing urbanisation of the surrounding area. This gradual transformation of the landscape may increase the risk of impacts on sub-surface archaeological remains. However, the implementation of appropriate mitigation measures—including preservation by record, archaeological monitoring, and, where necessary, excavation—will ensure that any known or as-yet-undiscovered archaeological features are identified, recorded, and appropriately managed. This integrated approach minimises the potential for significant cumulative impacts on the cultural heritage resource.

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The potential cumulative impacts of the relevant plan for the area was assessed, which is considered to be the Cork City Development Plan 2022. The assessment of the potential impacts on the environment of the Cork City Development Plan 2022 was undertaken utilising the Strategic Environmental Objectives (SEOs) which are detailed in Table 5.1 of the CDP's Strategic Environmental Assessment. The potential cumulative impacts of the Plan were assessed having regard to these SEO's. Table 5.1 of the SEA identifies the SEO' for 'Cultural Heritage' as being to.

Protect places, features, buildings and landscapes of cultural archaeological or architectural heritage.

Table 7.5 of the CDP's Strategic Environmental Assessment, 'Comparative Assessment of each of the Alternatives against Strategic Environmental Objectives' indicates that Alternative/Scenario 3 'Compact Liveable Growth', the 'Selected Scenario' has positive interactions with the status of the SEO for ''Cultural Heritage'.

9.5 Mitigation Measures

9.5.1 Construction Phase

Targeted archaeological testing confirmed the presence of seven archaeologically significant features - five (F2–F6) in Field 1 and two (F7–F8) in Trench 20 of Area A. These features will be excavated in advance of construction and preserved by record.

Licensed archaeological monitoring of all topsoil removal will be undertaken during construction. If archaeological features or deposits are revealed, the NMS and the Planning Authority will be consulted as outlined in Framework and Principles for the Protection of the Archaeological Heritage (1999). All newly identified archaeological sites will be preserved in situ or by record and sufficient time and resources will be allowed to resolve all archaeological matters. Preservation by record will require the excavation of the archaeological material and such material will be fully resolved to professional standards of archaeological practice (Policy Guidelines on Archaeological Excavation – Department of Arts, Heritage, Gaeltacht and the Islands). This work will be funded by the developer.

9.6 Residual Effects

Following a comprehensive assessment, the residual effects of the proposed development on the cultural heritage environment are assessed as not significant.

There are no registered archaeological monuments or architectural structures on the proposed development site. There will be no direct or indirect effects on any Protected Structures, NIAH-listed buildings, or Architectural Conservation Areas (ACAs).

Due to the subsurface character of nearby archaeological sites, the lack of visual connectivity, and the presence of intervening development and vegetation, the potential visual impact of the proposed development on surrounding heritage assets is considered not significant.

The archaeological excavation and preservation by record of the seven features identified during testing, along with licensed archaeological monitoring during construction, will serve as effective mitigation, ensuring that any unexpected archaeological material encountered is appropriately addressed.

9.7 Difficulties Encountered

No difficulties were encountered during compilation of this EIAR chapter.

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9.9 List of Chapter Appendices

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Appendix 9-2 - Archaeological Testing Report – Lane Purcell Archaeology.

Appendix 9-3 - Walkover Survey Photographs – Lane Purcell Archaeology.

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CHAPTER TEN

NOISE & VIBRATION

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CHAPTER TEN

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CHAPTER 10 | Noise & Vibration

10.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the proposed development with respect to noise and vibration. The proposed development involves the construction of a Large Scale Residential Development (LRD) at Greenfield, Ballincollig, Co. Cork. A full description of the development is available in Chapter 2. The assessment for noise and vibration is based on the most up to date applicable guidance and assessment documents available both nationally and internationally.

Noise and vibration will be considered in terms of two aspects. The first is the outward effect of the development on its surrounding environment, and the second is the inward effect of the existing noise sources in the surrounding environment on the development itself.

This chapter of the EIAR has been prepared by Dr. Aoife Kelly (Senior Acoustic Consultant) with AWN Consulting Ltd.

10.2 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Project Description and Alternative Considered' of this EIAR.

For the purposes of this Chapter the proposed development is a Large Scale Residential Development (LRD,) which includes a mix of residential dwellings ranging over 2-4 storeys and will also include a creche to the east of the development and public realm upgrades to the Greenfield Road.

10.2.1 Construction Stage

During the construction phase, the main site activities are demolition of existing house and farmyard structures on site and site clearance and bulk excavation, foundations, building construction, road works, and landscaping. This phase has the greatest potential noise and vibration impacts on its surrounding environment, however this phase will be of short-term impact. The construction impact assessment will consider the potential impacts on noise sensitive locations (NSLs) external to the proposed development.

NSLs include areas where people spend significant periods of time and where concentration, sleep, and amenity are important considerations. Examples of these sensitive locations include residential dwellings, schools and other educational establishments, hospitals and nursing homes, hotels and other short-term accommodation buildings, buildings of religious sensitivity, recreational and noise-sensitive amenity areas, and offices.

10.2.2 Operational Stage

During the operational phase of the development, no significant sources of noise or vibration are expected with the development. The primary source of outward noise in the operational 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 creche buildings and amenity spaces.

10.3 Methodology

The assessment has been undertaken using the following methodology:

- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- An environmental noise survey has been undertaken in the vicinity of the subject site in order to characterise the existing baseline noise environment;
- Predictive calculations have been performed to estimate the likely noise emissions during the construction phase of the proposed development at the nearest NSLs to the site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at NSLs surrounding the development site;
- An assessment has been completed of potential cumulative impacts that may arise as a result of the proposed development and other existing or proposed plans and projects;
- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with both the construction and operational phases of the proposed development; and
- The inward effect of noise from the surrounding environment into the proposed residential buildings has also been assessed to determine the requirements, for additional noise mitigation, where required, to ensure a suitable internal noise environment for residential amenity.

10.3.1 Relevant Legislation & Guidance

The assessment of impacts has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this chapter. In addition to specific guidance documents for the assessment of noise and vibration impacts which are discussed further in the relevant sections, the EPA *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (May 2022) (EPA EIAR Guidelines) were considered and consulted for the purposes of this chapter.

10.3.2 Construction Phase Methodology

10.3.2.1 Criteria for Assessing Construction Phase - Noise Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phases of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale is considered to be the British Standard BS 5228 – 1: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Noise.*

The approach adopted here requires the designation of a NSL into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a Construction Noise Threshold (CNT) that, if exceeded, indicates a potential significant noise impact associated with the construction activities, depending on context.

The table below sets out the values which, when exceeded, signify a potential significant effect at the façades of residential receptors, as recommended by BS 5228-1:2009+A1:2014.

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Table 10.1 Example Threshold of Potential Significant Effect at Dwellings

Assessment Category and Threshold Value Period	Threshold Value (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23:00 – 07:00)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 19:00–23:00 weekdays, 13:00–23:00 Saturdays and 07:00–23:00 Sundays.

It should be noted that this assessment method is only valid for residential properties, and if applied to commercial premises without consideration of other factors, may result in an excessively onerous thresholds being set.

Proposed Threshold Levels for Noise

Taking into account the proposed document outlined above and making reference to the baseline noise environment monitored around the proposed development site (referred to in Section 10.6.1), CNTs are set using Category A for the closest NSLs to the proposed development.

Interpretation of the Construction Noise Levels (CNL)

In order to assist with interpretation of the significance of a CNL, guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT, is taken from the UK document Design Manual for Roads and Bridges (2020) LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2 (DMRB: Noise and Vibration - UKHE 2020) and adapted to include the EPA 2022 EIAR Guidelines.

Table 10.2 Interpretation of CNL at Dwelling

Impact Guidelines for Noise Impact Assessment Significance (Adapted from DMRB)	CNL per Period	EPA EIAR Guidelines	Determination
Negligible	Below or equal to baseline noise level	Not Significant	Depending on range of CNL, baseline noise level and duration
Minor	Above baseline and below or equal to CNT	Slight to Moderate	
Moderate	Above baseline and below or equal to CNT +5 dB	Moderate to Significant	
Major	Above CNT +5 dB	Significant to Very Significant	

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely impacts during the construction stages.

10.3.2.2 Criteria for Assessing Construction Phase - Vibration Impacts

There are two aspects to the issue of vibration that are considered for this development: the risk of cosmetic or structural damage to buildings; and human response to vibration. In the case of this development, vibration levels used for the purposes of evaluating building protection and human response are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

There is no published statutory Irish guidance relating to the maximum permissible vibration levels for either building response. The following standards are the most widely accepted in this context and are referenced here in relation to cosmetic or structural damage to buildings:

- British Standard BS 5228-2: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Vibration (BS 5228 – 2); and
- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings. Part 2: Guide to damage levels from ground borne vibration (BS 7385-2).

Cosmetic or Structural Damage to Buildings

BS 5228-2 and BS 7385 define the following thresholds for cosmetic damage to residential or light commercial buildings: PPV should be below 15 mm/s at 4 Hz to avoid cosmetic damage. This increases to 20 mm/s at 15 Hz and to 50 mm/s at 40 Hz and above. At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

The standard also notes that below 12.5mm/s PPV, the risk of damage tends to be zero. Historically important buildings that are difficult to repair might require special consideration on a case by case basis, but buildings of historical importance should not be assumed to be more sensitive unless they are structurally unsound. If a building is in an unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other ground borne disturbance. The vibration limit range for protected and historical buildings are equal to or up to 50% of those for light framed buildings, depending on their structural integrity. Where no structural defects are noted, the same limit to those for light framed buildings apply. This is summarised in Table 10.3 below.

Table 10.3 Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Unsound or Vulnerable Structures	6mm/s	

Note 1: Values referred to are at the base of the building.

Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

Human Perception

Humans are sensitive to vibration stimuli, and perception of vibration at high magnitudes may cause concern to building occupants. BS 5228-2:2009+A1:2014 notes that vibration typically becomes perceptible at around 0.15 to 0.3 mm/s and may

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become disturbing or annoying at higher magnitudes. Higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin of vibration is known.

Table 10.4 presents the significance table relating to potential impacts to building occupants during construction based on guidance from BS5228-2:2009+A1:2014 and the DMRB Noise and Vibration (UKHE 2020) document and the associated EPA significant ratings.

Table 10.4 Guidance on Effects of Human Response to PPV Magnitudes

Criteria	DMRB Impact Magnitude	EPA Significance Rating
≥10 mm/s PPV	Very High	Very Significant
≥1 mm/s PPV	High	Moderate to Significant
≥0.3 mm/s PPV	Medium	Slight to Moderate
≥0.14 mm/s PPV	Low	Not significant to Slight
<0.14 mm/s PPV	Very Low	Imperceptible to Not significant

10.3.2.3 Criteria for Assessing Construction Phase – Traffic

Vehicular movement to and from the construction site for the proposed development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced: DMRB Noise and Vibration 2020 and the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB document. Table 10.5 relates changes in traffic noise levels to impact on human perception based on the guidance contained in these documents.

Table 10.5 Classification of Magnitude of Noise Impacts in the Short-Term

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant
3 – 4.9	Perceptible	Moderate	Slight, Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

The DMRB guidance outlined will be used to assess the predicted increases in traffic levels on public roads associated with the proposed development and comment on the likely impacts during the construction stage.

For both construction noise and construction traffic, a significant effect is deemed to occur where a moderate or major impact is likely to occur for a period of greater that 10 days/nights over 15 consecutive day/nights, or greater than 40 days over 6 consecutive months.

10.3.3 Operational Phase Methodology

10.3.3.1 Criteria for Assessing Operational Outward Noise Impacts

The main potential source of outward noise from the proposed development will be limited to traffic flows to and from the development site onto the public roads. There will also be an element of mechanical and electrical plant required to service creche and apartment buildings. The relevant guidance documents used to assess potential operational noise and vibration impacts on the surrounding environment are summarised in the following sections.

Change in Traffic Noise Levels

In the absence of any Irish guidelines or standards describing the effects associated with changes in road traffic noise levels, reference has been made to the DMRB Noise and Vibration (UKHE 2020) document. This document provides magnitude rating tables relating to changes in road traffic noise. For the operational phase of the development, changes in traffic noise are assessed against the long-term magnitude criteria for traffic flows along the surrounding road network. In summary, the assessment looks at the impact with and without development at the nearest noise sensitive locations.

Table 10.6 Likely Impact Associated with Long-term Change in Traffic Noise Level (DMRB 2020)

Change in Noise Level (dB L_{A10})	DMRB Long-Term Term Magnitude	EPA Classification Magnitude of Impact
<0.1	Negligible	Imperceptible
0.1 – 2.9		Not significant
3 – 4.9	Minor	Slight to Moderate
5 – 9.9	Moderate	Moderate to Significant
10+	Major	Significant to Very Significant

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

Mechanical and Electrical Plant

The proposed development is largely residential in nature comprising a mixture of houses, duplex and apartments. There is one creche located to the east of the site. There will be minimal mechanical and/ or electrical plant items required to service the development that will generate noise levels outside of the site boundary or at the developments buildings themselves. Plant contained within plant rooms has the least potential for impact, once consideration is given to appropriate design of the space.

The closest NSLs to any operational plant items are the residential dwellings within the proposed development. To ensure there is no adverse impact on the future inhabitants of the proposed development itself, it is appropriate to refer to internal noise targets derived from BS 8233: 2014: *Guidance on Sound Insulation and Noise Reduction for Buildings*. The recommended indoor ambient noise levels and derived external noise levels are set out in Table 10.7 and are based on annual average data.

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The derived external levels are based on the approximate attenuation provided by a partially open window of 15 dB, as advised in BS 8233 (BSI 2014c), and represent the appropriate noise level at the external façade of the building. For mechanically ventilated buildings, higher external noise levels will achieve the same internal noise levels with closed windows.

Table 10.7 Internal Noise Design Range for Residential Buildings (BS 8233:2014)

Activity	Location	Internal Noise Design Range dB $L_{Aeq,\ T}$	Derived External Levels dB $L_{Aeq,\ T}$
Residential Day	Living room	35	50
	Dining room/area	40	55
	Bedroom	35	50
Residential Night	Living room	35	50
	Dining room/area	40	55
	Bedroom	30	45

10.3.3.2 Criteria for Assessing Inward Noise Impacts

Cork Agglomeration Noise Action Plan (NAP) 2024-2028

The Cork Agglomeration Noise Action Plan was revised in 2024. To assist local authorities and in the absence of Irish planning guidance the Draft Interim National Guidance for the Consideration of Transportation Noise in the Design of New Residential Development was compiled in 2021 by the NIECE Local Authority Noise Subgroup, recommends:

> *"consideration is given to the potential impact of transportation noise in line with Professional Planning Guidance (ProPG) on Planning & Noise: New Residential Development (ProPG, 2017)."*

Section 7.5 of the NAP sets out the approach for minimising the adverse impacts of noise without placing unreasonable restrictions on development. For the scenario where new developments are developed close to existing noise sources, e.g. new housing, hospitals, school, nursing home etc developments near to existing road, rail, industry etc. The NAP notes:

> *"to effectively employ the planning process for consistent noise exposure avoidance or mitigation, it is deemed beneficial to incorporate guidelines on noise exposure levels during the initial proposal and design phase of planning applications. Descriptions of guidance adopted in the Agglomeration is set out below"*

The guidance documents referred to in 7.5.1 to 7.5.4 of the NAP relate to residential development to control noise levels both within internal noise sensitive areas and within external amenity areas. The relevant standards and guidance for the consideration of noise where there is proposed new residential development near major transportation sources (roads and railways) include:

- the Professional Planning Guidance on Planning & Noise: New Residential Development (ProPG, 2017),
- Acoustic Ventilation and Overheating, Residential Design Guide (AVO, 2021),
- BS 8233:2014 Guidance on sound Insulation and Noise Reduction for Buildings and
- ISO 19488:2021 Acoustics: Acoustic classification of dwellings.

The NAP also states the following:

> *"Applications for new residential developments in the Agglomeration will be assessed in accordance with the policies and goals outlined in the relevant City and County Development Plans. Where applicable, these include adoption of the principles of Professional Planning Guidance (ProPG) on Planning & Noise: New Residential Development, as described in Section 7.5.1.*
>
> *Where the assessment outcome determines the likelihood of an adverse noise impact, planning applications should be supplemented by an Acoustic Design Statement carried out by appropriately qualified acousticians and competent persons. The Acoustic Design Statement should demonstrate that all facets of ProPG have been followed."*

In accordance with this NAP policy, the *Professional Practice Guidance on Planning & Noise* (ProPG) guidance has been adopted to inform the inward impact of the assessment and is described in further detail below.

Professional Practice Guidance on Planning & Noise (ProPG 2017)

The *Professional Practice Guidance on Planning & Noise* (ProPG 2017)[1] has been generally considered best practice guidance adopted in Ireland, in the absence of equivalent Irish guidance for inward noise impact assessments.

The ProPG outlines a systematic risk based 2-stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows: -

- *Stage 1:* Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels.
- *Stage 2:* Involves a full detailed appraisal of the Proposed Development covering four "key elements" that include: -
  - ***Element 1*** – Good Acoustic Design Process
  - ***Element 2*** – Noise Level Guidelines
  - ***Element 3*** – External Amenity Area Noise Assessment
  - ***Element 4*** – Other Relevant Issues

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk, based on the pre-existing noise environment. Figure 10.1 presents the basis of the initial noise risk assessment; it provides appropriate risk categories for a range of continuous noise levels either measured and / or predicted on site.

1 Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH).

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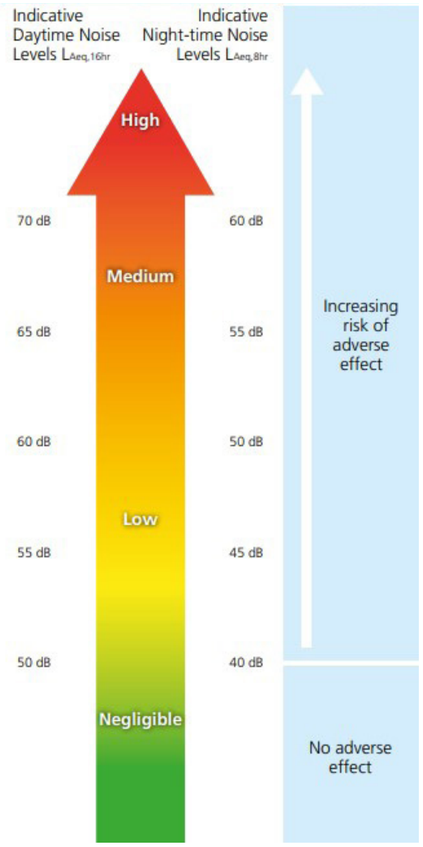

Figure 10.1 ProPG Stage 1 - Initial Noise Risk Assessment

It should be noted that a site should not be considered a negligible risk if more than 10 no. L_{AFMax} events exceed 60 dB during the night period, and the site should be considered a high risk if the L_{AFMax} events exceed 80 dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233: 2014. The recommended indoor ambient noise levels are set out in Table 10.7 previously and are based on annual average data.

In addition to these absolute internal noise levels, ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

ProPG provides the following advice with regards to external noise levels for amenity areas in the development: -

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

Appendix 10.1 Acoustic Design Statement presents the ProPG assessment for the Proposed Development. Mitigation measures identified from the ProPG assessment are presented in Section 10.9.2.3 of this EIAR chapter. A glossary of acoustic terminology is available in Appendix 10.2.

10.3.3.3 Operational Phase – Vibration

The development is residential in nature and there are no vibration sources associated with the proposed development. Therefore, there will be no outward impacts associated with vibration for the operational phase, and accordingly such impacts have been scoped out.

10.4 Difficulties Encountered

There were no difficulties encountered in compiling this assessment.

10.5 Description of existing Environment

The proposed development site is a greenfield site located in Greenfield, Ballincollig, County Cork, directly bound on the north by the existing Woodberry/Greenfields Road and to the south by the Ballincollig Bypass (N22). For the Proposed Development the existing noise and vibration environments across the sites and in the vicinity of the nearest existing NSLs are dictated by transportation sources in the study area.

10.6 Baseline Noise Survey

10.6.1 Survey Locations and Periods

The monitoring locations for this survey are described below and illustrated in Table 10.8 and Figure 10.2.

Table 10.8 Survey Locations and Periods

Ref	Description	Survey Period
UN01	Unattended Noise meter installed along southern site boundary, approximately 20m from N22 road. Microphone was positioned to a height of 4m. Representative of the south façade of the proposed development. Noise monitoring was installed at this location to log over 24 hours.	5 to 6 February 2025, logged over 15 minute intervals
AT01	Attended daytime noise survey location. The measurement position was along the western site boundary, representative of residential dwellings located to the west and north-west of site. The microphone was positioned to a height of 1.5m.	3 x 15 minute daytime attended measurements, 5 February 2025
AT02	Attended daytime noise survey location at northern site boundary, representative of residential dwellings to the north and north-east of site. The microphone was positioned to a height of 1.5m.	3 x 15 minute daytime attended measurements, 5 February 2025
AT03	Attended daytime noise survey location. The measurement position was representative of the east façade of the proposed development. The microphone was positioned to a height of 1.5m.	3 x 15 minute daytime attended measurements, 5 February 2025

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Figure 10.2 Noise Monitoring Locations

10.6.2 Survey Procedures

Baseline noise monitoring has been undertaken across the development site from 5th to 6th February 2025 to determine the range of noise levels at varying locations across the development site and to establish the existing noise climate the nearest existing NSLs as outlined in Table 10.8 and detailed in Figure 10.5.

The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise.*

10.6.3 Survey Parameters

The following measurement parameters were measured and are discussed within this chapter.

$L_{Aeq,T}$ is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value over the defined measurement period, T.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

$L_{A90,T}$ is the A-weighted sound level that is exceeded for 90% of the sample period; generally used to quantify background noise. The T is the sample period the parameter is measured over.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$Pa.

10.6.4 Survey Equipment and Personnel

The unattended and attended noise surveys were undertaken by AWN Consulting using Rion NL-52 sound level meters and were calibrated using a Rion NC-75 type calibrator. The specific equipment details are summarised in Table 10.9.

Table 10.9 Noise Monitoring Equipment

Equipment	Serial Number	Calibration Date
Rion NL-52	586940	20/02/2024
Rion NL-52	976162	19/09/2024
Rion NC-75	34313057	28/11/2024

For unattended noise surveys, a Rion WS-15 Outdoor Microphone Protection System was used with microphone extension cable and outdoor peli-case.

10.6.5 Weather Conditions

Weather conditions during the unattended and attended surveys were calm and dry and did not adversely affect noise measurements.

10.6.6 Survey Results

10.6.6.1 Attended Survey Results

The survey results for the attended monitoring locations are presented in Table 10.10.

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Table 10.10 Noise Monitoring Results at AT01, AT02 and AT03

Date	Location	Start Time	Measured Noise Levels (dB re.2x10-5Pa)		
			L_{Aeq}	L_{AMax}	L_{A90}
5 February 2025	AT01	11:00	50	61	47
		12:35	52	62	46
		13:55	52	60	47
	AT02	11:35	55	66	46
		13:05	56	66	51
		14:25	55	68	48
	AT03	12:00	52	61	47
		13:30	55	69	51
		14:55	54	68	50

Local road traffic from Greenfields Road and birdsong were the dominant noise sources at AT01. Distant noise from the N22 was audible throughout the daytime measurement periods, along with intermittent air traffic. Ambient noise levels ranged between 50 to 52 dB L_{Aeq}. Background noise levels ranged between 46 to 47 dB L_{A90}.

At monitoring location AT02, road traffic noise from Greenfields Road and birdsong were noted as the dominant noise source. Distant noise from the N22 was noted during all monitoring periods during lulls in local road traffic. A nearby operating generator was audible during the second measurement. Ambient noise levels ranged between 55 to 56 dB L_{Aeq}. Background noise levels ranged between 46 to 51 dB L_{A90}.

Road traffic from the N22 and birdsong were the dominant sources of noise at AT03. Intermittent air traffic was noted during the third measurement period. Ambient noise levels ranged between 52 to 55 dB L_{Aeq}. Background noise levels ranged between 47 to 51 dB L_{A90}.

10.6.6.2 Unattended Survey Results

Unattended measurements at location UN01 were carried out between 10:45hrs on 5 February 2025 to 10:45hrs on 6 February 2025. The weather during the survey period was dry, with 50% cloud cover and winds speeds not exceeding 5 m/s.

Road traffic from the N22 was the main source of noise at this location. Other noise sources recorded were intermittent birdsong as well as occasional air traffic flying overhead. Noise levels measured at UN01 are presented in Figure 10.3.

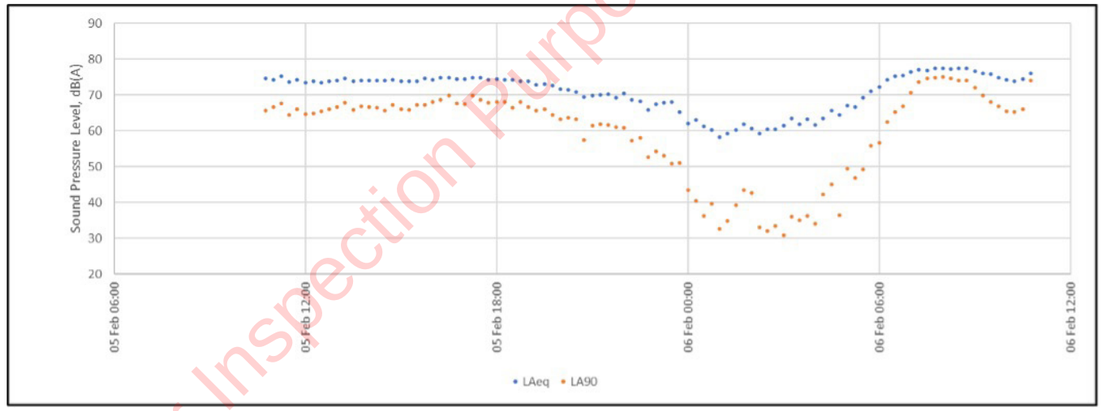

Figure 10.3 UN01 Survey Noise Levels (L_{Aeq} and L_{A90})

The average L_{Aeq} and L_{A90} survey results and maximum L_{AMax} noise level for each date measured at U01 are summarised in Table 10.11. The results are presented in terms of the average 16 hour daytime (07:00 to 23:00hrs) and 8 hour night-time (23:00 to 07:00hrs). Subjective observations during the setup and removal of the monitoring equipment noted that the primary contributor to noise build-up was road traffic noise.

Table 10.11 Unattended Noise Monitoring Results

Date	Time	Measured Noise Levels (dB re.2x10-5Pa)		
		$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
5 February 2025	L_{Day} (07:00 – 19:00)	73	94	65
	L_{Night} (23:00 – 07:00)	68	84	44
6 February 2025	L_{Day} (07:00 – 19:00)	76	87	71
Average	$L_{Aeq\ 16hr}$ (07:00-23:00)	74	-	51
	L_{night} (23:00 – 07:00)	68	-	44

10.7 The ‘Do Nothing’ Scenario

The Do Nothing scenario includes retention of the current site without the proposed development in place. In this scenario, noise levels at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

In the absence of the proposed development it is likely that a development of a similar nature would be constructed in the future in line with national policy and the development plan objectives. Therefore, the construction and operational phase impacts outlined in this assessment are likely to occur in the future even in the absence of the implementation of the development proposed in this EIAR.

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10.8 Potential Significant Effects

The general commentary presented in the following sections are the same across the proposed development, unless otherwise indicated under the relevant headings.

10.8.1 Demolition & Construction Phase

10.8.1.1 Noise

A variety of items of plant will be in use for the purpose of demolition, site clearance and construction works. There will also be vehicular movements to and from the site that will make use of existing roads. Due to the nature of these activities, there is potential for the generation of elevated levels of noise in the vicinity of existing NSLs. It is estimated that the overall duration of the four phase construction period will be approximately 96 months in total but completed over four phases and hence impacts are temporary to short-term in nature at any one NSLs as outlined in Figure 10.4.

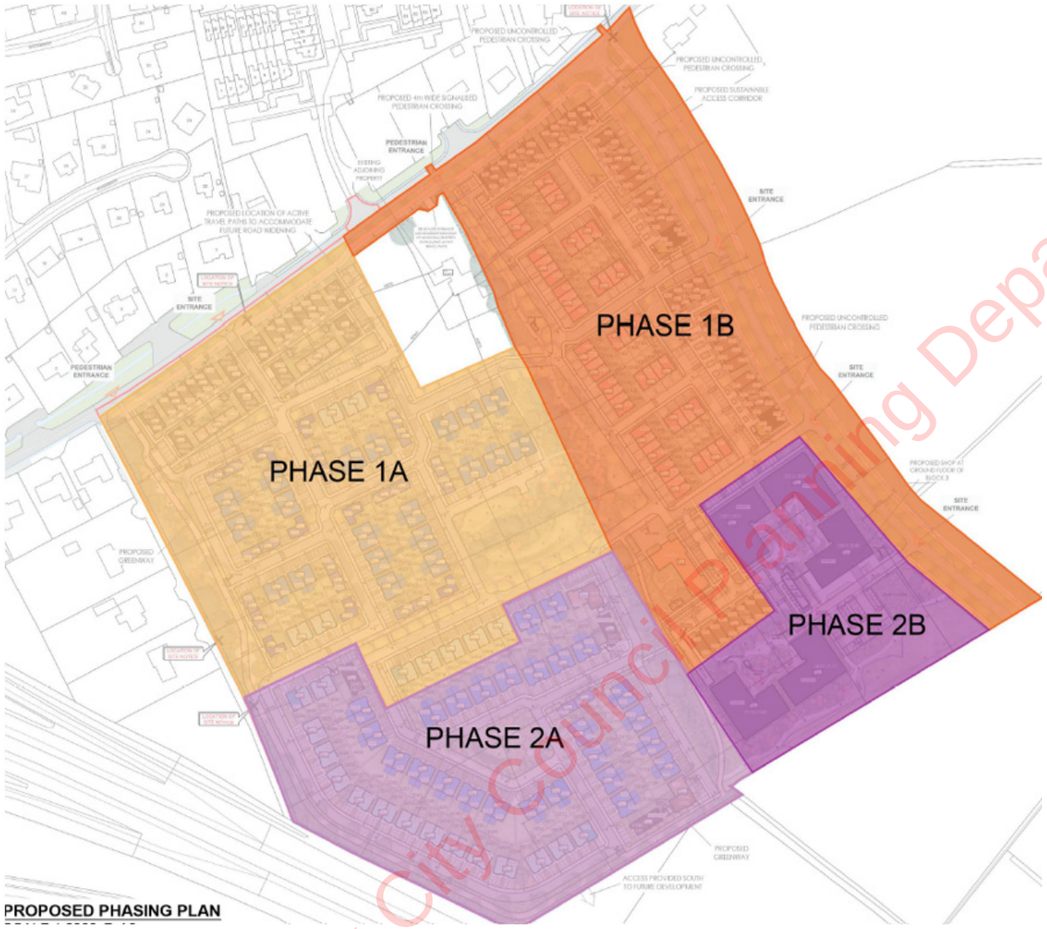

Figure 10.4 Proposed Phasing Plan

The proposed general construction hours are 07:30 to 18:00 hrs, Monday to Friday and 07:30 to 12:00 hrs on Saturdays. On occasions it may prove necessary to carry out noisy activities outside of normal working hours. In such instances prior consultation will be carried out with Cork City Council and local residents outlining the nature and reason for the works and their likely duration.

As discussed in Section 10.3.2, the construction noise threshold (CNT)s are set using Category A from BS 8233-1 for the closest NSLs which sets the following threshold values.

- Daytime (07:00 – 19:00hrs weekdays) /Saturday AM: 65 dB $L_{Aeq,12hr}$
- Evening and Weekends: 55 dB $L_{Aeq,T}$

The main stages of construction will be progressed in four successive phases. As the construction programme has been established in outline form only, construction noise associated with activities on site during this phase are reviewed for the purposes of determining the likely significant effects. Indicative ranges of noise levels associated with construction may be calculated in accordance with the methodology set out in BS 5228-1:2009+A1:2014. This standard sets out sound power and sound pressure levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels. However, it is not possible to conduct detailed accurate prediction calculations for the construction phase of a project due to the level of variability during different construction stages over short periods of time.

The following activities have been assessed to determine the likely potential noise impacts associate with the planned works across the three construction phases of the site.

Rock Excavation

As per the CEMP, it is likely the volume of rock to be removed will be minimal and localised and should not require a rock-breaker. Therefore the construction assessment for noise does not include for rock excavation.

Site Clearance, Bulk Excavation, Foundations and Road Works

For site clearance, bulk excavations and fill work, foundation and road works using excavators, loaders, dozers, concreting works, mobile cranes, generators, noise source levels are quoted in the range of 70 to 80 dB L_{Aeq} at distances of 10 m within BS 5228-1.

For ongoing construction activity associated with the above activities, a total construction noise level of 85 dB L_{Aeq} at 10m has been used for the purposes of indicative calculations representing a variety of plant items and activities over this stage. This would include, for example two items of plant at 80 dB L_{Aeq} and three items of plant at 75 dB L_{Aeq} operating simultaneously within one work area resulting in a total noise level of 85 dB L_{Aeq}.

This scenario is a robust assumption made for a development of this size, on the basis that it is unlikely that more than 5 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other at all times. In reality items of construction plant and machinery will be operating at varying distances from any one NSL.

Superstructure and Landscaping Works

Given the nature of the proposed construction phases which will include standard residential house building techniques across the site, once the ground preparation and foundation works have been completed, a large portion of the work will involve manual labour and cranes with lower overall noise levels. For this phase of work, smaller items of mobile plant (excavators,

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cranes, dozers), landscaping and concreting works with lower noise emissions, a total construction noise level of 78 dB L_{Aeq} at 10m has been used for the purposes of indicative calculations. This would include, for example one item of plant at 75 dB L_{Aeq} and three items of plant at 70 dB L_{Aeq} operating simultaneously within a work area.

Indicative Construction Noise Calculations at Distance from Works

The closest NSLs to the proposed development are residential dwellings to the north of the N22 and east and west of the Greenfield Road. NSL01 to NSL04 are located to the west, northwest and north of the proposed development at distances between 5m to 35m from the site boundary and closest site works. The closest house construction works are within 30m of the closest NSL (NSL01).

Figure 10.5 illustrates the closest NSLs externally located to the proposed development site. During Phase 2a and Phase 2b NSLs within the proposed development may be within comparable distances to the construction works as the external NSLs to the site. Therefore comments related to the external NSLs are also applicable to those NSLs occupied during the Phase 2a/2b works.

Figure 10.5 Closest NSLs to Proposed Development

Construction noise levels (CNL) have been calculated at the closest NSLs, assuming the construction noise activities and source noise levels discussed previously. The calculations assume that the equipment will operate for 66% of the working time. Table 10.12 summarises the result of this assessment.

Table 10.12 Indicative CNLs at Closest Distances

Demolition and Construction Phase	Sound Pressure Level at Demolition and Construction Works, dB L_{Aeq}	Calculated Noise Levels at Varying Distances, dB $L_{Aeq,T}$					
		10m	15m	20m	35m	60m	75m
Demolition and Site Clearance, Bulk Excavation, Foundations, and Road Works	85	82	78	75	70	65	63
Superstructure, Compounds and Landscaping Works	78	75	71	68	63	58	56

Demolition, Site Clearance, Bulk Excavation and Foundations

The conservative predictions detailed in Table 10.12 indicate that construction activities can operate within the adopted construction noise thresholds of 65 dB $L_{Aeq,T}$ at the closest NSLs located at greater than 60m from building works with higher noise emissions associated with demolition, site clearance, excavations, road works etc, thus resulting in a negative, significant to very significant and temporary effect at NSLs immediately west, northwest and north of the proposed development (NSL01 to NSL04). At all remaining NSLs the CNT will not be exceeded, thus resulting in a negative, not significant to slight and short-term effect at distances of 60m and beyond.

Superstructure and Landscaping Works

During the general construction working associated with house construction, compounds and landscaping works etc. the calculated noise levels in Table 10.12 indicate that construction activities can operate within the adopted construction noise thresholds of 65 dB $L_{Aeq,T}$ at distances greater than 25m from the general construction works. Therefore resulting in a negative, moderate to very significant and temporary effect at NSLs immediately west, northwest and north of the proposed development (NSL01, NSL02 and NSL04) during landscaping works immediately along the site boundary. However at all remaining NSLs the CNT will not be exceeded, thus resulting in a negative, not significant to slight and short-term effect at distances of 25m and beyond.

The construction phase will be controlled through the use of construction noise threshold values which the contractor will be required to work within as much as is practicable. In this regard, the choice of plant, scheduling of works on site, provision of screening and other best practice control measures will be employed. Further discussion on construction noise and vibration control measures are included in Section 10.9.1.

10.8.1.2 Vibration

During site clearance and excavations activities, there is the potential for vibration to be generated through the ground. Empirical data for this activity is not provided in BS 5228–2, however the likely levels of vibration from this activity will be significantly below the vibration criteria for building damage based on monitoring data and experience from other sites. AWN Consulting has previously conducted vibration measurements under controlled conditions, during trial construction works on

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a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator; and
- 6 tonne hydraulic breaker on large Liebherr tracked excavator.

Vibration measurements were conducted during various staged activities and at various distances.

Peak vibration levels during staged activities using the 3 tonne breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Using a 6 tonne breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 to 50m respectively.

Whilst these measurements relate to a solid concrete slab, the range of values recorded provides some context in relation to typical ranges of vibration generated by general construction activity.

With respect to the potential vibration impact, the only significant source of vibration is expected to be due to excavations and foundation activities. The distance between the areas where these activities are to occur and the nearest NSLs are such that all vibration transmission would be orders of magnitude below recommended guideline criteria for building response in Table 10.3.

In terms of human response within buildings, there is potential for vibration magnitudes during breaking to be perceptible at low level at NSLs within 50m (NSL01 to NSL03). Therefore, it is expected in the absence of specific mitigation measures that there will be a negative, slight to moderate and temporary impact at the closest NSLs within 50m and a negative, not significant and temporary impact at NSLs at further distances.

Mitigation measures and recommended good practices have been outlined in Section 10.9.1.

10.8.1.3 Construction Traffic

Based on the CEMP prepared by DOSA Consulting Engineers it is anticipated that during the busiest period onsite, namely the groundworks element of the works, an estimated 60 no. HGV's will deliver to the site on a daily basis for the duration of this work element. Therefore as a conservative estimate it has been assumed that no more than 15 no. HGV peak vehicle movements will be carried out in a one hour period during the construction works. It is assumed that all of the HGVs will enter / exit the site via Greenfields Road to the north of the site. The nearest NSL to the site entrance is at 25m (NSL04).

The noise level associated with an event of short duration, such as a passing vehicle movement, may be expressed in terms of its Sound Exposure Level (L_{AX}). The mean value of Sound Exposure Level (SEL) for a truck at low to moderate speeds (i.e. 15 to 45km/hr) is of the order of 85 dB L_{AX} at a distance of 10 metres from the vehicle. This figure is based on a series of measurements conducted under controlled conditions. The SEL can be used to calculate the contribution of an event or series of events to the overall noise level in a given period.

The appropriate formula is given below.

$$L_{Aeq,T} = L_{AX} + 10Log_{10}(N) - 10Log_{10}(T) + 20Log_{10}\left(\frac{r_1}{r_2}\right) dB$$

where: -

$L_{Aeq,T}$ is the equivalent continuous sound level over the time period T in seconds).
L_{AX} is the "A-weighted" Sound Exposure Level of the event considered (dB).
N is the number of events over the course of time period T.
r_1 is the distance at which L_{AX} is expressed.
r_2 is the distance to the assessment location.

The predicted noise level at the nearest residential NSLs (25m) is in the order of 60 dB $L_{Aeq,1hr}$ and is therefore below the CNT of 65 dB $L_{Aeq,1hr}$ at the closest residential NSLs along the Greenfields Road. This is just perceptible comparable to the baseline monitoring results that were in the range between 55 to 56 dB $L_{Aeq,15\ mins}$ from the road side and remains below the CNT of 65 dB $L_{Aeq,1hr.}$

Therefore, it is expected in the absence of specific mitigation measures that there will be a negative, not significant and short-term impact at the closest receptors.

No further mitigation measures would therefore be required.

10.8.2 Operational Phase

Once the proposed development is operational, the potential noise impacts to the surrounding environment are predicted to be minimal. The residential aspect 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 (road traffic noise, estate vehicle movements, children playing, etc.) and, hence, no significant impact are predicted in this regard.

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 new residential buildings. Potential noise impacts from the Proposed Development also relate to operational plant serving the creche building.

Once operational, there are no noteworthy sources of vibration associated with the development site.

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10.8.2.1 Additional Vehicular Traffic on Surrounding Roads

For the purposes of assessing the potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads and junctions with and without the proposed development, given that traffic from the development will make use of the existing road network.

A traffic impact assessment relating to the proposed development has been prepared by Egis Group as part of this EIAR and the junctions are illustrated in Figure 10.6.

Traffic flows along the surrounding road network in terms of Annual Average Daily Traffic (AADT) for the Do Nothing (DN) and Do Something (DS) scenarios have been reviewed to calculate the change in traffic noise.

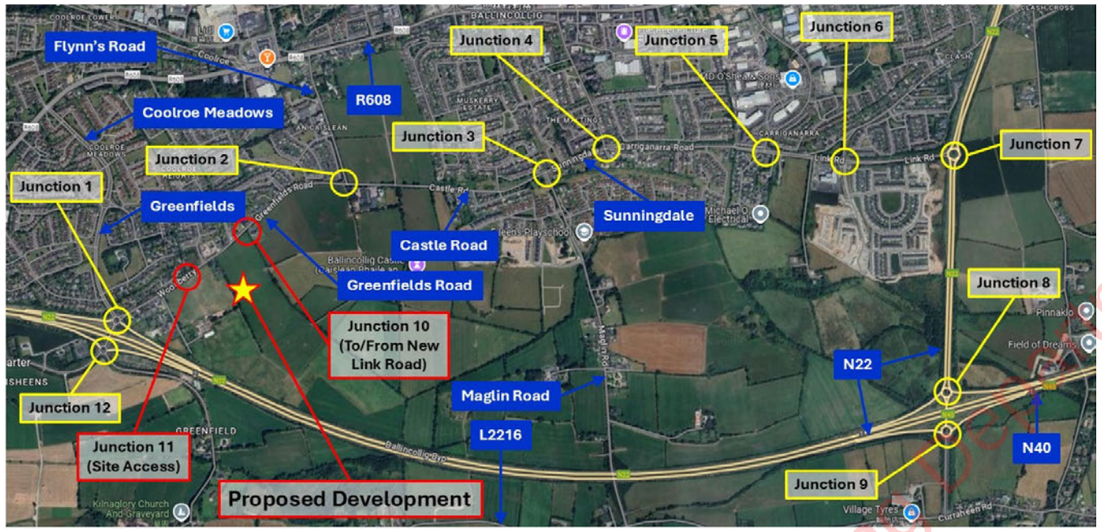

Figure 10.6 Operational Traffic Junctions Assessed Relative to Proposed Development (Source: Egis Group)

Table 10.13 summarises the AADT for the Proposed Development DN and DS scenarios across the various junctions and links for opening year (OY) 2032.

Table 10.13 Summary of Change in Noise Level, for 2032 OY

Junction	Arm	DN 2032 (OY)		DS 2032 (OY)		Increase in Noise Level dB
		AADT	% HGV	AADT	% HGV	
Junction 1	Arm A - Greenfields Rd	10,719	2.4%	12,519	2.0%	+0.3
	Arm B - N22 Eastbound	5,765	3.5%	6,102	3.3%	+0.1
	Arm C - L2216	11,601	3.3%	12,543	3.0%	+0.1
	Arm D - N22 Eastbound	1,566	3.5%	1,739	3.2%	+0.2
	Arm E – Greenfields Rd	9,146	2.5%	9,493	2.4%	+0.1
Junction 2	Arm A - Greenfields Rd	10,193	2.5%	12,285	2.1%	+0.4
	Arm B - Flynn's Rd	6,366	2.2%	7,077	2.0%	+0.2
	Arm C - Castle Rd	10,180	2.1%	11,562	1.8%	+0.2
Junction 3	Arm A - Sunningdale	11,224	1.3%	12,327	1.2%	+0.3
	Arm B - Maglin Rd	6,087	1.1%	6,366	1.1%	+0.2
	Arm C - Castle Rd	11,076	1.5%	12,458	1.3%	+0.3
Junction 4	Arm A - Sunningdale	11,290	1.3%	12,393	1.2%	+0.3
	Arm B - Station Rd	6,951	0.9%	7,247	0.8%	0.0
	Arm C - Carriganarra Road	11,320	1.4%	12,127	1.3%	+0.2
Junction 10	Arm C - Greenfields Road South	10,719	2.4%	12,577	2.0%	+0.3
Junction 12	Arm C - L2216	11,601	3.3%	12,543	3.0%	+0.1

The predicted increase in AADT traffic levels along the local road network surrounding the Proposed Development range between 0.0 to 0.4 dB(A) for the opening year 2032. Reference to Table 10.6 confirms that the traffic noise level increases for the opening year OY are neutral to negative, imperceptible to not significant and long-term.

Table 10.14 summarises the AADT for the Proposed Development DN and DS scenarios across the various junctions and links for design year (DY) 2047.

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Table 10.14 Summary of Change in Noise Level, for 2047 DY

Junction	Arm	DN 2047 (DY)		DS 2047(DY)		Increase in Noise Level dB
		AADT	% HGV	AADT	% HGV	
Junction 1	Arm A - Greenfields Rd	11,266	2.7%	12,901	2.3%	+0.2
	Arm B - N22 Eastbound	6,092	3.9%	6,398	3.7%	+0.1
	Arm C - L2216	12,248	3.7%	13,103	3.4%	+0.1
	Arm D - N22 Eastbound	1,651	3.9%	1,808	3.6%	+0.2
	Arm E – Greenfields Rd	9,662	2.8%	9,978	2.7%	0.0
Junction 2	Arm A - Greenfields Rd	10,706	2.8%	12,606	2.4%	+0.3
	Arm B - Flynn's Rd	6,696	2.4%	7,342	2.2%	+0.2
	Arm C - Castle Rd	10,651	2.3%	11,906	2.1%	+0.3
Junction 3	Arm A - Sunningdale	11,742	1.5%	12,744	1.4%	+0.2
	Arm B - Maglin Rd	6,215	1.3%	6,468	1.2%	0.0
	Arm C - Castle Rd	11,590	1.7%	12,845	1.5%	+0.2
Junction 4	Arm A - Sunningdale	11,812	1.5%	12,814	1.4%	+0.2
	Arm B - Station Rd	7,304	1.0%	7,572	0.9%	0.0
	Arm C - Carriganarra Road	11,874	1.6%	12,607	1.5%	+0.1
Junction 10	Arm C - Greenfields Road South	11,266	2.7%	12,954	2.3%	+0.2
Junction 12	Arm C - L2216	12,248	3.7%	13,103	3.4%	+0.1

The predicted increase in AADT traffic levels along the local road network surrounding the proposed development range between 0.0 to 0.3 dB(A) for the design year 2047. Reference to Table 10.6 confirms that the traffic noise level increases for the design year OY are neutral to negative, imperceptible to not significant and long-term.

There is also new link road (Junction 10 Arm B) entering into the proposed development at the north of the site and within 25m of the closest NSL (NSL04). The mean value of Sound Exposure Level (SEL) for a truck at low to moderate speeds (i.e. 15 to 45km/hr) is of the order of 68 dB L_{AX} at a distance of 10 metres from a light vehicle (e.g. car). This figure is based on a series of measurements conducted under controlled conditions. As per the equation outlined in Section 10.8.1.3 the SEL can be used to calculate the contribution of an event or series of events to the overall noise level in a given period.

Assuming an AADT of 2,252 for a light vehicle (Figure provided by Egis Group) the predicted noise level at the nearest residential NSLs (25m) is in the order of 51 dB $L_{Aeq,12hr}$ and is comparable to the baseline monitoring results that were in the range between 55 to 56 dB $L_{Aeq,15\ mins}$ from the road side.

Therefore, it is expected in the absence of specific mitigation measures that there will be a negative, not significant and long-term impact at the closest receptors.

No further mitigation measures would therefore be required.

10.8.2.2 Building Services Plant

Once operational, there will be building services plant items required to serve the residential and crèche building aspects of the proposed development. The specific requirements for mechanical and electrical plant items for each element of the residential buildings and crèche building have not yet been finalised at this stage of the design. Most of this plant will be capable of generating noise to some degree and may operate 24 hours a day. It would, therefore, be most noticeable during quiet periods (i.e. overnight). Noisy plant with a direct line-of-sight to noise sensitive properties as well as louder plant areas on roofs would potentially have the greatest impact.

Plant items will be selected, designed and located so that there is no adverse impact on sensitive receivers within the development itself. The cumulative operational noise level from building services plant at the nearest noise sensitive location within the Proposed Development will be designed/attenuated to not exceed the internal noise levels discussed in Table 10.7.

Taking into account that sensitive receptors within the proposed development are much closer than off-site sensitive receptors, once the relevant noise criteria are achieved within the proposed development, it is expected that there will be no significant negative impact to sensitive receptors off site.

10.8.3 Cumulative Effects

A review of approved and proposed developments in the local area which are external to the cumulative site, as summarised in Chapter 1 of this EIAR.

There are a number of approved applications in the local area as outlined in Chapter 1. Depending on the proximity of the construction works to the nearest NSLs it is possible that cumulative impacts could occur at the nearest receptors to the proposed development should all sites progress construction simultaneously. The closest development (Planning Ref: 23/42446 Cois CaIslean Phase 2) is located to the east at 500m from the closest site boundary. The closest common NSL is NSL04 at 750m. Therefore the construction noise from this sites is expected to be significantly below the predicted noise levels at the closest NSL (NSL04) for the proposed development i.e. logarithmically the other development will be at least 10 dB below the predicted noise levels in Section 10.8.1 and there will be no cumulative effect.

10.9 Mitigation Measures

The following mitigation measures are outlined for the Proposed Development.

10.9.1 Demolition & Construction Phase Mitigation

Mitigation measures for the demolition and construction phases are set out below in order to reduce potential impacts as far as practicable to within the adopted design goals for noise and vibration.

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The assessment detailed in Section 10.8.1 has determined that construction activities can typically operate within the adopted construction noise threshold levels at the closest off-site NSLs when carried out at distances greater than 60m from the main phases of the construction works.

Vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 10.3 to avoid any cosmetic damage to buildings.

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid exceedance of the adopted construction noise threshold values at the nearest NSLs. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

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

Further comment is offered on these items in the following paragraphs.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring.

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item will be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action will be to identify whether said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control at source. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

The following best practice migration measures will be considered:

- Site compounds will be located away from noise sensitive boundaries within the site constraints.
- The use of lifting bulky items, dropping and loading of materials within these areas will be restricted to normal working hours.
- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant will be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling, ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen will be wrapped around the source. BS 5228 *-1:2009+A1* states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice, screens constructed of materials with a mass per unit of surface area greater than 10kg/m^2 will give adequate sound insulation performance.

Post-mitigation construction noise calculations assume a partial line of sight (-5dB) is achieved using a solid 2.4m high standard construction site hoarding.

Annex B of *BS 5228-1:2009+A1:2014* (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials.

In addition, careful planning of the site layout will also be considered. The placement of temporary site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening during the phasing of works.

Liaison with the Public

A designated Community Liaison Officer (CLO) will be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the CLO. In addition, prior to particularly noisy construction activity the CLO will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

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Vibration Mitigation

On review of the likely vibration levels associated with construction activities, it may be concluded that the construction of the proposed development is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period: -

- A clear communication programme will be established to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars;
- Appropriate vibration isolation shall be applied to plant, where feasible;
- Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. The potential for cumulative works occurring both within the site and at any external sites with potential to generate significant noise effects will be reviewed in terms of limiting the duration and scale of these effects.

10.9.2 Operational Phase Mitigation

Mitigation measures for the operational phase are set out below.

10.9.2.1 Additional Traffic on Adjacent Roads

During the operational phase of the development, noise mitigation measures with respect to the impact of traffic from the development are not deemed necessary.

10.9.2.2 Mechanical Services Plant

Proprietary noise and vibration control measures will be employed as part of the detailed design in order to ensure that noise emissions from building services plant do not exceed the relevant internal noise criteria within Table 10.7 for residential dwellings within the proposed development. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements. Considering that sensitive receptors within the development are much closer than off-site sensitive receptors, once the relevant noise criteria is achieved within the development, there are no mitigation requirements to control building services and plant at off-site NSLs.

10.9.2.3 Inward Noise

In terms of the inward noise impact of road traffic on the development buildings and amenity areas, Appendix 10.1 sets out the approach for controlling noise levels across the site.

The majority of the proposed development site has been categorised as a ***Low Risk to Medium Risk*** in accordance with ProPG. The southern section of the site e.g. within 150m of the immediate south and southeast boundaries, (house type B1.5 and B2.5 and duplex type K.5 Block) have been categorised as ***High Risk*** (see further details in Appendix 10.1). Review of the location of residential buildings on site and the external noise levels, the assessment has determined that a specific noise mitigation measure in the form of a suitable 2.5m site boundary treatment to the immediate southern boundary of the proposed site is necessary. No other specific noise mitigation measures are required to the site boundary or site buildings to control noise intrusion to internal spaces.

As extracted from Appendix 10.1 Section 10.2.2.2 Proposed Boundary Treatment:

The inclusion of a 2.5m high boundary solid screen (either by use of walls, proprietary timber noise barrier, earth berms or a combination of these elements, once a 2.5m height from existing topography to top of barrier is achieved) is recommended to the south of the two storey houses in order to reduce road traffic noise levels at ground to second floor windows. Figure 10.7 illustrates the location of the proposed boundary screening to the south of the site.

If a timber noise barrier is being used – it must achieve a minimum acoustic design requirement – see below.

- All noise barriers shall have a minimum insulation performance of B3 as classified in I.S. EN 1793-2.

Blockwork or concrete walls will automatically achieve this requirement as standard.

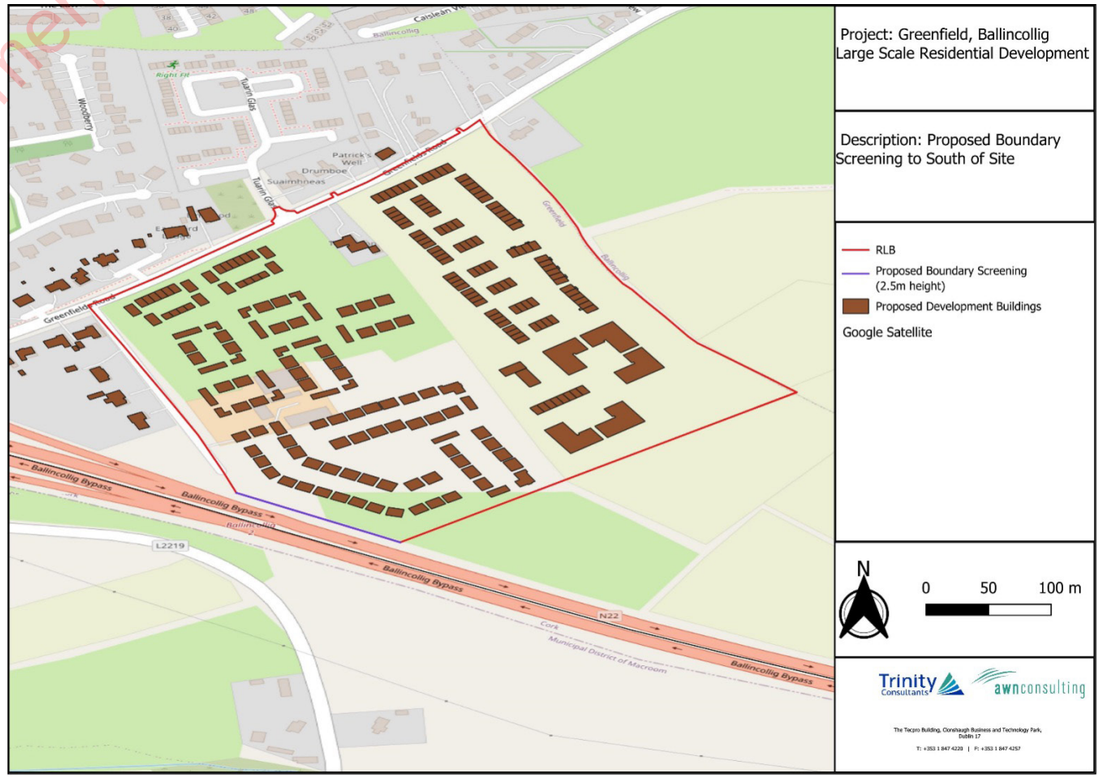

Figure 10.7 Proposed Boundary Treatment to South of the Site

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10.9.3 Cumulative Mitigation

In this instance, there are no additional noise mitigation measures over and above those set out in Sections 10.9.1 and 10.9.2 for the construction and operational phases.

10.10 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

10.10.1 Demolition & Construction Phase

10.10.1.1 Noise

During the demolition and construction phases of the project there is the potential for temporary to short-term noise effects on nearby noise sensitive locations due to noise emissions from site activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum as far as practicable. For the duration of the construction period, construction noise impacts will be short-term and negative, depending on the proximity of the works to the site boundary.

During site clearance the residual effect is **negative, significant to very significant and temporary** noise impact at distances up to 10m for NSL01, NSL02 and NSL04 if all plant items were assumed to work simultaneously while adjacent to the closest boundary to the site. In line with DMRB Noise and Vibration (UKHE 2020) document, a significant effect relating to construction noise is deemed to occur where a moderate or major impact is likely to occur for a period of greater that 10 days/nights over 15 consecutive day/nights, or greater than 40 days over 6 consecutive months. In the case of this activity, it is unlikely the durations will be exceeded and hence the overall residual effect is categorised as **negative, moderate and temporary**. At all other NSLs at distances of 20m and greater the CNT would not be exceeded and the residual significance of effect and is **negative, slight to moderate and temporary**.

During super structure, compounds and landscaping the residual effect is **negative, not significant to moderate and temporary** at all NSLs (greater than 10m from works) during all phases of the construction.

10.10.1.2 Vibration

Likely noise and vibration effects during the construction phase will be **negative, slight to moderate and temporary**.

10.10.2 Operational Phase

10.10.2.1 Additional Vehicular Traffic on Surrounding Roads

In the context of the existing noise environment, the overall contribution of traffic is not considered to pose any significant impact to nearby residential locations. The resulting residual effect is **neutral to negative, imperceptible to not significant, and long-term.**

10.10.2.2 Building Services Plant

There are no sources of mechanical or electrical plant associated with the building types across the development with potential to emit audible noise levels beyond the site boundary at off-site NSLs. Any required plant items will be selected, designed and located so that there is no negative impact on sensitive receivers within the development itself.

In this instance, best practice is to set appropriate noise limits that will inform the detailed design during the selection and layout of building services for the proposed development. The cumulative operational noise level from building services plant at the nearest noise sensitive location within the proposed development will be designed/attenuated to not exceed the internal noise levels discussed in Table 10.7. Once the relevant noise criteria are not exceeded within the proposed development, the related noise impact to existing NSLs offsite will be **negative, not significant and long-term.**

10.10.2.3 Inward Noise

The results of the baseline survey have determined the noise climate along the southern site boundary bordering the N22, have the highest day and night-time noise levels measured during the baseline study (UN01). The measured noise levels (see Appendix 10.1 for full details) indicate that with a suitable 2.5m acoustic boundary treatment to the southern site boundary and with standard double glazing and mechanical ventilation good and reasonable internal noise levels can be achieved with windows open for all dwellings. The exception to this are the southern facing bedrooms to the immediate southern and southeastern boundary of the site overlooking the N22 (B1.5, B2.5 and K.5 Block), which can achieve good internal levels with windows closed. The resultant residual inward noise effect will be of **neutral, not significant and long term**.

10.11 Risk of Major Accidents or Disasters

There are no likely risks of major accidents and disasters in relation to noise and vibration associated with the proposed development and the cumulative development.

10.12 Worst Case Scenario

In terms of construction phase impacts, worst-case assumptions regarding volumes of excavation materials and number of vehicle movements have been used in order to determine the highest level of mitigation required in relation to potential noise impacts (see Section 10.8.1). The proposed development is the worst-case scenario in terms of noise emissions, emissions from each individual phase will be lower than the cumulative proposed development.

Worst-case traffic data was used in the assessment of construction and operational phase impacts. In addition, conservative background concentrations were used in order to ensure a robust assessment. Thus, the predicted results of the construction and operational stage assessment are worst-case and the significance of effects is most likely overestimated.

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10.13 Significant Interactions

The potential interaction between noise and vibration and other specialist chapters in the EIAR is primarily limited to Chapter 4 (Material Assets - Traffic & Transportation), Chapter 8 (Biodiversity) and Chapter 13 (Population & Human Health). This chapter has been prepared in consideration of and in conjunction with the relevant elements of these chapters. For example noise and vibration impacts associated with the proposed development have been fully considered within this Chapter of the EIA Report. However, commentary on the impact assessment and related noise levels are also summarised specifically with respect to potential human health impacts in Chapter 13. The traffic flow projections associated with the development provided by the traffic consultants in Chapter 4 (Material Assets - Traffic & Transportation) has been utilised in the construction and operational noise calculations in this Chapter of the EIAR report.

10.14 Monitoring

The following monitoring measures are required to be implemented at the site for the project to ensure that construction activities do not cause excessive nuisance to receptors in the vicinity of the site.

10.14.1 Noise Monitoring

During the demolition and construction phase, the appointed contractor will monitor noise at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise will be monitored in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017).

The selection of monitoring locations will be based on the closest NSLs to the proposed works which have the potential to exceed the CNT, i.e., at NSL01, NSL02 and NSL04 to the southwest, west and north site boundaries.

Any Noise Monitoring Terminal (NMT) (number and locations to be agreed post-consent with Local Authority), to be installed will have the following specifications (or similar approved):

- Logging of two concurrent periods, e.g., 15-minute & hourly.
- Daily automated Charge Injection Calibration (CIC).
- E-mail alert on threshold exceedance.
- E-mail alert on low battery and low memory.
- Remote access to measured data.
- Live display of noise levels.

In addition, it is recommended that spot-check noise measurements are conducted on a monthly basis. These spot checks can be organised to coincide with works that have the potential to generate high levels of noise on site in order to confirm the potential extent of effects.

A monthly noise-monitoring report should be prepared by the contractor. Reports should identify any exceedances above nominal limit values and attempts to clarify the causes. Where remedial measures are required and identifiable, these should also be clearly stated.

10.14.2 Vibration Monitoring

Where the excavation works take place within 50m of vibration-sensitive locations (VSLs) e.g. NSL01, NSL02 and NSL04 vibration monitoring shall be installed, with the number and locations to be agreed with Local Authority.

Vibration monitoring stations should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with ISO 4866: 2010: *Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.*

The mounting of the transducer to the vibrating structure will need to comply with BS ISO 5348: 2021: *Mechanical vibration and shock – Mechanical mounting of accelerometers.*

In summary, the following ideal mounting conditions apply:

- The transducer and its mountings should be as rigid as possible;
- The mounting surfaces should be as clean and flat as possible;
- Simple symmetric mountings are best;
- The mass of the mounting should be small in comparison to that of the structure under test;
- The monitoring equipment should be set to monitor vibration in 5-minute periods;
- E-mail alert on threshold exceedance;
- E-mail alert on low battery and low memory;
- Remote access to measured data;
- Live display of vibration levels.

In addition, it is recommended that spot-check vibration measurements are conducted on a monthly basis. These spot checks can be organised to coincide with works that have potential to generate high levels of vibration on site in order to confirm the potential extent of effects.

A monthly vibration monitoring report should be prepared by the contractor. Reports should identify any exceedances above nominal limit values and attempts to clarify the causes. Where remedial measures are required and identifiable, these should also be clearly stated.

No monitoring is required for the operational phase.

10.15 Conclusion

AWN Consulting have undertaken an assessment of the potential noise and vibration impacts as a result of the proposed development. A range of mitigation measures have been specified for the construction stages, with no specific mitigation required for the operational stage. Noise and vibration monitoring has been identified during the demolition and construction phase to ensure the construction and vibration thresholds are not exceed at the closest receptors. Overall, no significant noise and vibration impacts are predicted during the construction or operational phases of the proposed development or cumulative development.

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The ProPG inward impact assessment has identified that the proposed units will achieve suitable internal noise levels with standard double glazing and the inclusion of a 2.5m high boundary solid screen (either by use of walls, proprietary timber noise barrier, earth berms or a combination of these elements, once a 2.5m height from existing topography to top of barrier is achieved) to the south the site boundary overlooking the N22. The resultant residual inward noise effect will be of neutral, not significant and long term.

10.16 References and Sources

- Cork Agglomeration Noise Action Plan 2024-2028.
- ANC, IOA & CIEH (2017). ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise – New Residential Development.
- British Standard BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.
- British Standard BS 5228: 2009 +A1:2014: Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration.
- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- Department of Transport Welsh Office, HMSO (1988). Calculation of Road Traffic Noise.
- EPA (2022). Guidelines on the Information to be contained in Environmental Impact Assessment Reports.
- ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- ISO 9613-2: 2024: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.
- United Kingdom Highways England (now National Highways) (UKHE) Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2 (UKHE, 2020).

10.17 List of Chapter Appendices

- Appendix 10.1 Acoustic Design Statement;
- Appendix 10.2 Glossary of Acoustic Terminology.

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CHAPTER ELEVEN

AIR QUALITY

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CHAPTER ELEVEN

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CHAPTER 11 | Air Quality

11.1 Introduction

This chapter assesses the likely air quality impacts associated with the proposed residential development at Greenfield, Ballincollig, Co. Cork. This report assesses the baseline air quality conditions at the site and evaluates the potential effects of the proposed development's construction and operation. Where required, appropriate mitigation measures to limit any identified likely significant adverse impacts to air quality are recommended.

A full description of the development is available in Chapter 2. This Chapter should be read in conjunction with Chapter 4 Material Assets Traffic and Transport and the Traffic and Transportation Assessment submitted with the planning application. This chapter was completed by Tanmay Gojamgunde. Tanmay is an Environmental Consultant in the Air Quality & Climate section of AWN Consulting, a Trinity Consultants Company. This chapter was reviewed by Ciara Nolan. Ciara is a Principal Environmental Consultant in the Air Quality & Climate section of AWN Consulting

11.1.1 Aspects Relevant to this Assessment

During the construction phase construction dust emissions have the potential to impact air quality. Dust emissions will primarily occur as a result of site preparation works, earthworks and the movement of trucks on site and exiting the site. There is also the potential for engine emissions from site vehicles and machinery to impact air quality. Construction phase impacts will be short-term in duration.

Engine emissions from vehicles accessing the site have the potential to impact air quality during the operational phase of the development through the release of nitrogen dioxide (NO_2) and particulate matter (as PM_{10} and $PM_{2.5}$). Operational phase impacts will be long-term in duration.

11.2 Methodology

11.2.1 Relevant Legislation & Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on air quality are summarised below.

- Guidance on the Assessment of Dust from Demolition and Construction v2.2 (Institute of Air Quality Management [IAQM] (hereafter referred to as the IAQM Guidelines) (IAQM, 2024);
- A Guide To The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites (Version 1.1) (IAQM, 2020); and
- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (Transport Infrastructure Ireland [TII], 2022).

In addition to specific air quality guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018); and
- Environmental Impact Assessment (EIA) Directive Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017).

11.2.2 Criteria for Rating of Impacts

11.2.2.1 Ambient Air Quality Standards

To reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or 'Air Quality Standards' are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland are set out in Directive (EU) 2024/2881 *of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe (recast)*. This Directive sets out new air quality standards for pollutants to be reached by 2030 which are more closely aligned with the World Health Organisation (WHO) air quality guidelines.

Prior to 2030 the air quality standards set out in EU Directive 2008/50/EC *of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe* are still applicable.

The Air Quality Standards Regulations 2022 (S.I. 739 of 2022) transposed EU Directive 2008/50/EC. With the adoption of Directive (EU) 2024/2881, Ireland must transpose this Directive into national law (i.e. update the Air Quality Standards Regulations) before December 2026.

The ambient air quality standards applicable for nitrogen dioxide (NO_2) and particulate matter (as PM_{10} and $PM_{2.5}$) are outlined in Table 11.1. These pollutants are of relevance to the proposed development. The limit values set out in Directive (EU) 2024/2881 will need to be achieved by 2030, with the limit values set out in the Air Quality Standards Regulations 2022 (and future updated regulations) applicable until 2030.

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Table 11.1 Ambient Air Quality Limit Values

Pollutant	Directive 2008/50/EC		Directive (EU) 2024/2881	
	Limit Type	Limit Value (applicable until 2030)	Limit Type	Limit Value (to be attained by 2030)
Nitrogen Dioxide (NO_2)	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m³	Hourly limit for protection of human health - not to be exceeded more than 3 times/year	200 µg/m³
	N/A	N/A	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	50 µg/m³
	Annual limit for protection of human health	40 µg/m³	Annual limit for protection of human health	20 µg/m³
Particulate Matter (as PM_{10})	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m³	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	45 µg/m³
	Annual limit for protection of human health	40 µg/m³	Annual limit for protection of human health	20 µg/m³
Particulate Matter (as $PM_{2.5}$)	N/A	N/A	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	25 µg/m³
	Annual limit for protection of human health	25 µg/m³	Annual limit for protection of human health	10 µg/m³

11.2.2.2 WHO Air Quality Guidelines & Clean Air Strategy

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland (Government of Ireland, 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target 3 (IT3) by 2026 (Table 11.2), the IT4 targets by 2030 and the final targets by 2040 (Table 11.2). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m³. The strategy also acknowledges that "*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2*".

Annex II of Directive (EU) 2024/2881 gives assessment thresholds which align with the clean air strategy final 2040 WHO targets. Directive (EU) 2024/2881 states that "*Member States shall endeavour to achieve and preserve the best ambient air quality and a high level of protection of human health and the environment, with the aim of achieving a zero-pollution objective as referred to in Article 1(1), in line with WHO recommendations, and below the assessment thresholds laid down in Annex II.*"

These assessment thresholds relate to monitoring of ambient air quality by Member States, where "*exceedances of the assessment thresholds specified in Annex II shall be determined on the basis of concentrations during the previous 5 years where sufficient data are available. An assessment threshold shall be deemed to have been exceeded if it has been exceeded during at least 3 separate years out of those previous 5 years.*"

Table 11.2 WHO Air Quality Guidelines 2021

Pollutant	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	24-hour limit for protection of human health	-	-	25 µg/m³
	Annual limit for protection of human health	20 µg/m³	-	10 µg/m³
PM (as PM_{10})	24-hour limit for protection of human health	75 µg/m³	50 µg/m³	45 µg/m³
	Annual limit for protection of human health	30 µg/m³	20 µg/m³	15 µg/m³
PM (as $PM_{2.5}$)	24-hour limit for protection of human health	37.5 µg/m³	25 µg/m³	15 µg/m³
	Annual limit for protection of human health	15 µg/m³	10 µg/m³	5 µg/m³

The applicable air quality limit values for the purposes of this assessment are those set out in Table 11.1. The limit values stipulated under Directive 2008/50/EC and the Air Quality Standards Regulations 2022 are applicable for the construction phase and the limit values outlined in Directive (EU) 2024/2881 are applicable to the Opening Year 2032 and for the Design Year 2047 for the proposed development.

11.2.2.3 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust that are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$). The EU ambient air quality standards outlined in Table 11.2-1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m²/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006). The document recommends that the TA-Luft limit of 350 mg/m²/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the proposed development.

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11.2.2.4 Air Quality & Traffic Significance Criteria

The Transport Infrastructure Ireland (TII) guidance document Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on the percentage change in pollutant concentrations relative to the Do-Nothing scenario. The TII significance criteria are outlined in Table 4.9 of Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022) and reproduced in Table 11.3 below. These criteria have been adopted for the proposed development to predict the impact of NO_2, PM_{10} and $PM_{2.5}$ emissions as a result of the proposed development.

Table 11.3 Air Quality & Traffic Significance Criteria

Long-term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Limit Value (AQLV)			
	1%	2-5%	6-10%	>10%
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQLV	Neutral	Slight	Moderate	Moderate
95 – 102% of AQLV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

Source: Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022))

As per Table 11.3 a neutral effect is one where a change in concentration at a receptor is:

- 5% or less where the Opening Year, without the proposed development, annual mean concentration is 75% or less of the standard; or
- 1% or less where the Opening Year, without the proposed development, annual mean concentration is 94% or less of the standard.

Where an effect does not meet the criteria for neutral, as described above, the effect can either be positive or negative. The TII guidance (TII, 2022) states that "the evaluation of significance of effects for the operational phase should be undertaken for the Opening Year only as the Design Year is likely to show lower total pollutant concentrations and changes in concentration" (TII, 2022).

Non-significant effects (i.e. of local importance only) are 'neutral' or 'slight' changes in concentrations while significant effects can be changes in pollutant concentrations that are either 'moderate' or 'substantial'. However, the TII guidance (TI, 2022) states that these must be considered in the context of the project and 'moderate' or 'substantial' increases are not necessarily always significant effects.

The impact descriptors in Table 11.3 are used to describe the impact at each modelled receptor location, and the significance of the impacts is then determined, aligning with the terminology in the EPA guidelines (EPA, 2022). Whilst it may be determined that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, an overall judgement should be made of whether the proposed development is 'significant' or 'not significant' in terms of air quality. Factors to consider when determining the overall significance of a proposed development are provided in Table 4.10 of the TII guidance (TII, 2022).

11.2.3 Construction Phase

11.2.3.1 Construction Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2024) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their guidance document Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022).

The major dust generating activities are divided into four types within the IAQM guidance (IAQM, 2024) to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site onto the public road network).

The magnitude of each of the four categories is divided into Large, Medium or Small scale depending on the nature of the activities involved. The criteria for determining the category for the works involved are outlined in Table 11.4, these are based on the IAQM guidance (IAQM, 2024). The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

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Table 11.4 IAQM Criteria to Determine Dust Emissions Magnitude

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
• Total building volume <12,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities <6 m above ground • Demolition during wetter months	• Total building volume 12,000 - 75,000 m^3 • Potentially dusty construction material • Demolition activities 6 – 12 m above ground level	• Total building volume >75,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities >12 m above ground level
Earthworks		
• Total site area <18,000 m^2 • Soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <3 m in height • Earthworks during wetter months	• Total site area 18,000 m2 - 110,000 m2 • Moderately dusty soil type (e.g. silt) • 5 – 10 heavy earth moving vehicles active at any one time • Formation of bunds 3–6 m in height	• Total site area >110,000 m2 • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >6 m in height
Construction		
• Total building volume <12,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)	• Total building volume 12,000 - 75,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site concrete batching	• Total building volume >75,000 m^3 • On-site concrete batching • Sandblasting
Trackout (Truck Movements)		
• <20 HDV (>3.5 t) outward movements in any one day • Surface material with low potential for dust release • Unpaved road length <50 m	• 20 – 50 HDV (>3.5 t) outward movements in any one day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50 – 100 m	• >50 HDV (>3.5 t) outward movements in any one day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100 m

Once the dust emission magnitude has been determined the next step, according to the IAQM guidance (IAQM, 2024), is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling, human health and ecological effects. The level of risk associated with each activity is determined using the criteria in Table 11.5.

Table 11.5 IAQM Criteria to Determine Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Construction			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

11.2.3.2 Construction Phase Traffic Assessment

Construction phase traffic also has the potential to impact air quality. The TII guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects, the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more.
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5m or greater.

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EGIS have prepared a Traffic and Transport Impact Assessment for the proposed development enclosed separately and have prepared Chapter 4 Material Assets – Traffic and Transportation of this EIAR. As per Chapter 4, it has been determined by EGIS that the construction stage traffic will not increase by 1,000 AADT, or 200 HDV AADT, or that the development will not result in speed changes or changes in road alignment. Therefore, the traffic does not meet the above scoping criteria. A detailed air quality assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality with respect with human or ecological receptors.

11.2.4 Operational Phase

11.2.4.1 Operational Phase Traffic Assessment

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the proposed development. The TII scoping criteria detailed in were used to determine EGIS has prepared a Traffic and Transport Impact Assessment for the proposed development enclosed separately and have prepared Chapter 4 (Material Assets – Traffic and Transportation). The traffic data provided for the operational phase assessment has included traffic associated with site of the development. While the traffic associated with each individual site in isolation is below the above screening criteria, when assessed in combination with all proposed sites there is a greater than 1,000 AADT increase on a small number of road links. As a result, an assessment of traffic related emissions was conducted. Additionally, traffic associated with other cumulative developments in the vicinity of the proposed development was included in the figures supplied to ensure a full cumulative assessment was conducted. See Traffic and Transport Assessment and Chapter 4 (Material Assets – Transportation) for further details.

The impact of traffic emissions on air quality is assessed for both human and ecological receptors within 200 m of impacted roads as per the TII PE-ENV-01106 guidance (TII, 2022). The following sections describe the methodology for each assessment.

The impact to air quality as a result of changes in traffic is assessed at sensitive human receptors in the vicinity of affected roads. These are discussed in further detail within Section 11.4.3.2 and shown graphically in Figure 11.3.

The TII guidance (2022) states that modelling should be conducted for NO_2, PM_{10} and $PM_{2.5}$ for the Base, Opening and Design Years for both the Do Minimum (Do Nothing – i.e. assuming the proposed development is not in place) and Do Something (with the proposed development in place) scenarios. Modelling of operational NO_2, PM_{10} and $PM_{2.5}$ concentrations has been conducted for the Do Nothing and Do Something scenarios using the TII Road Emissions Model (REM) online calculator tool (TII, 2024).

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The Default fleet mix option was selected along with the Intermediate Case fleet data base selection, as per TII Guidance (TII, 2024). The Intermediate Case assumes a linear interpolation between the Business as Usual case – where current trends in vehicle ownership continue and the Climate Action Plan (CAP) case – where adoption of low emission light duty vehicles occurs.

Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the identified sensitive receptors using generic meteorological data. The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM_{10} emissions associated with brake and tyre wear (TII, 2024). The predicted road contributions are then added to the existing background concentrations to give the predicted ambient concentrations. The ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards.

The TII guidance (2022) also states that impacts to sensitive ecology due to traffic emissions should be considered. Consideration should be given to designated sites within 2km of the proposed development. However, a detailed assessment is only required at a local level, where there is a designated site within 200m of impacted road links. The TII guidance (TII, 2022) notes that only sites that are sensitive to nitrogen and acid deposition need to be included in the assessment. It is not necessary to include sites, for example that have been designated as a geological feature or water course. There are no designated ecological sites within 200m of the site or impacted road links and therefore no assessment was required as there is no potential for significant impacts to the designated sites due to changes in air quality.

11.2.4.2 Traffic Data used in Modelling Assessment

Traffic flow information is detailed in Table 11.6 as obtained from EGIS for the purposes of this assessment. Data for the Base Year 2024 and the Do Nothing and Do Something scenarios for the Opening Year 2032 and Design Year 2047 were provided. The traffic data included traffic associated with the development site and other cumulative sites as relevant (see Chapter 4 for further details).

The modelling assessment has been undertaken for road links that were within 200 m of receptors. Background concentrations have been included as per 11.4.2 of this chapter based on available EPA background monitoring data (EPA, 2024).

Table 11.6 Traffic Data used in Operational Phase Air Quality Assessment

Road Name	Speed (kph)	Base Year	Opening Year		Design Year	
			Do Nothing	Do Something	Do Nothing	Do Something
		LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
Sunningdale Road	50	9566 (13)	11143 (147)	12244 (149)	11794 (18)	12796 (18)
Castle Road	50	9383 (14)	10910 (166)	12296 (162)	11570 (20)	12826 (19)
Greenfields Road	50	8867 (22)	9938 (255)	12027 (258)	10676 (30)	12576 (30)
Woodberry Road	50	9410 (23)	10462 (257)	12325 (252)	11236 (30)	12924 (30)

11.3 Difficulties Encountered

There were no difficulties encountered when compiling this assessment.

11.4 Baseline Environment

11.4.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the

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movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Cork Airport meteorological station, located approximately 8 km south-east of the site. Cork Airport meteorological data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (Figure 11.1). For data collated during five representative years (2020 – 2024), the predominant wind direction is north-westerly to south-westerly with generally moderate wind speeds (Met Éireann, 2025).

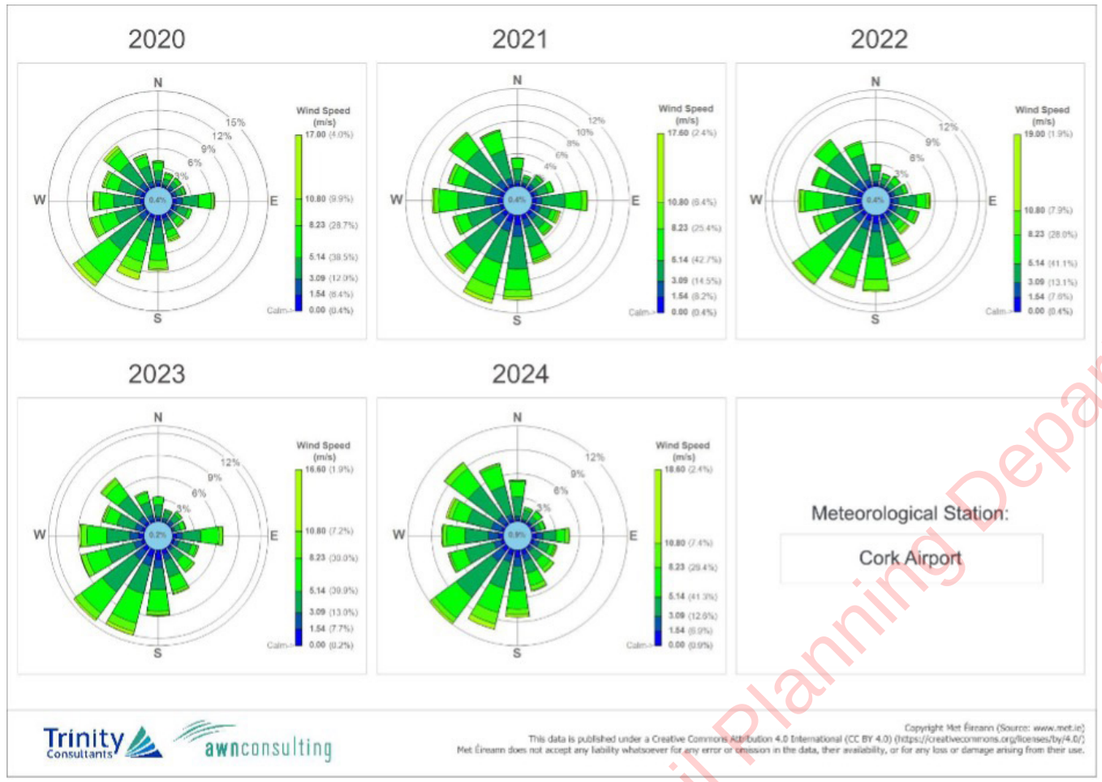

Figure 11.1 Wind Roses for Cork Airport Meteorological Station

11.4.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is 'Air Quality In Ireland 2023' (EPA, 2024). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments.

As part of the implementation of the Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) ,as amended, four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2024). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site is within Zone B (EPA, 2024). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.). The use of publicly available long-term datasets is recommended by TII in their PE-ENV-0016 guidance (2022). This use of long-term data sets is preferred over on-site baseline air monitoring surveys as it gives a better indication of long-term trends in air quality.

Continuous monitoring by the EPA is carried out at a number of monitoring stations within Zone B; these include urban background sites, roadside (traffic) sites and suburban background sites. It is necessary to select monitoring stations that are representative of the site location. Not all monitoring stations are considered suitable for determining background pollutant concentrations and must be reviewed on a case-by-case basis to determine the most appropriate EPA monitoring sites for the current assessment.

The EPA, on their website (EPA, 2025), state that background sites generally represent overall area-wide exposure more closely than roadside sites. Roadside monitoring sites are heavily influenced by traffic emissions and are not considered representative of area-wide pollutant levels.

The full suite of EPA Zone B monitoring locations were reviewed. These included urban traffic (Cork Glanmire Road), suburban traffic (South Link Road) and suburban background (Heatherton Park, UCC Distillery Fields, Bishopstown MTU) locations. Suburban background was determined to be the most representative background for the area of the proposed development. Influences from traffic emissions will be captured within the traffic modelling assessment and therefore, suburban background concentrations give the best indication of other, non-traffic derived sources of pollutants.

11.4.2.1 NO_2

Long-term NO_2 monitoring was carried out at the representative Zone B suburban background location of UCC Distillery Fields for the period 2019 – 2023 (Table 11.7) (EPA, 2024). Long-term average concentrations are significantly below the annual average limit of 40 µg/m³. Average results range from 8 – 10 µg/m³. The overall annual average concentration for this 5-year period is 9 µg/m³. Additionally, there were no exceedances of the hourly limit value of 200 µg/m³. Based on the above information a conservative estimate of the current background NO_2 concentration for the region of the proposed development is 9 µg/m³.

Table 11.7 Trends In Zone B Air Quality - Nitrogen Dioxide (NO_2)

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
UCC Distillery Fields	Annual Mean NO_2 (µg/m³)	10	8	9	9	8
	1-hr Mean > 200 µg/m³ (days)	-	0	0	0	0

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11.4.2.2 PM_{10}

Continuous PM_{10} monitoring was carried out at two representative Zone B locations from 2019 – 2023; Bishopstown MTU and Heatherton Park. Annual average PM_{10} concentrations across the sites ranged from 11 – 15 µg/m³ over the 2019 – 2023 period (Table 11.8). The overall annual average concentration for this 5-year period is 13 µg/m³. There were at most 2 exceedances of the daily limit of 50 µg/m³ in 2020 (at Heatherton Park). However, 35 exceedances are permitted per year (EPA, 2024). Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 13 µg/ m³.

Table 11.8 Trends In Zone B Air Quality - PM_{10}

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
Bishopstown MTU	Annual Mean PM_{10} (µg/m³)	15	14	13	14	11
	24-hr Mean > 50 µg/m³ (days)	-	0	1	0	-
Heatherton Park	Annual Mean PM_{10} (µg/m³)	-	11	11	12	11
	24-hr Mean > 50 µg/m³ (days)	-	2	1	0	-

11.4.2.3 $PM_{2.5}$

Average $PM_{2.5}$ levels in Heatherton Park, UCC Distillery Fields and Bishopstown MTU over the period 2019 - 2023 ranged from 5 - 8 µg/m³ (EPA, 2024). The overall annual average concentration for this 5-year period is 7 µg/m³ (Table 11.9). Based on this information, an estimate of the background $PM_{2.5}$ concentration in the region of the proposed development is 7 µg/m³.

Table 11.9 Trends In Zone B Air Quality - $PM_{2.5}$

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
Heatherton Park	Annual Mean $PM_{2.5}$ (µg/ m³)	8	8	8	5	6
UCC Distillery Fields	Annual Mean $PM_{2.5}$ (µg/ m³)	8	7	7	5	-
Bishopstown MTU	Annual Mean $PM_{2.5}$ (µg/ m³)	-	-	-	-	7

11.4.2.4 Summary

Based on the above information the air quality in the suburban Cork area is generally good, with concentrations of the key pollutants generally well below the relevant limit values set out in Directive 2008/50/EC. The current pollutant concentrations at these monitoring sites are also in compliance with the 2030 limit values set out in Directive (EU) 2024/2881 and the clean air strategy, however, concentrations are approaching the limit values. Further measures will be needed at a national scale to reduce air pollution in future years. The EPA have indicated that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2024).

11.4.3 Sensitivity of the Receiving Environment

11.4.3.1 Construction Phase

In line with the UK Institute of Air Quality Management (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2024) prior to assessing the impact of dust from a proposed development, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity. Table 11.10 outlines the criteria for determining the sensitivity of the area to dust soiling and dust-related human health effects as per the IAQM guidance (IAQM, 2024).

Table 11.10 Criteria for Determining the Sensitivity of the Area

Sensitivity of the Area to Dust Soiling Effects on People and Property					
Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Sensitivity of the Area to Human Health Impacts						
Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)			
			<20	<50	<100	<250
High	< 24 µg/ m³	>100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	< 24 µg/ m³	>10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Low	< 24 µg/ m³	>1	Low	Low	Low	Low

In terms of receptor sensitivity to dust soiling, there are a number of highly sensitive residential properties within 100 m of the proposed development boundary (Figure 11.2). There are 1-10 residential properties within 20m, 10-100 within 50m,10-100 within 100m, and 10-100 properties within 250m,of the site boundary. Based on these receptor numbers and using the IAQM criteria in Table 11.10, the sensitivity of the area to dust soiling impacts from the proposed development is medium.

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In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 13 µg/ m^3. There are 1-10 high sensitivity receptors within 20 m of the proposed development boundary (Figure 11.2). Based on the IAQM criteria outlined in Table 11.10 the worst-case sensitivity of the area to dust-related human health effects is low.

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological impacts. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant, as well as other effects. The guidance states that dust impacts to vegetation can occur up to 50 m from the site, and 50 m from site access roads, up to 250 m for the site entrance. The sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present. There are no sensitive ecological receptors that meet these criteria within the study area and there is no potential for impacts to sensitive ecology from construction dust emissions and no further assessment is required.

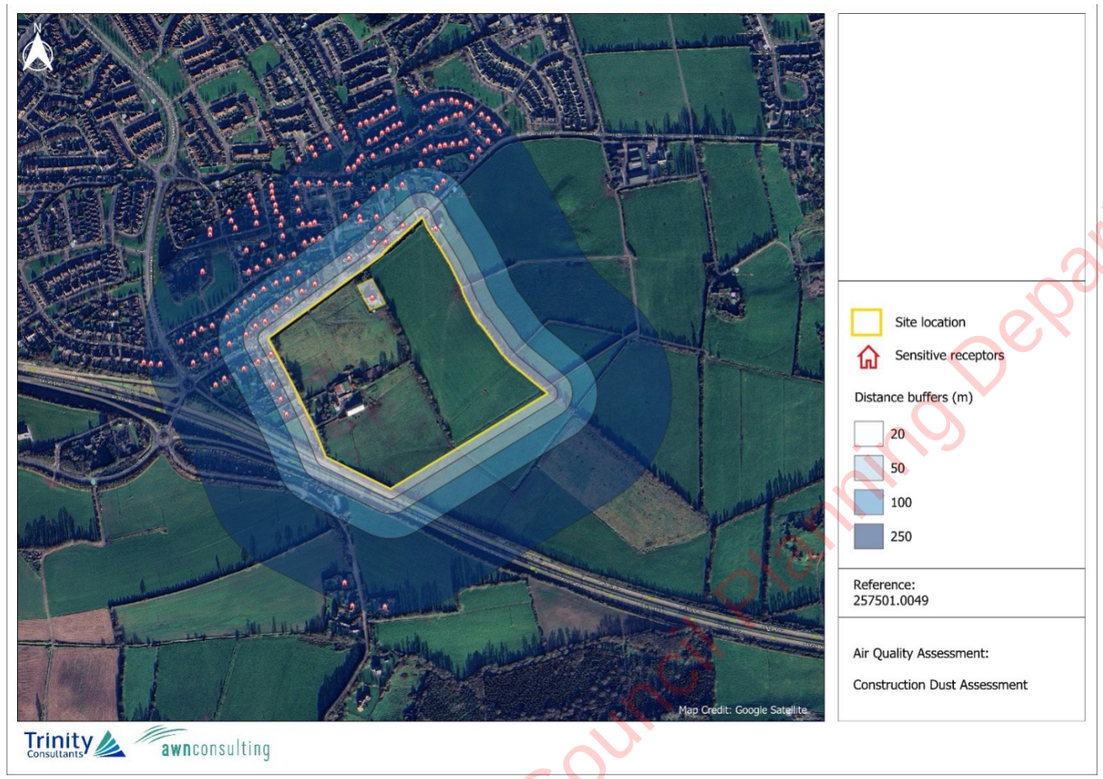

Figure 11.2 Sensitive Receptors within 250m of Site

11.4.3.2 Operational Phase

The impact to air quality due to changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The TII guidance (2022) states that a proportionate number of representative receptors, which are located in areas which will experience the highest concentrations or greatest improvements because of the proposed development, are to be included in the modelling. The TII criteria state that receptors within 200 m of impacted road links should be assessed; roads which are greater than 200 m from receptors will not impact pollutant concentrations at that receptor (TII, 2022). The TII guidance (2022) defines sensitive receptor locations for the purposes of modelling annual mean pollutant concentrations as: residential housing, schools, hospitals, care homes and short term-accommodation such as hotels, i.e. locations where members of the public are likely to be regularly present for 24 hours. A total of 4 no. high sensitivity residential receptors (R1, R2, R3 and R4) were included in the modelling assessment (see Figure 11.3)

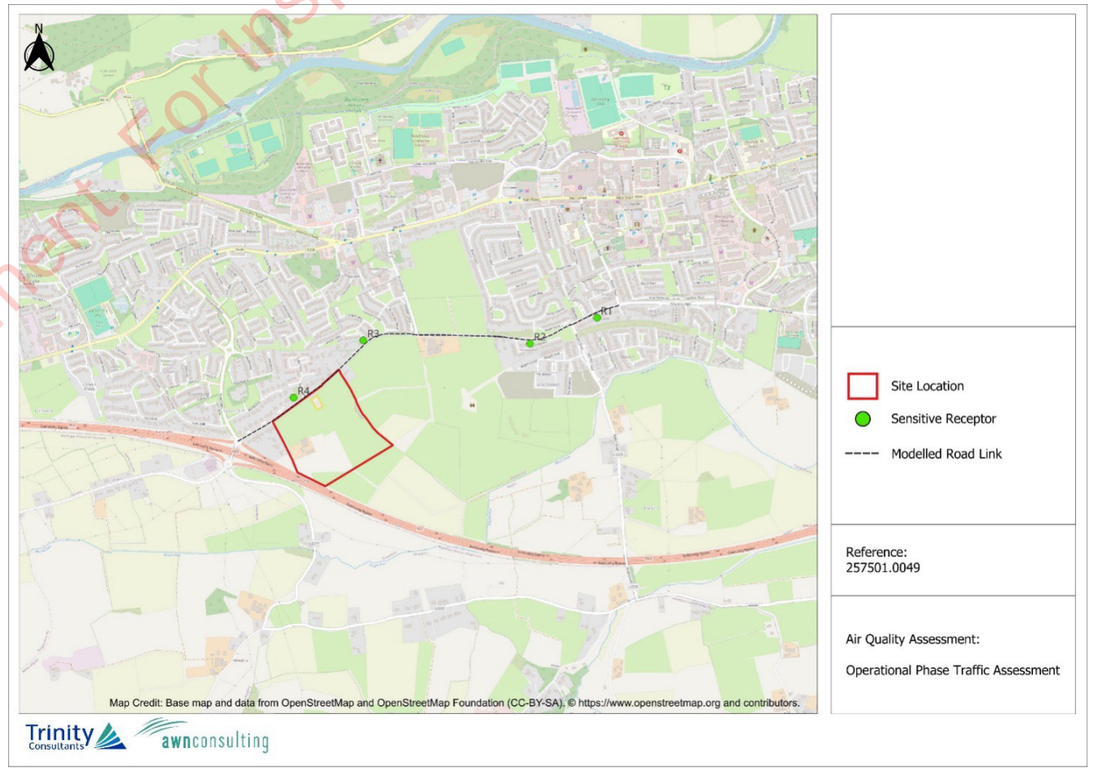

Figure 11.3 Location of Sensitive Receptors used in Operational Phase Air Quality Assessment

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11.5 Potential Impacts of the Proposed Development

11.5.1 Construction Phase

11.5.1.1 Construction Dust Assessment

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 250 m of a construction site, the majority of the deposition occurs within the first 50 m (IAQM, 2024). The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Cork Airport meteorological data indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature (Section 11.4.1).

In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30-year average data for Cork Airport meteorological station indicates that on average 194 days per year have rainfall over 0.2 mm (Met Éireann, 2025). Therefore, it can be determined that 53% of the time dust generation will be reduced due to natural meteorological conditions.

To determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (Section 11.4.3). The major dust generating activities are divided into four types within the IAQM (IAQM, 2024) guidance to reflect their different potential impacts. These are: demolition, earthworks, construction and trackout (movement of heavy vehicles).

Determining the Potential Dust Emission Magnitude

The magnitude of the works under each category can be classified as either small, medium or large depending on the scale of the works involved. The magnitude of each activity has been determined below for the proposed development using the criteria in Table 11.4.

- Demolition: The dust emission magnitude for the demolition activities can be categorised as small due to the volume of buildings involved, with the potential for <12,000 m^3 of buildings to be demolished.
- Earthworks: The dust emission magnitude for the proposed earthwork activities can be classified as medium as the total site area is between 18,000 m^2-110,000 m^2.
- Construction: The dust emission magnitude for the proposed construction activities can be classified as medium as a worst-case as the total volume of buildings to be constructed will be between 12,000 m^3-75,000 m^3.
- Trackout: The dust emission magnitude for the proposed trackout can be classified as medium, as there will be between 20 - 50 outward HGV movements per day during the construction phase of the proposed development.

Determining the Risk of Dust Impacts

Once the dust emission magnitude has been determined the next step, according to the IAQM guidance (IAQM, 2024), is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling and dust-related human health effects (Section 11.4.3). The level of risk associated with each activity is determined using the criteria in . The overall risk of dust impacts from the construction works is shown in Table 11.11 for each category.

- Demolition: As the overall sensitivity of the area to dust soiling is medium, when combined with a small dust emission magnitude, this produces an overall low risk of dust soiling impacts (as per the criteria in Table 11.5). As the overall sensitivity of the area to dust-related human health effects is low, this results in a negligible risk of dust-related human health effects (as per the criteria in Table 11.5).
- Earthworks: As the overall sensitivity of the area to dust soiling is medium, when combined with a medium dust emission magnitude, this produces an overall medium risk of dust soiling impacts (as per the criteria in Table 11.5). As the overall sensitivity of the area to dust-related human health effects is low, this results in a low risk of dust-related human health effects (as per the criteria in Table 11.5).
- Construction: Combining the medium dust emissions magnitude for the construction activities with the medium sensitivity to dust soiling results in a medium risk of dust soiling impacts using the criteria in Table 11.5. There is an overall low risk of dust-related human health impacts as a result of the proposed construction activities.
- Trackout: Combining the medium dust emission magnitude for the trackout activities with the medium sensitivity to dust soiling results in a medium risk of dust soiling impacts using the criteria in Table 11.5. There is an overall low risk of dust-related human health impacts as a result of the proposed trackout activities.

There is a medium risk of dust soiling impacts and at most low risk of dust-related human health impacts associated with the proposed works. As a result, best practice dust mitigation measures associated with medium risk works will be implemented to ensure there are no significant impacts at nearby sensitive receptors. In the absence of mitigation, dust impacts are predicted to be direct, short-term, negative and slight.

Table 11.11 Risk of Dust Impacts used to Define Site-Specific Mitigation

Category	Receptor Sensitivity	Dust Emission Magnitude	Risk of Dust-Related Impacts
Demolition			
Dust Soiling	Medium	Small	Low Risk
Human Health	Low		Negligible
Earthworks			
Dust Soiling	Medium	Medium	Medium Risk
Human Health	Low		Low Risk
Construction			
Dust Soiling	Medium	Medium	Medium Risk
Human Health	Low		Low Risk
Trackout			
Dust Soiling	Medium	Medium	Medium Risk
Human Health	Low		Low Risk

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11.5.1.2 Construction Phase Traffic Assessment

There is also the potential for traffic emissions to impact air quality with respect to human health in the short-term over the construction phase, particularly, due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed, and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the TII assessment criteria in Section 11.2.3.1.

Therefore, it can be determined that the construction stage traffic will have an imperceptible, neutral, short-term and not significant impact on air quality.

11.5.2 Operational Phase

11.5.2.1 Operational Phase Traffic Assessment

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated due to the development. The traffic data has included specific cumulative developments within the area to provide for a worst-case assessment and to assess potential cumulative impacts (see Traffic and Transport Assessment and Chapter 4: Material Assets Traffic & Transportation for further details).

The traffic data includes the Do Nothing (DN) scenario and Do Something (DS) scenario. The impact of NO_2, PM_{10} and $PM_{2.5}$ emissions for the Opening and Design Years was predicted at the nearest sensitive receptors to the impacted road links. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

The TII guidance PE-ENV-01106 (TII, 2022) details a methodology for determining air quality impact significance criteria for TII road schemes and infrastructure projects. However, this significance criteria can be applied to any development that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed development. Results are compared against the 'Do Nothing' scenario, which assumes that the proposed development is not in place in future years, to determine the degree of impact.

Traffic related air emissions have the potential to impact air quality which can affect human health. The following details the results of the air dispersion modelling assessment of traffic emissions to determine the impact to human health. The predicted pollutant concentrations have been compared against the ambient air quality limit values set out in Section 11.2.2.1. The limit values set out in Directive (EU) 2024/2881 are applicable to the Opening Year 2032 and to the Design Year 2047 as the assessment years are post-2030.

NO_2

The results of the NO_2 modelling are shown in Table 11.12. In the Opening Year 2032, predicted annual mean concentrations of NO_2 are in compliance with the annual mean limit value of 20 µg/ m^3 set out under Directive (EU) 2024/2881, reaching at most 53 % of the limit. In addition, the TII guidance (2022) states that the hourly limit value for NO_2 of 200 µg/ m^3 is unlikely to be exceeded at roadside locations unless the annual mean is above 60 µg/m^3. As predicted NO_2 concentrations are significantly below 60 µg/m^3 (Table 11.12), it can be concluded that the short-term NO_2 limit value will be complied with at all receptor locations. Some increases in NO_2 concentrations are predicted at the worst-case receptors assessed in the Opening Year when compared with the Do-Nothing scenario (see Table 11.12). Concentrations are predicted to increase by at most 0.25 µg/ m^3 at receptor R3. When comparing the change in concentration with the air quality limit value, it results in a maximum change of 1.25% at receptor R3. All other receptors in the area will experience similar or lesser impacts and all increases are considered 'neutral' as per the TII criteria in Table 11.3.

In the Design Year 2047, predicted annual mean NO_2 concentrations are in compliance of the limit value of 20 µg/m^3 set out under Directive (EU) 2024/2881, at the worst-case receptors assessed, reaching at most 51% of the limit. The proposed development will result in a 'neutral' increase in NO_2 concentrations according to the TII significance criteria in Table 11.3, with concentrations increasing by at most 0.18 µg/m^3 as a result of the proposed development (at receptor R3, see Table 11.12), which is an increase of 0.90% when compared with the applicable annual mean limit value for NO_2.Therefore, the impact of the proposed development on NO_2 concentrations is neutral.

Table 11.12 Predicted Annual Mean NO_2 Concentrations (µg/ m^3)

Receptor	Impact Opening Year						
	DN	% of AQLV	DS	% of AQLV	DS-DN	% Change of AQLV	Description
R1	10.2	51%	10.3	52%	0.12	0.60%	Neutral
R2	10.3	52%	10.5	53%	0.16	0.80%	Neutral
R3	10.3	51%	10.5	53%	0.25	1.25%	Neutral
R4	9.9	50%	10.1	50%	0.15	0.75%	Neutral
Receptor	**Impact Design Year**						
	DN	**% of AQLV**	**DS**	**% of AQLV**	**DS-DN**	**% Change of AQLV**	**Description**
R1	10.0	50%	10.1	50%	0.09	0.45%	Neutral
R2	10.1	51%	10.2	51%	0.11	0.55%	Neutral
R3	10.0	50%	10.2	51%	0.18	0.90%	Neutral
R4	9.7	49%	9.8	49%	0.11	0.55%	Neutral

PM_{10}

The results of the PM_{10} modelling can be seen in Table 11.13 for the Opening Year 2032 and Design Year 2047.

In the Opening Year 2032, annual mean PM_{10} concentrations are in compliance with the annual mean limit value of 20 µg/ m^3 set out under Directive (EU) 2024/2881 reaching at most 76% of the limit. In the Design Year 2047 annual mean PM_{10} concentrations are also in compliance with the annual mean limit value of 20 µg/ m^3 set out under Directive (EU) 2024/2881 reaching at most 76% of the limit. In addition, the proposed development will not result in any days of exceedance of the daily PM_{10} limit value (Table 11.1) in both the opening and design years.

The changes in PM_{10} concentrations as a result of the proposed development can be assessed relative to the 'Do Nothing' (DN) levels. In the Opening Year 2032 annual PM_{10} concentrations will increase by at most 0.37 µg/ m^3 at receptor R3, this is a 0.92% increase when compared with the annual mean limit value of 20 µg/ m^3. This is considered a 'slight adverse' impact as per the TII criteria in Table 11.3. All other receptors in the area will experience similar or lesser impacts and all increases at other modelled receptors are considered 'neutral' as per the TII criteria in Table 11.3.

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In the Design Year 2047 the proposed development will result in a maximum increase of 0.33 µg/ m³ at receptor R3, which is a 1.65% increase when compared with the annual mean limit of 20 µg/ m³. The changes in concentrations in the Design Year are considered 'neutral' except for R3 being 'slightly adverse' based on the TII criteria in Table 11.3.

Table 11.13 Predicted Annual Mean PM_{10} Concentrations (µg/ m³)

Receptor	Impact Opening Year						
	DN	% of AQLV	DS	% of AQLV	DS-DN	% Change of AQLV	Description
R1	14.8	74%	15.0	75%	0.17	0.85%	Neutral
R2	15.0	75%	15.2	76%	0.24	0.60%	Neutral
R3	14.9	75%	15.3	76%	0.37	0.92%	Slight Adverse
R4	14.4	72%	14.6	73%	0.22	0.55%	Neutral
Receptor	Impact Design Year						
	DN	% of AQLV	DS	% of AQLV	DS-DN	% Change of AQLV	Description
R1	14.8	74%	15.0	75%	0.16	0.80%	Neutral
R2	15.0	75%	15.2	76%	0.21	1.05%	Neutral
R3	14.9	74%	15.2	76%	0.33	1.65%	Slight Adverse
R4	14.3	72%	14.5	73%	0.20	1.00%	Neutral

$PM_{2.5}$

In relation to changes in $PM_{2.5}$ concentrations as a result of the proposed development, the results of the assessment can be seen in Table 11.14 for the modelled Opening Year 2032 and Design Year 2047.

In the Opening Year 2032, predicted annual mean concentrations of $PM_{2.5}$ are in compliance with the annual mean limit value of 10 µg/ m³ set out under Directive (EU) 2024/2881 reaching at most 83% of the limit. There is predicted to be an increase in $PM_{2.5}$ concentrations at the worst-case receptors assessed in the Opening Year when compared with the Do-Nothing scenario (see Table 11.14). Concentrations are predicted to increase by at most 0.20 µg/ m³ at receptor R3. When comparing the change in concentration with the air quality limit value, it results in a maximum change of 2% at receptor R3. . This is considered a 'slight adverse' impact as per the TII criteria in Table 11.3. All other receptors in the area will experience similar or lesser impacts and all increases at other modelled receptors are considered 'neutral' as per the TII criteria in Table 11.3.

In the Design Year 2047, predicted annual mean $PM_{2.5}$ concentrations are in compliance with the limit value of 10 µg/ m³ set out under Directive (EU) 2024/2881 at all receptors assessed. Concentrations reach at most 81% of the annual mean limit value. The proposed development will result in a 'neutral' to 'slightly adverse' increase in $PM_{2.5}$ concentrations according to the TII significance criteria Table 11.3 with concentrations increasing by at most 0.18 µg/m³ as a result of the proposed development (at receptor R3, Table 11.14), which is an increase of 1.8% when compared with the annual mean limit value of 10 µg/m³ for $PM_{2.5}$.

Table 11.14 Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m³)

Receptor	Impact Opening Year						
	DN	% of AQLV	DS	% of AQLV	DS-DN	% Change of AQLV	Description
R1	8.0	80%	8.1	81%	0.10	1.00%	Neutral
R2	8.1	81%	8.2	82%	0.13	1.30%	Neutral
R3	8.1	81%	8.3	83%	0.20	2.00%	Slight Adverse
R4	7.8	78%	7.9	79%	0.12	1.20%	Neutral
Receptor	Impact Design Year						
	DN	% of AQLV	DS	% of AQLV	DS-DN	% Change of AQLV	Description
R1	8.0	80%	8.1	81%	0.08	0.80%	Neutral
R2	8.1	81%	8.2	82%	0.12	1.20%	Neutral
R3	8.0	80%	8.2	82%	0.18	1.80%	Slight Adverse
R4	7.7	77%	7.9	79%	0.11	1.10%	Neutral

Significance of Predicted Changes in NO_2, PM_{10} and $PM_{2.5}$ Concentrations

As outlined in Section 11.2.2.4, the TII guidance (2022) states that the significance of effects should be assessed based on the opening year only. Non-significant effects are 'neutral' or 'slight' changes in concentrations while significant effects can be changes in pollutant concentrations that are either 'moderate' or 'substantial' however, the TII guidance (2022) states that these must be considered in the context of the project and 'moderate' or 'substantial' increases are not necessarily always significant effects.

In relation to NO_2, PM_{10} and $PM_{2.5}$ the predicted changes in concentrations range from 'neutral' to 'slight adverse' at the worst-case receptors assessed. Therefore, according to the TII criteria as outlined in Section 11.2.2.4, the impact is not significant.

For the purposes of this assessment, it has been assumed that the current estimated background pollutant concentrations are applicable for both the opening and design years, with no decreases in future background concentrations allowed for. There will be some decreases in background concentrations in future years, however at present there is no guidance-based methodology available for estimating future year background concentrations and therefore, as a conservative approach, the current estimated background concentrations have been applied to future years.

Due to the large uncertainty in future improvements in fleet composition and emissions, such as projected changes to vehicle registration and electric vehicle uptake, the future year emission rates utilised by the REM do not account for the full implementation of these measures. Predicted design year concentrations are therefore currently overly conservative as future emissions improvements are not fully taken into account, as well as no improvement in background concentrations being assumed.

As a result, the opening year predicted concentrations are the most appropriate for determining the significance of effects as per Section 11.2.2.4.

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It can be concluded that the impact of traffic emissions on air quality and human health during the operational phase is long-term, direct, localised, negative and not significant in EIA terms.

The measures set out in the Clean Air Strategy for Ireland (Government of Ireland 2023) aim to work towards solutions to ensure that air pollution concentrations are reduced in order to comply with the future changes in limit values. Ireland will need to continue to implement and develop measures to ensure continuing improvements in air quality in future years in order to meet the objectives of the Clean Air Strategy for Ireland (Government of Ireland, 2023) and to ensure the ambient air quality limit values set out in Directive (EU) 2024/2881 are achieved. The estimated background concentrations used in the assessment are the largest contribution to predicted pollutant concentrations, rather than pollutant contributions associated with the proposed development. Strategies to improve air quality at a national level in future years will contribute to reducing background concentrations and therefore it is envisioned that air quality will improve in the future.

11.5.3 The 'Do Nothing' Scenario

In the Do-Nothing scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

The Do Nothing scenario associated with the operational phase of the development is assessed within Section 11.5.2.1 and it was found to be direct, long-term, negative and slight which is overall not significant.

11.6 Cumulative Impacts

11.6.1 Construction Phase

Cumulative construction dust impacts may occur if other large-scale developments within 500 m of the site are under construction simultaneously.

A review of other planned and permitted projects within the vicinity of the proposed development was undertaken to identify developments with the potential for cumulative construction phase impacts. There were no sites identified with the potential for simultaneous construction phases and therefore, no cumulative construction dust impacts are predicted.

Should the construction phase of the proposed development coincide with that of another large scale development within 500m the dust mitigation measures outlined in Section 11.7 will be applied during the construction phase which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development is short-term, direct, negative and not significant. No significant cumulative impacts to air quality predicted for the construction phase.

11.6.2 Operational Phase

There is the potential for cumulative impacts to air quality during the operational phase as a result of traffic associated with other existing and permitted developments within the area. The traffic data provided for the operational stage air quality assessment included specific cumulative developments within the area (see Traffic and Transport Assessment and Chapter 4 Material Assets - Traffic & Transportation for further details).

The cumulative operational phase impact is assessed within the Operational Phase Traffic Assessment. The cumulative operational stage impact is long-term, localised, direct, negative and not significant.

11.7 Mitigation Mesures

11.7.1 Construction Phase Mitigation

The proposed development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of demolition, earthworks, construction and trackout activities (see Section 11.5.1.1). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC (2018), DLRCC (2022)), the UK (IAQM (2024), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Community engagement includes explaining the nature and duration of the work to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.

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.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have 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.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Fully enclose sites or specific operations where there is a high potential for dust production and the site is actives for an extensive period.

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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 15 kph 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 (public transport, cycling, walking, and car-sharing)

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.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition

- Prior to demolition blocks should be soft striped inside buildings (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- During the demolition process, water suppression should be used, preferably with hand-held spray. Only the use of cutting, grinding or sawing equipment fitted or used in conjunction with a suitable dust suppression technique such as water sprays/local extraction should be used.
- Drop heights from conveyors, loading shovels, hoppers and other loading equipment should be minimised, if necessary fine water sprays should be employed.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers 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
- 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 power materials, ensure bags are sealed after use and stored appropriately to prevent 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.

Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent the 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 permit.
- Access gates to be located at least 10 m from receptors where possible.

Monitoring

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- 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.

11.7.2 Operational Phase Mitigation

No site-specific mitigation measures are proposed for the operational phase as impacts are predicted to be not significant.

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11.8 Residual Impact Assessment

11.8.1 Construction Phase

11.8.1.1 Air Quality

To minimise dust emissions during construction, a series of mitigation measures have been prepared as outlined in Section 11.7. Provided the dust minimisation measures are adhered to, the predicted residual air quality impacts during the construction phase are short-term, direct, negative, localised and not significant.

11.8.1.2 Human Health

Best practice mitigation measures are proposed for the construction phase of the proposed development, which will focus on the proactive control of dust and other air pollutants, to minimise generation of emissions at source. The mitigation measures that will be put in place during construction will ensure that the impact complies with all EU ambient air quality legislative limit values (set out in Directive 2008/50/EC), which are based on the protection of human health (Table 11.3). Therefore, the predicted residual, dust-related, human health impact of the construction phase of the proposed development is short-term, direct, negative, localised and not significant.

11.8.2 Operational Phase

11.8.2.1 Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed development was carried out using the TII REM tool. The modelling assessment determined that the change in emissions of NO_2, PM_{10} and $PM_{2.5}$ at nearby sensitive receptors as a result of the proposed development will be 'neutral' and at most ' slightly adverse' in line with the TII assessment criteria (Table 11.3).Therefore, the operational phase impact to air quality is long-term, direct, negative, and not significant.

11.8.2.2 Human Health

Dispersion modelling of traffic emissions at sensitive receptors in proximity to impacted road links during the operational phase indicate pollutant emissions will be in compliance with the TII assessment criteria which is based on the impacts in the opening year. Section 11.5.2.1 determined that the impact to air quality as a result of increased traffic volumes during the operational phase of the proposed development will be localised, direct, long-term, negative and not significant for the opening year. However, Ireland will need to develop measures to ensure continuing improvements in air quality in future years in order to meet the objectives of the Clean Air Strategy for Ireland (Government of Ireland, 2023) and to ensure the ambient air quality limit values set out in Directive (EU) 2024/2881 are achieved.

11.9 Cumulative Residual Effects

11.9.1 Construction Phase

According to the IAQM guidance (2024) should the construction phase of the proposed development coincide with the construction phase of any other developments within 500m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. However, provided the mitigation measures outlined in Section 11.7, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. Impacts are predicted to be direct, short-term, negative, localised and not significant.

11.9.2 Operational Phase

Air dispersion modelling of operational traffic emissions associated with the proposed development and cumulative developments in the wider area was carried out using the TII REM tool. The modelling assessment determined that the change in emissions of NO_2, PM_{10} and $PM_{2.5}$ at nearby sensitive receptors as a result of the proposed development in combination with cumulative developments will be imperceptible. Therefore, the operational phase impact to air quality is long-term, direct, negative, and not significant.

Cumulative Impact of the Relevant Plan for the Area

The potential cumulative impact of the relevant plan for the area was assessed, which is considered to be the Cork City Development Plan 2022. The assessment of the potential impacts on the environment of the Cork City Development Plan 2022 was undertaken utilising the Strategic Environmental Objectives (SEOs) which are detailed in Table 5.1 of the CDP's Strategic Environmental Assessment. The potential cumulative impacts of the Plan were assessed having regard to these SEO's. Table 5.1 of the SEA identifies the SEO's for 'Air' as:

- To avoid, prevent or reduce harmful effects on human health and the environment as a whole resulting from emissions to air from all sectors with particular reference to emissions from transport, residential heating, industry and agriculture.
- Maintain and promote continuing improvement in air quality through the reduction of emissions and promotion of renewable energy and energy efficiency.
- Promote continuing improvement in air quality.
- Reduction of emissions of sulphur dioxide, nitrogen oxides, volatile organic compounds, ammonia and fine particulate matter which are responsible for acidification, eutrophication and ground-level ozone pollution.
- Meet Air Quality Directive standards for the protection of human health — Air Quality Directive.
- Significantly decrease noise pollution by 2020 and move closer to WHO recommended levels.

Table 7.5 of the CDP's Strategic Environmental Assessment, 'Comparative Assessment of each of the Alternatives against Strategic Environmental Objectives' indicates that Alternative/Scenario 3 'Compact Liveable Growth', the 'Selected Scenario' has positive interactions with the status of the SEO's for 'Air The impact of the proposed development on ambient air quality has been assessed against the Air Quality Standards set out under S.I. 739 of 2022 as well as those set out in Directive (EU) 2024/2881. Air emissions associated with the proposed development are in compliance with the relevant ambient air quality limit values which are set for the protection of human health and the environment and is in line with the SEOs of the Cork City Development Plann 2022 as referenced above. The impact to air quality from the proposed development is direct, negative, and not significant. Impacts in the construction phase are short-term, whereas operational phase impacts are long-term in duration.

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11.10 Risk of Major Accidents or Disasters

There are no likely risks of major accidents and disasters in relation to air quality associated with the proposed development due to the nature and scale of the development. The proposed development is residential in nature and will not require large scale quantities of hazardous materials or fuels.

11.11 Worst Case Scenario

Reasonable worst-case estimates have been used as part of this assessment. As a result, Section 11.8 details the worst-case residual effect of the proposed development.

11.12 Interactions

11.12.1 Air Quality and Population & Human Health

11.12.1.1 Construction Phase

Air quality does 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 air quality impact during the construction phase can cause health and dust nuisance issues. There is a low risk of dust-related human health impacts during the construction phase of the proposed development. Best practice mitigation measures will be implemented during the construction phase to ensure that the impact of the proposed development complies with all ambient air quality legislative limits. Therefore, the predicted impact is direct, short-term, negative, localised and not significant with respect to Population and Human Health during the construction phase.

11.12.1.2 Operational Phase

Vehicles accessing the site will emit pollutants which may impact Air Quality and Human Health. However, the increased number of vehicles associated with the proposed development will not cause a significant change in air pollutant emissions in the locality. It has been assessed that emissions will be in compliance with the ambient air quality standards which are set for the protection of human health. Impacts will be long-term, localised, direct, negative and not significant.

11.12.2 Air Quality and Climate

Air Quality and Climate have interactions as the emissions from the burning of fossil fuels during the construction and operational phases generate both air quality and climate impacts. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

11.12.3 Air Quality and Land & Soils

11.12.3.1 Construction Phase

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between Air Quality and Land & 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 land and soils during the construction phase.

11.12.3.2 Operational Phase

There are no potentially significant interactions identified between Air Quality, and Land & Soils during the operational phase.

11.12.4 Air Quality and Biodiversity

11.12.4.1 Construction Phase

Dust generation can occur during extended dry weather periods due to construction traffic along haul routes and construction activities such as excavations and infilling works. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability as well as other effects. There are no designated ecological sites within 250 m of the proposed development site area. Significant dust impacts are not predicted beyond this distance. Dust mitigation measures will be implemented on site as set out in Section 11.7. With the implementation of these mitigation measures dust emissions will be minimised and impacts will be direct, short-term, negative, localised and not significant with respect to biodiversity.

11.12.4.2 Operational Phase

There are no potentially significant interactions identified between Air Quality, and Biodiversity during the operational phase.

11.12.5 Air Quality and Material Assets – Traffic & Transport

11.12.5.1 Construction Phase

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 roads close to the site. In this assessment, the impact of the interactions between Traffic and Air Quality are linked but there is no potential for significant impacts from traffic on air quality. The effects are considered to be direct, short-term, neutral, localised and not significant during the construction phase.

11.12.5.2 Operational Phase

The impact of the interactions between Traffic and Air Quality are considered to be long-term, direct, neutral and not significant during the operational phase.

11.13 Monitoring

11.13.1 Construction Phase

The following monitoring measures are proposed to ensure the dust mitigation measures are working satisfactorily:

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- 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.

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11.13.2 Operational Phase

There is no monitoring recommended for the operational phase of the proposed development as impacts to air quality are predicted to be not significant.

11.14 References

BRE (2003) Controlling Particles, Vapours & Noise Pollution from Construction Sites

Department of the Environment Heritage and Local Government (DEHLG) (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

Dublin City Council (2018) Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition

Environmental Protection Agency (2006) Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)

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CHAPTER TWELVE

CLIMATE

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CHAPTER TWELVE

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CHAPTER 12 | Climate

12.1 Introduction

This chapter assesses the likely climate impacts associated with the proposed residential development at Greenfield, Ballincollig, Co. Cork. A full description of the development is available in Chapter 2.

The climate assessment is divided into two distinct sections – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- Greenhouse Gas Emissions Assessment (GHGA) – Quantifies the GHG emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude.
- Climate Change Risk Assessment (CCRA) – Identifies the impact of a changing climate on a project and receiving environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience.

This chapter was completed by Ciara Nolan. Ciara is a Principal Environmental Consultant in the Air Quality & Climate section of AWN Consulting, a Trinity Consultants Company.

12.1.1 Aspects Relevant to this Assessment

During the construction phase engine emissions from site vehicles and machinery have the potential to impact climate through the release of CO_2 and to a lesser extent, other greenhouse gases (GHGs). Embodied carbon of materials used in the construction of the development along with site activities will impact climate. Impacts to climate are assessed against Ireland's obligations under the EU 2030 GHG targets and sectoral emissions ceilings.

Engine emissions from vehicles accessing the site have the potential to impact climate during the operational phase of the development through the release of CO_2. Operational phase impacts will be long-term in duration. In addition, the vulnerability of the proposed development in relation to future climate change must be considered during the operational phase. The proposed development has been designed to minimise the impact on climate where possible in line with the most recent development guidelines (Part L of the Building Regulations 2022) and in reference to measures within the Climate Action Plan 2024 (DECC, 2023a).

12.2 Methodology

12.2.1 Relevant Guidance, Legislation & Policy

12.2.1.1 Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on climate are summarised below. In addition to specific climate guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022); and
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).
- The assessment has made reference to national guidelines where available, in addition to international standards and guidelines relating to the assessment of climate impacts. These are summarised below:
- Transport Infrastructure Ireland (TII) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022a);
- Transport Infrastructure Ireland (TII) PE-ENV-01105: Climate Assessment Standard for Proposed National Roads (TII, 2022b);
- Transport Infrastructure Ireland (TII) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2024);
- Institute of Environmental Management & Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the IEMA 2022 GHG Guidance) (IEMA, 2022);
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the IEMA 2020 EIA Guide) (IEMA, 2020a);
- IEMA GHG Management Hierarchy (hereafter referred to as the IEMA 2020 GHG Management Hierarchy) (IEMA, 2020b);
- IEMA Principles Series: Climate Change Mitigation & EIA (IEMA, 2010);
- Carbon Management in Infrastructure and Built Environment - PAS 2080 (BSI, 2023); and
- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a).

12.2.1.2 Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the 2015 Act). The purpose of the 2015 Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*' (3.(1) of No. 46 of 2015). This is referred to in the 2015 Act as the 'national transition objective'. The 2015 Act made provision for a national mitigation plan, and a national adaptation framework. In addition, the 2015 Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021a) with further updated CAPs in December 2022 (Government of Ireland, 2022) and December 2023 (DECC, 2023a). The fifth and most recent CAP, was published in April 2025 (Government of Ireland, 2025).

Following on from Ireland declaring a climate and biodiversity emergency in May 2019, and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme in December 2019, followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the 2021 Climate Act) in March 2021. The Climate Act was signed into Law on the 23rd July 2021, giving statutory effect to the core objectives stated within the CAP.

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The purpose of the 2021 Climate Act (Government of Ireland, 2021) is to provide for the approval of plans "*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*". The 2021 Climate Act also provides for "*carbon budgets and a decarbonisation target range for certain sectors of the economy*". The 2021 Climate Act defines the carbon budget as "*the total amount of greenhouse gas emissions that are permitted during the budget period*".

In relation to carbon budgets, the 2015 Act (as amended) states 'A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'. The carbon budget is to be produced for 3 sequential budget periods (Table 12.1). The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in the Climate Action Plan 2024 (CAP24) (DECC, 2023a) (Table 12.2).

Table 12.1 5-Year Carbon Budgets

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO_2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 12.2 Sectoral Emission Ceilings 2030

Sector	Baseline ($MtCO_2e$)	Carbon Budgets ($MtCO_2e$)		2030 Emissions ($MtCO_2e$)	Indicative Emissions % Reduction in Final Year of 2025 – 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment – Residential	7	29	23	4	40
Built Environment – Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP24 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	200	-	51

12.2.1.3 Policy

Greenhouse Gas Assessment Policy

In 2024, the Government published its *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (DECC, 2024). This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the CAP.

In December 2023, CAP24 was published, establishing key actions to deliver a 51% reduction in GHG emissions by 2030 (compared to 2018 levels) and achieve climate neutrality by 2050 (DECC, 2023a). The updated and current CAP25, published in April 2025, builds on the progress of the previous four iterations of the CAP, with CAP23 first publishing carbon budgets and sectoral emission ceilings. It also reaffirms Ireland's climate ambition, with a focus on delivery, implementation and measurable outcomes, particularly ahead of the second carbon budget period (2026–2030). 2025 is the last year in the first 5-year carbon budget period. During the initial 5-year budget period the average annual reduction required was 4.8%, this increases to 8.3% in the second budget period (2026-2030). CAP25 retains the high-impact sectors where the biggest savings can be achieved, while emphasising public sector leadership and green procurement. These sectors include renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and land-use change.

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CAP25 also includes targeted actions to decarbonise industrial heat and support the transition to carbon-neutral manufacturing processes. Public sector leadership is strengthened through a new Buying Greener: Green Public Procurement Strategy and Action Plan (2024–2027), the development of mandatory Climate Action Roadmaps, and enhanced emissions monitoring and reporting across government operations. To support innovation and ensure future economic resilience, IDA Ireland continues to attract and support businesses investing in climate technologies and low-carbon solutions.

CAP25 highlights a significant 17% reduction in electricity emissions in early 2024, with wind power supplying nearly 40% of Ireland's total electricity demand and over 100,000 rooftop microgenerators connected to the grid. Investments are ongoing in grid reinforcement, offshore wind development, and interconnectors with France and the UK to enhance renewable generation capacity. EirGrid, Enterprise Ireland and IDA Ireland have recently signed an MoU to collectively support offshore wind development in Ireland.

CAP25 also reinforces targets first outlined in CAP24 to reduce the embodied carbon of construction materials, with a 10% reduction by 2025 and 30% reduction by 2030 for materials produced and used in Ireland. Cement and high embodied carbon construction materials can be reduced through product substitution, reduced clinker content in cement and uptake of low-carbon construction methods, including those outlined in the Construction Industry Federation 2021 report Modern Methods of Construction (Construction Industry Federation, 2021). There also remains scope for the construction industry to use more timber in construction. In 2022, 24% of new construction in Ireland was built using timber frames to satisfy the demand for housing. Public bodies are now required under the Public Sector Mandate to use best practice project design to reduce embodied carbon; procure concretes with clinker replacements (lower carbon); and require that large construction projects produce a whole life cycle GHG emissions assessment.

Furthermore, CAP25 advances sector-specific measures in green procurement, electrification of transport and heat, and just transition (with the introduction of a Just Transition Commission) to support vulnerable communities. Transport emissions increased by 0.3%. Electric vehicles and the use of biofuels are stated as the best means of transport emission reductions in the medium term.

The *Cork City Council (CCC) Climate Action Plan 2024-2028* (CCC, 2024) outlines the Council's commitment to achieving significant reductions in GHG emissions while preparing for the impacts of climate change. The plan is informed by Cork's participation in the EU Mission for Climate-Neutral and Smart Cities, which sets ambitious goals, including a transition to net-zero emissions by 2030.

A key focus of the Cork City Climate Action Plan is to reduce car dependency by promoting a shift towards more sustainable modes of transport, such as active travel (walking and cycling), and expanding the public transport network. The Council also plans to work with relevant transportation bodies to introduce these measures, similar to the approach adopted by the National Climate Action Plan.

Climate Change Vulnerability Policy

The second National Adaptation Framework (NAF) (DECC, 2024) was published in June 2024 in line the five-year requirement of the 2015 Climate and Low Carbon Development Act. The plan provides a whole of government and society approach to climate adaptation in Ireland to reduce Irelands vulnerability to climate change risks including extreme weather events, flooding, drought, loss of biodiversity, sea level rise and increased temperatures. Similar to the *"Just Transition"* when considering carbon emissions, the NAF aims for *"Just Resilience"* stating that:

"A climate resilient Ireland will have a reduced reliance on fossil fuel, it will have widely accessible electrified public transport and will have transitioned towards sustainable agricultural practices such as agroforestry and organic farming."

In relation to the built environment the NAF states in Chapter 3 "*deepening of adaptation considerations in the planning and building standards processes is considered the most appropriate way of increasing the resilience of the built environment*". Within the NAF it mentions that there is a risk of damage to buildings and structures from severe weather events such as high winds and intense rainfall. New development should accommodate predicted future climate change impacts without requiring major redesign or redevelopment in the future which may be costly and inefficient. This will require facilitating innovative building design, new materials and standards (to accommodate hotter summers while withstanding changes in precipitation patterns and more intense storms for example) according to the NAF (DECC, 2024).

The National Climate Change Risk Assessment (NCCRA) was published in May 2024 (EPA, 2024a). The NCCRA was required to be developed under Action 457 from the 2021 CAP (Government of Ireland 2021). Action 457 seeks to "*Further develop Ireland's national climate change risk assessment capacity to identify the priority physical risks of climate change to Ireland'*. The NCCRA uses definitions of the risk determinants from the Intergovernmental Panel on Climate Change (IPCC) Risk Framework (IPCC 2023):

- **Hazard** - the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources
- **Exposure** - the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected
- **Vulnerability** - the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity
- **Risk** - the potential for adverse consequences for human or ecological systems.

When considering risk, the NCCRA assesses exposure and vulnerability for two future climate change scenarios or Representative Concentration Pathways (RCPs):

- RCP4.5 was selected as it represents a scenario aligned with the global temperature trajectory
- RCP8.5 was selected as it represents a high-emissions scenario and achieves the highest level of modelled temperature increases by the end of the century. Consequently, this scenario will result in the highest level of physical risk for Ireland, and the greatest requirement for adaptation.

These scenarios align with a conservative approach to assess risks to Ireland and assumes global emission reduction targets are not met. This aligns with the principle of precaution as stated in the NAF (DECC 2024). In addition to the future climate scenarios, the NCCRA assesses the risk from the future climate during the following timeframes:

- Present (~2030)
- Medium term (~2050)
- Long term (~2100).

The *Cork City Climate Action Plan 2024-2028* highlights the increasing risks posed by climate change to the city's infrastructure, residents, and businesses, particularly from extreme weather events such as flooding, heatwaves, and droughts. Pluvial, fluvial, and coastal flooding are identified as significant risks due to rising sea levels and more intense rainfall events. Without mitigation, these events are projected to lead to the inundation of properties, damage to infrastructure, and disruptions to transport networks.

Flood-relief measures, including both engineered and nature-based solutions, such as Sustainable Urban Drainage Systems (SuDS), have been incorporated into city planning. Recent and ongoing works, including those in Togher, Douglas, and the Lower Lee flood protection schemes, will enhance Cork's resilience to future flooding risks.

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12.2.2 Greenhouse Gas Assessment

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established with reference to EPA data on annual GHG emissions (see Section 12.4.1).

12.2.2.1 Construction Phase

The GHG assessment accounts for various components relating to the project during different life stages to determine the total impact of the development on climate. The reference study period (i.e. the assumed building life expectancy) for the purposes of the assessment is 60 years. Embodied carbon emissions are attributed to four main categories, taken from BS EN 15978. The categories are:

- **Product Stages (Category A1 to A3)** The carbon emissions generated at this stage arise from extracting the raw materials from the ground, their transport to a point of manufacture and then the primary energy used (and the associated carbon impacts that arise) from transforming the raw materials into construction products.
- **Construction (Category A4 to A5)** These carbon impacts arise from transporting the construction products to site, and their subsequent processing and assembly into the building.
- **Use Stage (Category B1 to B7)** This covers a wide range of sources from the GHG emissions associated with the operation of the building (B1), maintenance (B2), repair (B3), refurbishment (B4) and replacement (B5) of materials, and operational energy use (B6) and water use (B7).
- **End of Life Stages (Category C1 to C4)** The eventual deconstruction and disposal of the existing building at the end of its life takes account of the on-site activities of the demolition contractors. No 'credit' is taken for any future carbon benefit associated with the reuse or recycling of a material into new products.

PE-ENV-01104 (TII, 2022a) recommends the calculation of the construction stage embodied carbon using the TII Online Carbon Tool (TII, 2024) or an appropriate alternative tool. Embodied carbon refers to the sum of the carbon needed to produce a good or service. It incorporates the energy needed in the mining or processing of raw materials, the manufacturing of products and the delivery of these products to site. The purpose of the embodied carbon assessment is to engage the design team in the consideration of embodied carbon at an early stage in the development and mitigate embodied carbon. This engagement aims to ensure carbon savings are made and to assist in aligning the project to Ireland's CAP goal of Net Carbon Zero by 2050.

The TII Online Carbon Tool (TII, 2024) has been commissioned by TII to assess GHG emissions associated with road or rail projects in Ireland. The TII Carbon Tool (TII, 2024) uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013), which can be applied to a variety of developments, not just road or rail. The tool aligns with PAS 2080.

For the building elements of the proposed development, the OneClick LCA tool was utilised. OneClick LCA is certified to EN 15978, EN 15978, ISO 21931 – 1 & ISO 21929, and data requirements of ISO 14040 & EN 15804, and is LEED, BREEAM and PAS 2080 aligned. It allows users to assess the carbon impact of buildings at various stages of design. The tool includes a detailed product and material list based on Irish materials as well as materials from the UK and Europe. Data was obtained from the project design team in terms of estimated material types and quantities. Where an exact material type or quantity was not known, as it will not be chosen until detailed design, an estimate value or alternative material was used within the tool to complete the GHG assessment. The tool allows for optioneering and optimization of the carbon impact, it highlights the key areas within the building with the highest carbon impact and provides options for lower carbon intensive materials.

Reasonable conservative estimates have been used in this assessment where necessary to provide an estimate of the GHGs associated with the proposed development.

12.2.2.2 Operational Phase

Traffic Emissions

Emissions from road traffic associated with the proposed development have the potential to emit carbon dioxide (CO_2) which will impact climate.

The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022b), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment, and also the climate assessment.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5 m or greater.

While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

There are a number of road links that will experience a change of over 1,000 in the AADT during the operational phase due to the proposed development. As a result, a detailed assessment of traffic related carbon dioxide (CO_2) emissions was conducted.

PE-ENV-01104 (TII, 2022a) states that road traffic related emissions information should be calculated using the TII Road Emissions Model (REM) online calculator tool (TII, 2024). The TII guidance (TII, 2022b) states that modelling should be conducted for the Base, Opening and Design Years for both the Do Nothing and Do Something scenarios. The output is provided in terms of CO_2e.

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The *Default* fleet mix option was selected along with the *Intermediate Case* fleet data base selection for cars, the *ICE Sales Ban 2035* fleet data base for LGVs and the *EU Target* for the HGV fleet data base, as per TII Guidance (TII, 2024b; 2025). The Intermediate Case assumes a linear interpolation between the Business-as-Usual case – where current trends in vehicle ownership continue and the Climate Action Plan (CAP) case – where adoption of low emission light duty vehicles occurs. The ICE Sales Ban 2035 represents a sales ban on new combustion engine vehicles to be implemented by 2035, and the EU Target for HGV represents interim targets for emissions from sales of new HGVs.

Traffic flow information was obtained from EGIS, the traffic engineers, for the purposes of this assessment, see Chapter 4 of this EIAR, Material Assets – Traffic & .Transportation. Data was provided for the Base Year 2024 and the Do Nothing and Do Something scenarios for the Opening Year 2032 and Design Year 2047 (see Traffic and Transport Assessment for further details). Both the Do Nothing and Do Something scenarios are quantified to determine the degree of change in emissions due to the proposed development. A total of 2 no. scenarios were assessed, these include:

- The Do Nothing scenario – this scenario assumes the proposed development is not in place in future years but includes traffic associated with cumulative developments in the wider area.
- The Proposed scenario – this is the "Do Something" scenario and includes traffic from the Do Nothing scenario and traffic associated with the proposed development as well as traffic associated with cumulative developments in the wider area.

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Further detail on the modelling scenarios can be found in the Traffic and Transport Assessment prepared by EGIS and included within Chapter 4 of this EIAR. The traffic data is detailed in Table 12.3. Only road links that met the TII scoping criteria were included in the modelling assessment. Inputs include light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type and project county location.

Table 12.3 Traffic Data used in Operational Phase GHG Assessment

Road Name	Speed (kph)	Base Year	Opening Year		Design Year	
			Do Nothing	Do Something	Do Nothing	Do Something
		LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
Sunningdale Road	50	9566 (13)	11143 (147)	12244 (149)	11794 (18)	12796 (18)
Castle Road	50	9383 (14)	10910 (166)	12296 (162)	11570 (20)	12826 (19)
Greenfields Road	50	8867 (22)	9938 (255)	12027 (258)	10676 (30)	12576 (30)
Woodberry Road	50	9410 (23)	10462 (257)	12325 (252)	11236 (30)	12924 (30)
New Link Road	50	0 (0)	0 (0)	2253 (0)	0 (0)	2046 (0)

Operational Phase Energy Use

The EU guidance (European Commission, 2013) also states indirect GHG emissions as a result of a development must be considered, which includes emissions associated with energy usage. Information on the proposed energy strategy for the development was obtained from the Scheme Sustainability & Climate Resilience Statement prepared by DOSA Consulting Engineers, , and used to inform this assessment (See Appendix 12-1 of this EIAR). A number of measures in relation to sustainable energy usage have been incorporated into the overall design of the development which will have the benefit of reducing the impact to climate where possible during operation.

12.2.2.3 Significance Criteria for GHGA

The Transport Infrastructure Ireland (TII) guidance document entitled PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022a) outlines a recommended approach for determining the significance of both the construction and operational phases of a development.

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022a) is based on IEMA guidance (IEMA, 2022) which is consistent with the terminology contained within Figure 3.4 of the EPA's (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'.

The 2022 IEMA Guidance (IEMA, 2022) sets out the following principles for significance:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. Therefore, the significance of a project's emissions should be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors (i.e. Ireland's National GHG targets). In relation to climate, there is no project specific assessment criteria, but the project will be assessed against the recommended TII significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

TII (TII 2022a) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. TII reference the IEMA guidance (2022) which states that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050".*

Significance is determined using the criteria outlined in Table 12.4 (derived from Table 6.7 of PE-ENV-01104 (TII 2022a)) along with consideration of the following two factors:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

Table 12.4 Significance Criteria for GHGA

Effects	Significance Level	Description
Significant adverse	Major adverse	• The project's GHG impacts are not mitigated. • The project has not complied with do-minimum standards set through regulation, nor provided reductions required by local or national policies; and • No meaningful absolute contribution to Ireland's trajectory towards net zero.
	Moderate adverse	• The project's GHG impacts are partially mitigated. • The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and • Falls short of full contribution to Ireland's trajectory towards net zero.
Not significant	Minor adverse	• **The project's GHG impacts are mitigated through 'good practice' measures.** • **The project has complied with existing and emerging policy requirements; and** • **Fully in line to achieve Ireland's trajectory towards net zero**.
	Negligible	• The project's GHG impacts are mitigated beyond design standards. • The project has gone well beyond existing and emerging policy requirements; and • Well 'ahead of the curve' for Ireland's trajectory towards net zero.
Beneficial	Beneficial	• The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration. • The project has gone well beyond existing and emerging policy requirements; and • Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

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Ireland's carbon budgets can also be used to contextualise the magnitude of GHG emissions from the proposed development (TII, 2022a). The approach is based on comparing the net proposed development GHG emissions to the relevant carbon budgets (DECC, 2023a). With the publication of the Climate Action Act in 2021 and the Climate Action Plan 2024, sectoral carbon budgets have been published for comparison with the net GHG emissions from the proposed development over its lifespan. The aim of the carbon budgets is to ensure we are on a trajectory to meet the National Climate Objective of Net Zero by 2050.

12.2.3 Climate Change Risk Assessment

The assessment involves determining the vulnerability of the proposed development to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability.

PE-ENV-01104 (TII, 2022a) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents:

- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a); and
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (IEMA, 2020).

The baseline environment information provided in Section 12.4, future climate change modelling and input from other experts working on the proposed development (i.e. hydrologists) should be used to assess the likelihood of a climate risk.

First an initial screening CCRA based on the operational phase is carried out, according to the TII guidance PE-ENV-01104. This is carried out by determining the sensitivity of proposed development assets (i.e. receptors) and their exposure to climate change hazards.

The proposed development asset categories must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022a) provides the list of asset categories and climate hazards to be considered. The asset categories will vary for development type and need to be determined on a development by development basis.

- **Asset Categories** Pavements; drainage; structures; utilities; landscaping; signs, light posts, buildings, and fences.
- **Climate Hazards** Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog.

The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.

- **High Sensitivity** The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium Sensitivity** It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2**.**
- **Low Sensitivity** It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

Once the sensitivities have been identified the exposure analysis is undertaken. The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type. For example, flooding could be a risk if the project location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High Exposure** It is almost certain or likely this climate hazard will occur at the project location, i.e. might arise once to several times per year. This is an exposure score of 3.
- **Medium Exposure** It is possible this climate hazard will occur at the project location, i.e. might arise a number of times in a decade. This is an exposure score of 2.
- **Low Exposure** It is unlikely or rare this climate hazard will occur at the project location, i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1.

Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability.

12.2.3.1 Significance Criteria for CCRA

The CCRA involves an initial screening assessment to determine the vulnerability of the proposed development to various climate hazards. The vulnerability is determined by combining the sensitivity and the exposure of the proposed development to various climate hazards.

Vulnerability = Sensitivity x Exposure

The vulnerability assessment takes any proposed mitigation into account. Table 12.5 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale.

TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. Therefore, the impact from climate change on the proposed development can be considered to be not significant.

However, where residual medium or high vulnerabilities exist the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks.

Table 12.5 Vulnerability Matrix

		Exposure		
		High (3)	Medium (2)	Low (1)
Sensitivity	High (3)	9 - High	6 – High	3 - Medium
	Medium (2)	6 - High	4 - Medium	2 - Low
	Low (1)	3 - Medium	2 – Low	1 - Low

The screening CCRA, detailed in Section 12.6, did not identify any residual medium or high risks to the proposed development as a result of climate change. Therefore, a detailed CCRA for the construction and operational phase were scoped out.

While a CCRA for the construction phase was not required, best practice mitigation against climate hazards is still recommended in Section 12.8.

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12.3 Difficulties Encountered

There were no difficulties encountered in compiling this assessment.

12.4 Baseline Environment

PE-ENV-01104 (TII, 2022a) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the project for both the current and future baseline.

Ireland declared a climate and biodiversity emergency in May 2019 and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 (European Union, 2018) results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

12.4.1 Current GHG Baseline

Data published in July 2025 (EPA, 2025a), indicates that Ireland exceeded, without the use of flexibilities, its 2024 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 1.03 Mt CO_2e. However, the 2024 emissions represent the second consecutive year in which Ireland's emission were below (-4.2%) 1990 levels. ETS (Emissions Trading Scheme) emissions decreased (-7.4%) and ESR (Effort Sharing Regulation) emissions decreased (-0.5%). Ireland's target is an emission reduction of 626 kt of CO_2e by 2030 on an average baseline of 2016 to 2018.

The EPA estimate that 2024 total national GHG emissions, excluding LULUCF, have decreased by 2.0% on 2023 levels to 53.75 Mt CO_2e, with a 0.7 Mt CO_2e (-8.9%) reduction in electricity industries alone. This was driven by a 39.6% share of energy from renewables in 2024 and the complete phase-out of peat for electricity generation. Manufacturing combustion and industrial processes decreased by 4.6% to 6.0 Mt CO_2e in 2024 due to declines in fossil fuel usage. The sector with the highest emissions in 2024 was agriculture at 38% of the total, followed by transport at 21.7%. For 2024, total national emissions (including LULUCF) were 57.65 Mt CO_2e (EPA, 2025a) (Table 12.6).

The current estimates of National greenhouse gas emissions (including LULUCF) in 2024 are 12.0% below 2018, well off the National Climate ambition of a 51% reduction by 2030. The data indicate that from 2021- 2024 Ireland has used 82.5% of the 295 Mt CO_2e Carbon Budget for the five-year period 2021-2025. This leaves 17.5% of the budget available for 2025, requiring a substantial 10.3% annual emissions reduction for 2025 to stay within budget.

Table 12.6 Trends in Total National GHG Emissions 2021 – 2023

Sector *Note 1*	2021	2022	2023	2024	Total Budget (Mt CO_2e) (2021-2025)	% Budget 2021-2025 Used	Annual Change 2022 to 2023
Electricity	9.89	9.69	7.57	6.95	40	85.25%	-8.19%
Transport	11.09	11.76	11.80	11.65	54	85.74%	-1.27%
Buildings (Residential)	6.87	5.75	5.35	5.61	29	81.31%	4.86%
Buildings (Commercial and Public)	1.44	1.45	1.39	1.49	7	82.43%	7.19%
Industry	7.09	6.62	6.31	6.01	30	86.77%	-4.75%
Agriculture	21.94	21.78	20.72	20.41	106	80.05%	-1.50%
Other *Note 2*	1.86	1.93	1.81	1.63	9	80.33%	-9.94%
LULUCF	4.63	3.98	3.89	3.89	–	–	0
Total including LULUCF	64.82	62.99	58.83	57.64	295	82.81%	-2.04%

Note 1 Reproduced from latest emissions data on the EPA website May 2025 (EPA, 2025).

Note 2 Other includes Petroleum refining, F-Gases and Waste (emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste).

12.4.2 Future GHG Baseline

The future baseline with respect to the GHGA can be considered in relation to the future climate targets which the assessment results will be compared against. In line with TII (TII, 2022a) and IEMA Guidance (IEMA, 2022) the future baseline is a trajectory towards net zero by 2050, "*whether it* [the project] *contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

The future baseline will be determined by Ireland meeting its targets set out in the CAP25, and future CAPs, alongside binding 2030 EU targets. The European Union (EU) enacted *'Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013'* (hereafter referred to as the Regulation) (European Union, 2018) to meet the commitments under the Paris Agreement. The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. The Regulation was amended in April 2023 and Ireland must now limit its ETS and non-ETS greenhouse gas emissions by at least 42% by 2030. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and includes GHG emissions from transport, residential and commercial buildings and agriculture.

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In May 2025, the EPA released the report Ireland's Greenhouse Gas Emissions Projections 2024-2055 (EPA, 2025b), which includes total projected emissions and a breakdown of projected emissions per sector under the 'With Existing Measures' and 'With Additional Measures' scenarios. The EPA projections indicate that currently implemented measures (With Existing Measures) will achieve a reduction of 10% on 2005 levels by 2030, significantly short of the 42% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 22% by 2030, still short of the 42% reduction target.

12.4.3 Current CCRA Baseline

The region of the proposed development has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Cork Airport is the nearest, representative, weather and climate monitoring station to the proposed development with meteorological data recorded for the 30-year period from 1991 to 2020. The historical regional weather data for Cork Airport metrological station is representative of the current climate in the region of the proposed development. The data for the 30-year period from 1991 to 2020 indicates that the wettest months at Cork Airport Metrological Station were January, October and December, and the driest month on average was May (Met Éireann, 2025a). July was the warmest month with a mean temperature of 15.2 Celsius. January was the coldest month with a mean temperature of 5.7 Celsius.

Met Éireann's 2023 Climate Statement (Met Éireann, 2024a) states 2023's average shaded air temperature in Ireland is provisionally 11.20°C, which is 1.65°C above the 1961-1990 long-term average. Previous to this 2022 was the warmest year on record; however, 2023 was 0.38°C warmer (see Figure 12.1).

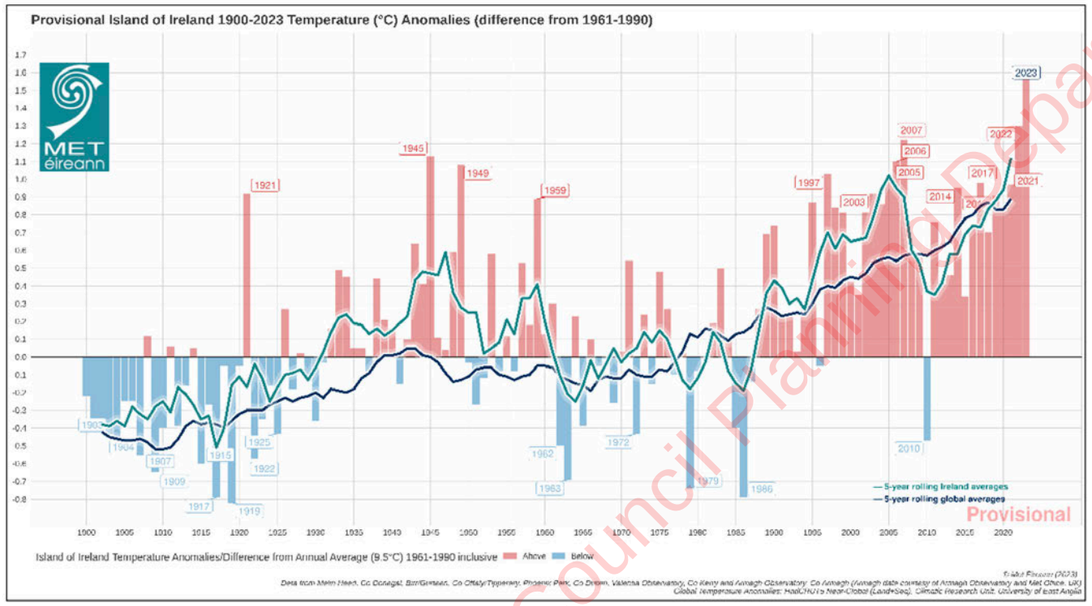

Figure 12.1 1900-2023 Temperature (°C) Temperature Anomalies (differences from 1961-1990)

2023 also had above average rainfall, this included the warmest June on record and the wettest March and July on record. Record high sea surface temperatures (SST) were recorded since April 2023 which included a severe marine heatwave to the west of Ireland during the June 2023. This marine heatwave contributed to the record rainfall in July.

Met Éireann's 2024 *Climate Statement* (Met Éireann 2025b) states 2024's average shaded air temperature in Ireland is provisionally 10.72°C, which is 1.17°C above the 1961-1990 long-term average or 0.55°C above the most recent 1991-2020 long-term average. This is the 4th warmest year on record with 2023 breaking previous records. Seven of the top ten warmest years have occurred since 2005. Record high sea surface temperatures (SST) were recorded in 2022, and in 2024 continued at or near record high levels. 2024 was overall drier than average, however there were many instances of heavy or intense rainfall which led to flooding events. This trend is predicted to continue with climate change with an increase in both dry periods and heavy rainfall events. Considering the extraordinary data, Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters. The record temperatures means the likelihood of extreme weather events occurring has increased. This will result in longer dry periods and heavy rainfall events. Storm surges and coastal flooding due to sea level rise. Compound events, where coastal surges and extreme rainfall events occur simultaneously will also increase. Met Éireann has high confidence in maximum rainfall rates increasing but not in how the frequency or intensity of storms will change with climate change.

12.4.4 Future CCRA Baseline

Impacts as a result of climate change will evolve with a changing future baseline, changes have the potential to include increases in global temperatures and increases in the number of rainfall days per year. Therefore, it is expected that the baseline climate will evolve over time and consideration is needed with respect to this within the design of the proposed development.

Ireland has seen increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east including in the region where the proposed development will be located (EPA, 2021b). The EPA have compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the proposed development (EPA, 2021b):

- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality; and
- Changes in distribution of plant and animal species.

TII's Guidance document PE-ENV-01104 (TII 2022a) states that for future climate change a moderate to high Representative Concentration Pathways (RCP) should be adopted. RPC4.5 is considered moderate, while RPC8.5 is considered high. Representative Concentration Pathways (RCPs) describe different 21st century pathways of GHG emissions depending on the level of climate mitigation action undertaken.

National Framework for Climate Services (NFCS) was founded in June 2022 to streamline the provision of climate services in Ireland and will be led by Met Éireann. The aim of the NFCS is to enable the co-production, delivery and use of accurate, actionable and accessible climate information and tools to support climate resilience planning and decision making. In addition to the NFCS, further work has been ongoing into climate projects in Ireland through research under the TRANSLATE project. TRANSLATE (Met Éireann, 2023b) has been led by climate researchers from University of Galway – Irish Centre for High End Computing (ICHEC), and University College Cork – SFI Research Centre for Energy, Climate and Marine (MaREI), supported by Met Éireann climatologists. TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted

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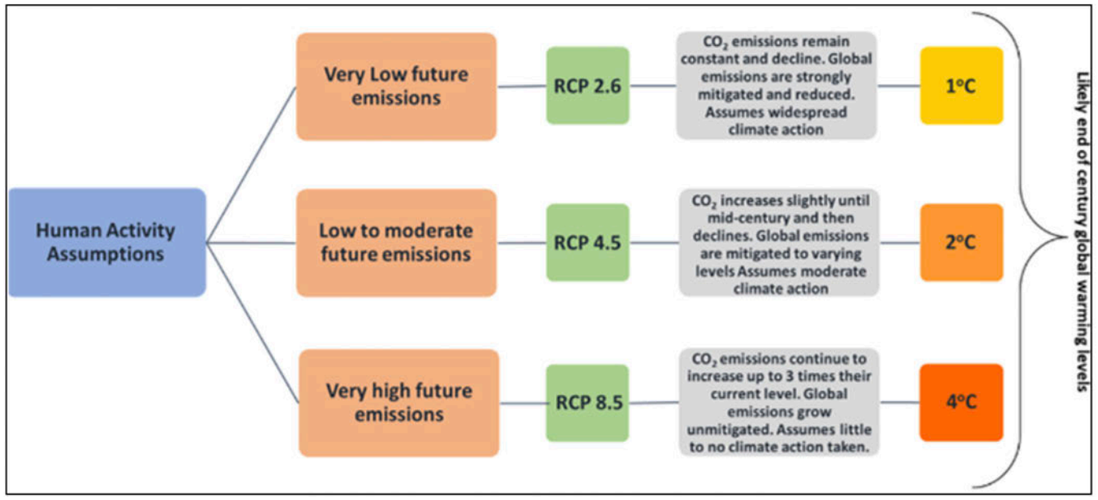
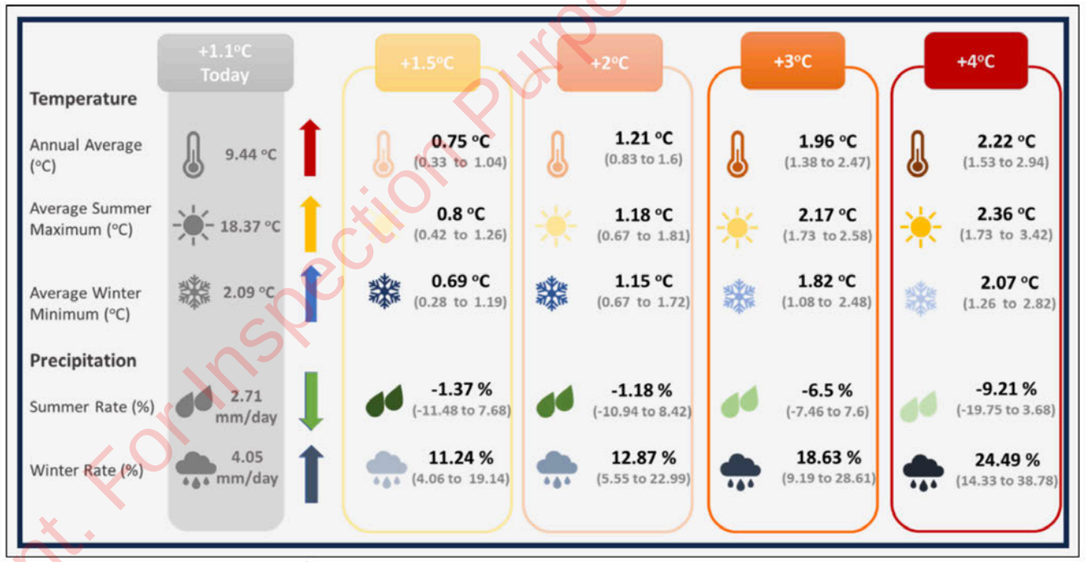
models from both CORDEX and CMIP5. Representative Concentration Pathways (RCPs) provide a broad range of possible futures based on assumptions of human activity. The modelled scenarios include for "least" (RCP2.6), "more" (RCP4.5) or "most" (RCP8.5) climate change, see Figure 12.2.



Source: TRANSLATE project storymap (Met Éireann 2023)

Figure 12.2 Representative Concentration Pathways associated emission levels

TRANSLATE (Met Éireann, 2023b) provides the first standardised and bias-corrected national climate projections for Ireland to aid climate risk decision making across multiple sectors (for example, transport, energy, water), by providing information on how Ireland's climate could change as global temperatures increase to 1.5˚C ,2˚C, 2.5˚C, 3˚C or 4˚C. Projections broadly agree with previous projections for Ireland. Ireland's climate is dominated by the Atlantic Meridional Overturning Circulation (AMOC), a large system of ocean currents – including the Gulf Stream – characterised by a northward flow of warm water and a southward flow of cold water. Due to the AMOC, Ireland does not suffer from the extremes of temperature experienced by other countries at a similar latitude. Recent studies have projected that the AMOC could decline by 30 – 40 % by 2100, resulting in cooler North Atlantic Sea surface temperatures (SSTs) (Met Éireann, 2023b). Met Éireann projects that Ireland will nevertheless continue to warm, although the AMOC cooling influence may lead to reduced warming compared with continental Europe. AMOC weakening is also expected to lead to additional sea level rise around Ireland. With climate change Ireland's temperature and rainfall will undergo more and more significant changes e.g. on average summer temperature could increase by more than 2°C, summer rainfall could decrease by 9% while winter rainfall could increase by 24% (See Figure 12.3). Future projects also include a 10-fold increase in the frequency of summer nights (values > 15°C) by the end of the century, a decrease in the frequency of cold winter nights and an increase in the number of heatwaves. A heatwave in Ireland is defined as a period of 5 consecutive days where the daily maximum temperature is greater than 25°C.



Source: TRANSLATE project storymap (Met Éireann, 2023b)

Figure 12.3 Change of climate variables for Ireland for different Global warming thresholds

The TRANSLATE research report (Met Éireann, 2024d) finds that night-time temperatures will warm more than day-time temperatures, with temperatures increases across all seasons but the highest in the summer (with an increase of 0.5°C to 3.5°C). Autumn is projected to have the highest increase in average minimum temperatures (with an increase of 1.1°C to 4.4°C). The variance is dependent on the scenario that is being reviewed. While these temperatures are projected across all of Ireland, they increase most in the east of the country compared to the west. With respect to rainfall, increases of 4% to 38% are projected, however this will not be spread across the year as during summer months there are projected decreases in rainfall beyond the 2°C warming scenario.

In January 2024 the EPA published *Ireland's Climate Change Assessment Synthesis Report* (EPA, 2024e) which contained four volumes:

- Volume 1: Climate Science: Ireland in a Changing World
- Volume 2: Achieving Climate Neutrality by 2050
- Volume 3: Being Prepared for Ireland's Future Climate
- Volume 4: Realising the Benefits of Transition and Transformation

This report reinforces the existing and future risks arising from climate change. Volume 1 (EPA, 2024e) states that under Early action, the temperature increase averaged across the island of Ireland relative to the recent past (1976 to 2005) would reach 0.91°C (0.44 to 1.10°C) by mid-century before falling back to 0.80°C (0.34 to 1.07°C) at the end of the century. Whereas under Late action, by the end of the century it is projected that the temperature increases could be 2.77°C (2.02 to 3.49°C). Heat extremes will become more frequent and more severe and cold extremes will become less frequent and less severe with further warming.

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Precipitation was 7% higher over the period 1991 to 2020 than over the 1961 to 1990 period. The average future predicted increase in precipitation is <10% in annual mean accumulated. By 2100 projected additional rises in sea level range from 0.32 to 0.6m under early action to 0.63 to 1.01m under late action scenarios, with greater storm surges potentially effecting critical infrastructure along the coastline. Projections of changes in storminess are highly uncertain and translate into large uncertainties in future frequency and intensity of extreme waves.

Volume 3 (EPA, 2024e) discusses how water supplies will face growing pressures resulting in increased water demand and how options need to be developed, including potential new sources. The report states the key role of critical infrastructure for delivering public services, economic development and a sustainable environment. These are exposed to a range of climate extremes. Failures in critical infrastructure can cascade across other sectors and present a multi-sector risk due to climate change.

The report references the EPA's *Critical Infrastructure Vulnerability to Climate Change* report (EPA, 2021a) as the most substantial research project in Ireland to date on climate change and critical infrastructure which assesses the future performance of Ireland's critical infrastructure when climate is considered. The Critical Infrastructure Vulnerability to Climate Change report states with respect to water availability and quality, that flood risk and heatwaves have a medium vulnerability index and the underground supply network has a high vulnerability to snowstorms and cold spells. However, while the vulnerability is high, the exposure is likely to reduce due to future climate change resulting in less cold weather events. The risk assessment highlights the co-dependence of the water sector to the energy sector, and how vulnerability in the energy sector may have cascading impacts.

Volume 4 (EPA, 2024e) calls for system change, including a transformation of urban settings. Stating that meaningful urban transformation can create a better living environment while simultaneously reducing emissions.

The projections were echoed by the *Updated High-resolution Climate Projections for Ireland Research Report: 471* (EPA, 2024f) which was in broad agreement with previous research. The future autumn and winter months are projected to be up to 10% wetter, while summer is projected to be up to 8% drier.

12.5 The 'Do Nothing' Scenario

In the Do-Nothing scenario, the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

As the site is zoned for development, it is likely that in the absence of the proposed development a development of a similar nature would occur. Therefore, the predicted climate impacts within this report are likely to occur even in the absence of the proposed development.

12.6 Potential Impacts of the Proposed Development

12.6.1 Greenhouse Gas Assessment

12.6.1.1 Construction Phase

The most significant proportion of GHG emissions tend to occur during the construction phase as a result of embodied carbon in construction materials and emissions from construction activities. Therefore, the assessment has been included in the construction phase assessment for the purposes of the EIAR. The assessment is broken down into the following stages as per Section 12.2.2.1

- Product stage (A1 – A3);
- Transportation to site (A4);
- Site operations (construction activities) (A5); and
- Material replacement & refurbishment (B4 – B5).

The construction phase GHG emissions comprise stages A1 – A5 which includes the construction materials, the transport of the materials to site and the construction activities or site operations. Ongoing material refurbishment and replacement throughout the lifetime of the development is included within category B4 – B5, these are default values based on the typical maintenance requirements for the chosen material types over the assumed 60 year lifetime. Figure 12.4 shows the GHG emissions for the proposed development per life-cycle stage based on the output from the OneClick tool.

Construction materials make up the majority of GHG emissions for the proposed development making up approximately 81% of the total construction phase GHG emissions. Material replacement makes up the second highest contribution at 17% of the total and material transport and construction activities make up the remainder of the construction GHG emissions. The A5 and B4-B5 categories include carbon savings associated with waste material recycling or re-use.

The carbon assessment has highlighted the areas where the highest embodied carbon emissions occur, specifically as a result of building materials. The carbon emissions have been calculated assuming the building foundations and external walls are made up of lightweight concrete blocks. Additionally, the calculations assume the use of ready-mix concrete with a 0% recycled cement content. In order to reduce carbon impacts from the proposed development, the use of alternative materials with lower embodied carbon emissions such as timber frame walls rather than traditional concrete block walls or concrete with a 50% recycled cement content for example will help to reduce the impact of the development on climate. Alternative material types with lower embodied carbon should be investigated during the detailed design phase of the proposed development.

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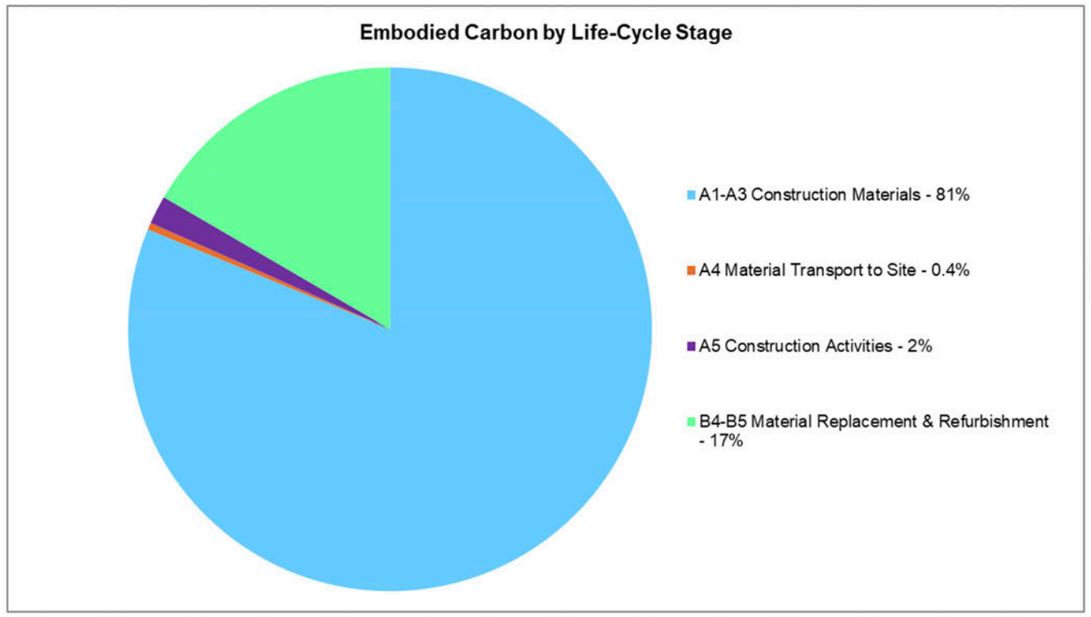

Figure 12.4 Embodied Carbon by Life-Cycle Stage

It has been calculated that the total construction phase embodied carbon (including maintenance and replacement of materials over the development lifetime) will be 63,610 tonnes CO_2e (see Table 12.7). The GHG emissions from the development as a total cannot be compared against one specific sector 2030 carbon budget, the emissions are broken down into different assessment categories and these must be compared separately to the relevant sectoral emissions budget which are detailed in Table 12.7 And Table 12.8. The relevant sectoral emissions for the proposed development comparison include the Industry sector, Transport sector and Waste sector. The predicted emissions for the proposed development are annualised over the assumed 60-year lifespan and then compared to the relevant sector 2030 carbon budgets. Annualising the full carbon emissions over the lifetime of the development allows for appropriate comparison with annual GHG targets.

Table 12.7 GHG Assessment Results

Stage	GHG Assessment Category	Predicted GHG Emissions (tCO_2e)	Predicted GHG Emissions as % of Project Total	Relevant Sector for Carbon Budget Comparison
A1-A3	Materials	51,662	81%	Industry
A4	Material Transport	275	0%	Transport
A5	Construction site material waste	1,047	2%	Waste
	Construction site material waste transport	12	0.0%	Transport
	Construction site waste	60	0.1%	Waste
B4 - B5	Maintenance Material	10,443	16%	Industry
	Maintenance Material Transport	56	0.09%	Transport
	Maintenance Material Waste	55	0.1%	Waste
Total		63,610		

In Table 12.8, GHG emissions have been compared against the carbon budget for the industry, transport and waste sectors in 2030 (DECC, 2024), against Ireland's total GHG emissions in 2023 and against Ireland's EU 2030 target of a 30% reduction in non-ETS sector emissions based on 2005 levels (27.7 Mt CO_2e) (set out in Regulation EU 2018/842 of the European Parliament and of the Council).

The estimated total GHG emissions, when annualised over the 60-year proposed development lifespan, are equivalent to 0.018% of Ireland's total GHG emissions in 2023 and 0.004% of Ireland's non-ETS 2030 emissions target. The estimated GHG emissions associated with transport-related activities are 0.0001% of the 2030 Transport budget, construction waste GHG emissions are 0.002% of the Waste budget and industry-related activities are 0.03% of the 2030 Industry budget.

Table 12.8 Estimated GHG Emissions Relative to Sectoral Budgets and GHG Baseline

Target/Sectoral Budget (tCO_2e)		Annualised Development GHG Emissions		% of Relevant Target/Budget
Ireland's 2023 Total GHG Emissions (existing baseline)	5,883,000	1,060	Total GHG Emissions	0.018%
Non-ETS 2030 Target	27,722,000	1,060	Total GHG Emissions	0.004%
2030 Sectoral Budget (Industry Sector)	4,000,000	1,035	Total Industry Emissions	0.03%
2030 Sectoral Budget (Transport Sector)	6,000,000	6	Total Transport Emissions	0.0001%
2030 Sectoral Budget (Waste Sector)	1,000,000	19	Total Waste Emissions	0.002%

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12.6.2 Operational Phase

12.6.2.1 Operational Energy Usage

The proposed development has been designed to reduce the impact to climate where possible. A number of measures have been incorporated into the design to ensure the operational phase emissions are minimised. The primary elements with respect to reducing climate impacts and optimising energy usage are summarised in Section 12.8.1 and are based on information provided by the project building engineers and the Scheme Sustainability & Climate Resilience Statemen t prepared by DOSA.

12.6.2.2 Operational Traffic Emissions

There is the potential for increased traffic volumes to impact climate during the operational phase. To provide for a worst-case assessment and to assess potential cumulative impacts, the traffic data has included specific cumulative developments within the area (see Chapter 4 of his EIAR for further details).

The predicted concentrations of CO_2e for the future years of 2032 and 2047 are detailed in 12.9. These are significantly less than Ireland's national 2030 target set out under EU legislation (targets beyond 2030 are not available) and the 2030 sectoral emissions ceilings. It is predicted that in 2032 the proposed development will increase CO_2 emissions by 110 tonnes CO_2e. This equates to 0.0004% of the 2030 national emission ceiling or 0.002% of the 2030 Transport sector emissions ceiling (see Table 12.9). Similarly low increases in CO_2 emissions are predicted to occur in 2047 with emissions increasing by 95 tonnes CO_2e. This equates to 0.0003% of the 2030 national emission ceiling or 0.002% of the 2030 Transport sector emissions ceiling (Table 12.9).

In addition, bicycle parking and electric vehicle parking and charging infrastructure will be provided as part of the parking requirements at the proposed development which will promote the use of more sustainable methods of transport.

Table 12.9 Traffic Emissions GHG Impact Assessment

Year	Scenario	CO_2e (tonnes/annum)
2032	Do Nothing	820
	Do Something	930
2047	Do Nothing	736
	Do Something	831
Increment Change in 2032		**110**
National Emission Ceiling 2030 (Tonnes) Note 1		**27,720,000**
Impact in 2032 (as % of national emissions ceiling)		**0.0004%**
Transport Sector 2030 Emission Ceiling		**6,000,000**
Impact in 2032 (as % of transport sector emissions ceiling)		**0.002%**
Increment Change in 2047		**95**
National Emission Ceiling 2030 (Tonnes) Note 1		**27,720,000**
Impact in 2047 (as % of national emissions ceiling)		**0.0003%**
Impact in 2047 (as % of transport sector emissions ceiling)		**0.002%**

Note 1 Target under Commission Implementing Decision (EU) 2020/2126 of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council.

12.6.3 GHGA Significance of Effects

The TII guidance states that the following two factors should be considered when determining significance:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

The level of mitigation described in Section 12.8 has been taken into account when determining the significance of the proposed development's GHG emissions.

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According to the TII significance criteria described in Section 12.2.2 and Table 12.4, the significance of the GHG emissions during the construction and operational phase is minor adverse. The proposed development aligns with the following GHG significance criteria as per Table 12.4:

- The project's GHG impacts are mitigated through 'good practice' measures.
- The project has complied with existing and emerging policy requirements; and
- Fully in line to achieve Ireland's trajectory towards net zero.

In accordance with the EPA guidelines (EPA, 2022), the above significance equates to a significance of effect of GHG emissions during the construction and operational phase which is ***direct, long-term, negative*** and ***not significant*** .

12.6.4 Climate Change Risk Assessment

12.6.4.1 Construction Phase

A detailed CCRA of the construction phase has been scoped out as there are no residual medium or high risk vulnerabilities to climate change hazards. However, consideration has been given to the proposed development's vulnerability to the following climate change hazards with best practice mitigation measures proposed in Section 12.8:

- Flood Risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding;
- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather;
- Reduced temperatures resulting in ice or snow; and
- Major Storm Damage including wind damage.

12.6.4.2 Operational Phase

The sensitivity and exposure of the development to various climate hazards must first be determined to then determine the vulnerability of the proposed development to climate change. Flooding (coastal, pluvial, fluvial), extreme heat, extreme cold, wildfire, drought, extreme wind, lightning, hail, landslides and fog have been considered as climate hazards in the context of the proposed development.

The sensitivity of the proposed development to the climate hazards is assessed irrespective of the project location. Table 12.10 details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the proposed development to each of the climate hazards is determined, this is the likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the proposed development to each of the climate hazards as per Table 12.5. The results of the vulnerability assessment are detailed in Table 12.10.

Table 12.10 Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (Coastal, Pluvial, Fluvial)	1 (Low)	2 (Medium)	2 (Low)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low)
Extreme Cold	1 (Low)	2 (Medium)	2 (Low)
Wildfire	1 (Low)	1 (Low)	1 (Low)
Drought	1 (Low)	1 (Low)	1 (Low)
Extreme Wind	1 (Low)	1 (Low)	1 (Low)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low)
Landslides	1 (Low)	1 (Low)	1 (Low)
Fog	1 (Low)	1 (Low)	1 (Low)

The sensitivity and exposure of the area was determined with reference to a number of online tools and with input from the various discipline specialists on the project team. It was concluded that the proposed development does not have any significant vulnerabilities to the identified climate hazards as described in the below sections. All vulnerabilities are classified as low.

Flooding

A Flood Risk Assessment (FRA) was undertaken by Malachy Walsh & Partners & is included within Appendix 7-3 of this EIAR. This document was reviewed to inform the climate change vulnerability assessment and assess the potential for flooding at the proposed development site.

In relation to fluvial flooding, the majority of the site is located in Flood Zone C and therefore has a low probability of flooding. More localised areas of the site in the southeast corner are located in Flood Zone A/B and therefore has a high/moderate probability of flooding. The residential units will be located in the Flood Zone C area of the site, with the area located in Flood Zone A/B used for amenity space or landscaping.

A portion of the proposed distributor road is located within Flood Zone A/B and mitigation has been included to prevent significant effects.

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The following mitigation in relation to flood risk is outlined in the FRA:

- The finished floor level (FFL) of all buildings should be set above the 1% AEP flood level for the MRFS plus 500mm freeboard. On this basis, the minimum FFL would be 19.05mOD. The proposed minimum F.F.L of the residential units is 20.00mOD.
- The land within the site which is located in Flood Zone A/B should be used only for amenity open space, landscaping or the like.
- A 450mm circular pipe culvert should be added beneath the proposed road to provide continuity of flow along the existing floodplain.
- As the amenity area will be located within an area susceptible to flooding, it is recommended that users of the site are made aware of the potential for flooding in the area and that warning signs and life-saving equipment are provided at accessible locations. The exact details of these should be established by an operational risk assessment of the site.

The finished floor levels for the proposed development have been designed to allow for a 20% increase in rainfall due to future climate change. The 20% climate change allowance aligns with the RCP4.5 'Medium Risk' future scenario. Additionally, a sensitivity assessment was undertaken for a 30% increase in flows from climate change, which aligns with the RCP8.5 'High End' future scenario. The sensitivity assessment concluded that the minimum floor levels for the proposed development remain appropriate. The FRA concludes that the proposed development is not at risk during the high-end future scenario.

It can be concluded that overall the proposed development has low vulnerability to flood risk.

Extreme Wind, Fog, Lightning & Hail

In relation to extreme winds, the buildings shall be designed to the appropriate standards to account for the relevant wind loadings events for RCP4.5 and RCP8.5. If required as part of the apartment block building design, and if deemed tall enough, lightning protection shall be provided for. Hail and fog are not predicted to significantly affect the buildings due to their design.

It can be concluded that overall the proposed development has low vulnerability to extreme wind, fog, lightning and hail.

Wildfires

In relation to wildfires, the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR, 2025), indicates that the wildfire hazard is classified as medium for the Cork area. This means that there is between a 10% to 50% chance of experiencing weather that could support a hazardous wildfire that may poses some risk to life and property loss in any given year. Future climate modelling indicates that there could be an increase in the weather conditions which are favourable to fire conditions. These include increases in temperature and prolonged dry periods. However, due to the project location in a built-up, urban area the risk of wildfire is significantly lessened and it can be concluded that the proposed development is of low vulnerability to wildfires.

Landslides

The Geological Society of Ireland (GSI) landslide susceptibility mapping database (GSI, 2025) was reviewed to inform the risk from landslides at the proposed development. There have not been any historical landslide events in the vicinity of the proposed development and the area is considered of low susceptibility to future landslides.

Slope failure on-site during the operational phase is unlikely as any required cutting will be less than 1.5m. The site is underlain by limestone bedrock that is susceptible to karstification, to prevent future risks, the building foundations will be raft supported by end-bearing piles or similar to be specified during the detailed design.

Therefore, the vulnerability of the proposed development to landslides is classed as low.

Extreme Temperatures (Heat & Cold) & Drought

Extreme temperatures, both extreme heat and extreme cold, have the potential to impact the building materials and some related infrastructure. However, high quality, durable building materials will be selected for the proposed development at the detailed design stage. Throughout detailed design phase, the architects will be using guidance documents to inform with design detail decisions including; the EU Commission *Technical Guidance on Adapting Buildings to Climate Change* (European Commission (2021a), LETI emergency design guide (LETI, 2020), and the latest available IPCC report. In addition, should updated EuroCodes be published prior to completion of detailed design, which will include consideration for climate impacts, these design standards will be taken into account.

Summary

Overall, the proposed development has at most low vulnerabilities to the identified climate hazards. Therefore, no detailed risk assessment is required.

12.6.4.3 CRA Significance of Effects

With design mitigation in place, there are no significant risks to the proposed development as a result of climate change. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the proposed development as a result of climate change are ***direct, long-term, negative*** and ***imperceptible***, which is overall ***not significant*** in EIA terms.

12.7 Cumulative Impacts

With respect to the requirement for a cumulative assessment the IEMA (IEMA, 2022) and TII (TII, 2022a) guidance on which the assessment is based states that:

"the identified receptor for the GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable. By presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its national carbon reduction target. This assessment approach is considered to be inherently cumulative".

The traffic data used for the operational phase assessment included cumulative traffic from existing and permitted developments in the surrounding area. Therefore, this impact assessment is cumulative.

As per the above, the cumulative impact of the proposed development in relation to GHG emissions is considered ***direct, long-term, negative*** and ***not significant***.

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12.8 Mitigation Measures

12.8.1 Incorporated Design Mitigation

A number of measures have been incorporated into the design of the development to mitigate against the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated into the design of the development to avoid potential flooding impacts as a result of increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the proposed development to climate change (Section 12.6.3.2).

In relation to operational energy usage information as detailed in the Scheme Sustainability & Climate Resilience Statement prepared by DOSA has been used to inform this assessment. The development has been designed in line with the requirements of Nearly Zero Energy Buildings (NZEB) Standards and the requirements of the Cork City Development Plan 2022 – 2028. Section 2.1 of the Climate Action & Energy Statement for the proposed development outlines the relevant climate specific objectives of the development plan for the area. The incorporated design measures as part of the proposed development's sustainability strategy are outlined below:

- Design Longevity and Passive Performance: The development will feature a flexible, futureproof design aimed at maximising its lifecycle. Passive design strategies, such as optimal façade orientation and enhanced building fabric (with U-values exceeding regulatory standards), will be employed to reduce energy demands. The design will also prioritise airtightness to achieve excellent air permeability performance.
- Daylighting and Visual Comfort: Natural daylight will be maximised in accordance with European, CIBSE, and BRE guidance. High-performance glazing will be used to improve visual comfort and support occupant well-being.
- Façade Optimisation: Advanced computer modelling will be used in collaboration with the project Architect to optimise façade design, enhancing daylight penetration, natural ventilation, and solar benefits specific to the site context.
- Whole-Site Sustainability: Sustainable practices will extend beyond the building envelope to encompass site-wide construction, commissioning, and handover processes, reinforcing environmental performance throughout the development lifecycle.
- Resource Efficiency – Reduce, Reuse, Recycle: Circular economy principles will be integrated across all project phases—design, construction, and operation—to minimise waste and environmental impact.
- Thermal Modelling and Climate Resilience: Dynamic Thermal and Energy Simulations will be conducted to ensure a low-carbon, low-energy design. Residential units will prioritise natural ventilation and undergo compliance assessments for overheating under Part L and long-term climate impacts using CIBSE 2020/2050 weather files.
- Energy Efficient Building Services: Mechanical and electrical systems will be designed to minimise energy use while maintaining high air quality. Measures include:
    - Efficient use of natural light to reduce artificial lighting;
    - Use of high-efficiency LED fittings with dimming, daylight sensing, and occupancy detection;
    - A Lighting Management Plan in common areas to reduce unnecessary energy use;
    - Elimination of fossil-fuel-based systems in favour of heat pumps and other low carbon heating technologies;
    - Selection of Triple E-registered products to ensure high-performance, energy efficient installations.
- Renewable Energy Integration: Where technically and economically feasible, renewable energy solutions will be incorporated, such as roof-mounted photovoltaic (PV) arrays and heat pump systems, to offset primary energy use and further reduce emissions.
- Building Energy Rating (BER) Target: All residential units will be designed to achieve an 'A-rated' BER, ensuring high energy efficiency and offering future residents predictable, low operating costs and environmental assurance.
- Water Conservation and Management: The development will include a water-efficient design, utilising low-flow sanitary appliances (e.g. dual-flush toilets, spray taps), leak detection linked to the Building Management System (BMS), and measures to reduce potable water consumption.
- Sustainable Transport Infrastructure: The strategy encourages a modal shift away from private car usage by integrating access to public transport and active travel modes. EV charging infrastructure will be installed in accordance with Policy in CAP27 and Part L 2022 to support the transition to electric vehicles.
- Material and System Lifecycle Optimisation: A whole life-cycle approach will inform the selection of building materials and plant. Embodied carbon will be reduced through the avoidance of heavy or high-carbon components, minimisation of mechanical systems where possible, and careful selection of materials with strong environmental credentials. Low-GWP refrigerants with minimal leakage rates will be used to mitigate environmental impacts.

These identified measures will aid in reducing the impact to climate during the operational phase of the proposed development in line with the goals of the Climate Action Plan and the Cork City Development Plan 2022-2028 and Cork City Climate Action Plan 2024-2028.

In addition to the above, in relation to promoting a modal shift and more sustainable methods of transport, the proposed development is located in Ballincollig which is particularly well served by several existing bus routes which provide the area with regular public transport links to all areas of Cork City. Additionally, Ballincollig is included as a key location on one of the twelve new 'Sustainable Transport Corridors' in the Draft BusConnects Cork (STC Route E – Ballincollig to City)which in turn links with STC F Bishopstown to City). Locating the proposed development in an area with connectivity to more sustainable transport methods will promote a modal shift away from private passenger cars which will benefit climate through a reduction in transport related GHG emissions.

12.8.2 Construction Phase Mitigation

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. The following measures to reduce the embodied carbon of the construction works are:

- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled.
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.
- Sourcing materials locally where possible to reduce transport-related CO_2 emissions.
- Target embodied carbon rates for detailed design (LETI, 2020).

The carbon emissions have been calculated assuming the building foundations and external walls are made up of lightweight concrete blocks. Additionally, the calculations assume the use of ready-mix concrete with a 0% recycled cement content. In order to reduce carbon impacts from the proposed development, the use of alternative materials with lower embodied carbon emissions such as timber frame walls rather than traditional concrete block walls or concrete with a 50% recycled cement content for example will help to reduce the impact of the development on climate. Alternative material types with lower embodied carbon should be investigated during the detailed design phase of the proposed development.

In terms of impact on the proposed development due to climate change, during construction the Contractor will be required to mitigate against the effects of extreme rainfall/flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind/storms, temperature extremes through site

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risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction. During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

Throughout detailed design and construction phase, guidance documents to inform with design detail decisions shall be reviewed e.g. the EU Commission *Technical Guidance on Adapting Buildings to Climate Change* (European Commission (2021a), LETI emergency design guide (LETI, 2020), and the latest IPCC report.

12.8.3 Operational Phase Mitigation

The proposed development has been designed to reduce the impact on climate as a result of energy usage during operation. These measures are outlined in Section 12.8.1 above as incorporated design mitigation. No further operational phase mitigation is proposed.

12.9 Residual Impact Assessment

12.9.1 Construction and Operational Phase

The impact to climate as a result of a proposed development must be assessed as a whole for all phases. The proposed development will result in some impacts to climate through the release of GHGs. TII reference the IEMA guidance which states that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*". The proposed development has proposed some best practice mitigation measures and is committing to reducing climate impacts where feasible and aligning with Ireland's net-zero by 2050 trajectory. As per the TII significance criteria in Table 12.4 the residual impact of the proposed development in relation to GHG emissions is considered minor adverse, this equates to a ***direct, long-term, negative*** and ***not significant*** climate impact.

In relation to climate change vulnerability, it has been assessed that there are no significant risks to the proposed development as a result of climate change. The residual effect of climate change on the proposed development is considered ***direct, long-term, negative*** and ***imperceptible***, which is overall ***not significant*** in EIA terms.

12.9.2 Cumulative Residual Impacts

With respect to the requirement for a cumulative assessment the IEMA (IEMA, 2022) and TII (TII, 2022a) guidance on which the assessment is based states that:

"*the identified receptor for the GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable. By presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its national carbon reduction target. This assessment approach is considered to be inherently cumulative*".

The traffic data used for the operational phase assessment included cumulative traffic from existing and permitted developments in the surrounding area. Therefore, this impact assessment is cumulative.

As per the above, the cumulative impact of the proposed development in relation to GHG emissions is considered ***direct, long-term, negative*** and ***not significant.***.

12.9.3 Cumulative Impact of the Relevant Plan for the Area

The potential cumulative impacts of the relevant plan for the area, which is considered to be the Cork City Development Plan 2022, was assessed. The assessment of the potential impacts on the environment of the Cork City Development Plan 2022 was undertaken utilising the Strategic Environmental Objectives (SEOs) which are detailed in Table 5.1 of the CDP's Strategic Environmental Assessment. The potential cumulative impacts of the Plan were assessed having regard to these SEO's. Table 5.1 of the SEA identifies the SEO's for 'Climatic Factors' as being to.

- To minimise emissions of greenhouse gasses
- Integrate sustainable design solutions into the City's infrastructure(e.g. energy efficient buildings; green infrastructure)
- Contribute towards the reduction of greenhouse gas emissions in line with national targets
- Promote development resilient to the effects of climate change.
- Promote the use of renewable energy, energy efficient development and increased use of public transport.

Table 7.5 of the CDP's Strategic Environmental Assessment, 'Comparative Assessment of each of the Alternatives against Strategic Environmental Objectives' indicates that Alternative/Scenario 3 'Compact Liveable Growth', the 'Selected Scenario' has positive interactions with the status of the SEO's for 'Climatic Factors'.

12.10 Risk of Major Accidents or Disasters

As detailed in Section 12.6.3.2, climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. However, the potential for flooding on site has been reviewed and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. All climate change related risks were categorised as 'low' as per Section 12.6.3.2.

12.11 Worst Case Scenario

Worst case estimates have been used as part of this assessment. As a result, Section 12.6 details the worst-case impact for the proposed development.

12.12 Interactions

Climate has the potential to interact with a number of other environmental attributes.

12.12.1 Land, Soils, Geology and Hydrology

The impact of flood risk has been assessed and the surface water drainage network will be designed to cater for increased rainfall in future years as a result of climate change. The effect of the interactions between climate and land, soils, geology and hydrology are *direct, short-term, negative* and *imperceptible* during the construction phase and *direct, long-term, negative* and *imperceptible* during the operational phase, which is overall *not significant* in EIA terms.

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12.12.2 Air Quality

Air quality and climate have interactions due to the emissions from the burning of fossil fuels during the construction and operational phases generating both air quality and climate impacts. Air quality modelling outputs are utilised within the Climate Chapter. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

12.12.3 Traffic and Transportation

During the construction and operational phase, there is the potential for interactions between climate and traffic. Vehicles accessing the site will result in emissions of CO_2, a greenhouse gas. The effects of the proposed development on climate are assessed by reviewing the change in annual average daily traffic on roads close to the site. In this assessment, the effects of the interactions between traffic and climate are considered to be *direct, short-term, negative* and *not significant* during the construction phase and *direct, long-term, negative* and *not significan*t during the operational phase, which is overall *not significant* in EIA terms.

12.12.4 Waste

Waste management measures will be put in place to minimise the amount of waste entering landfill, which has higher associated embodied carbon emissions than other waste management such as recycling. The effect of the interactions between waste and climate are considered to be *direct, short-term, negative* and *not significant* during the construction phase and *direct, long-term, negative* and *not significan*t during the operational phase, which is overall *not significant* in EIA terms.

12.13 Monitoring

Monitoring and reporting of the embodied carbon in the construction phase will be conducted. The aim of monitoring will be to seek further ways to minimise climate impacts. Monitoring will include contractual obligations, in line with the most recent Climate Action Plan and sectoral targets, for the successful tenderer to ensure that the proposed development stays in line with updated aims. Commitments to monitor GHG emissions during the construction phase will also be secured through the final Construction Environmental Management Plan (CEMP). Monitoring will include embodied carbon of construction materials, water usage, power and fuel usage, and waste generation (including reuse and recycling rates). Where monitoring shows that the proposed development is not meeting its targets, further mitigation will be put in place.

Monitoring should also include reviewing potential for extreme weather events which may cause damage during construction. Contractors' Environmental Management System (EMS) will include measures to address risks during such events i.e. flooding

12.14 References

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Transport Infrastructure Ireland (2024) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document

12.15 Chapter Appendices

Appendix 12-1- Scheme Sustainability & Climate Resilience Statement - DOSA Consulting Engineers.

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CHAPTER THIRTEEN

POPULATION AND HUMAN HEALTH

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CHAPTER THIRTEEN

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CHAPTER 13 | Population and Human Health

13.1 Introduction

13.1.1 Chapter Author

This Chapter has been prepared by Harry Walsh, (BA HONS, Master of Regional and Urban Planning, MIPI), Director at HW Planning.

13.1.2 Chapter Context

The European Commission's 'Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report' 2017 specifies the following in relation to the assessment of population and human health.

> *"Human health 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."*

As noted in Figure 13.1 below, there are several inter-related environmental topics such as the potential impacts of the proposed development on air quality and climate, noise and vibration, water, traffic and access, construction and waste management, which are of intrinsic direct and indirect consequence to human health. While the baseline scenario for these environmental topics is not duplicated in this section, in line with the EPA guidance, the assessment of impacts on population and human health refers to those environmental topics under which human health effects might occur.

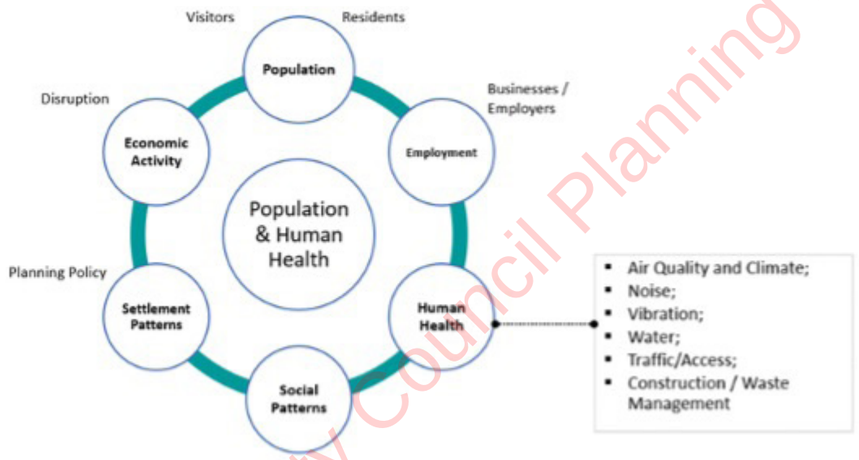

Figure 13.1 Potential Impacts on Population and Human Health

13.1.3 Assessment Methodology

This chapter of the EIAR document has been prepared with reference to the Guidelines on the information to be contained in Environmental Impact Assessment Reports, published by the EPA in 2022, as well as European Commission's 'Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report' 2017. A desktop study of the following published policy documents and data was undertaken to appraise the location and likely and significant potential impact upon population and human health receptors and to assess population trends in the subject site and in the wider hinterland:

- Central Statistics Office (CSO) Census 2011 & 2016 and 2022 data.
- Cork City Development Plan 2022-2028

This assessment is a study of the potential indirect and direct socio-economic impacts of the construction phase and the operational phases of the development. Effects on receptors were assessed in terms of magnitude, quality, significance and duration.

13.2 Description of Existing Baseline Environment

13.2.1 Demographics

13.2.1.1 Settlement Context and EIA Study Area

The study area for the Population and Human Health chapter has been defined to reflect the scale, location, and nature of the proposed Large-scale Residential Development (LRD), and to ensure that potential impacts, both direct and indirect, on human health and population can be comprehensively assessed.

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Figure 13.2 EIA Study Area for Population and Human Health

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In defining the EIA study area for this chapter a focused analysis of Census boundaries was undertaken, including both Electoral Divisions (ED) and Census Small Areas (SA) which are a sub-division of the ED units and generally cover 65-90 households. Using a combination of these units a study area was defined that:

- Includes the smaller settlements, established and planned residential areas and employment areas served by the Urban Town of Ballincollig. This takes the form of a belt of urban areas built up along the R608 regional road.
- The area is largely delimited by the physical barrier of the River Lee to the north and the and N22/N40 Road to the south.

Prior to the Cork City Boundary extension in 2019 the traditional catchment area of the then County 'Main Town' of Ballincollig was all located within the administrative area of Cork County Council. This catchment now straddles the boundary of Cork City and County Councils, with the Urban Town of Ballincollig and lands to the east falling within the Cork City Council area and the western environs of the town located within the Cork County Council area. However, Ballincollig and its traditional catchment has remained a relatively discrete and self-contained area, and this is reflected in the study area in terms of population, urban amenities and services and employment.

The study area (Figure 13.2) principally comprises the following Census 2022 EDs:

- Ballincollig ED (Ref. 4701619),
- Ovens ED (Ref. 47127019).

However, to capture the full extent of the Killumney/Ovens settlements, which form a natural part of the wider Ballincollig catchment, the following Census 2022 Sas are also included:

- 047028003
- 047028002
- 047028004
- 047028001
- 047270004
- 047270002
- 047270003

The population of the study area in the 2022 Census was 22,790. The majority of these residents were living within the 2 EDs approximating the area of the settlements of Ballincollig and Ovens (20,8554).

13.2.1.2 Population

Table 13.1 Historic Population Growth Trends –CSO Census Data 1991 - 2022

Area	1991	1996	2002	2006	2011	2016	2022[1]	% Change 1991 - 2022
Ballincollig ED	12,562	13,760	15,119	16,308	17,989	18,621	20,538	+63%
Ovens ED	993	976	1,047	1,703	2,086	2,342	2,829	+185%
Cork City	178,716	184,502	191,277	195,478	200,373	210,853	224,004	+ 25.3%
Cork	410,369	420,510	447,829	481,295	519,032	542,868	584,156	+ 42.3%
State	3,525,719	3,626,087	3,917,203	4,239,848	4,588,252	4,761,865	5,149,139	+ 46%

Given that the ED boundaries have changed in the most recent Census 2022, and that the SA data was only introduced in the 2011 Census, it is not possible to accurately present population change over time for the study area. However, it is possible to compare population change within the Ballincollig and Ovens area EDs which remain largely the same and provide an indication of the rate of population growth in the area. Over the 31-year period between 1991 and 2022, the EDs of Ballincollig and Ovens have experienced 63% and 185% population growth respectively. In contrast, Cork City experienced a 25.3% growth in population.

Percentage growth rates for County Cork and the State were 42.3% and 46% respectively. A primary driver of this significant population growth within the study area can be attributed to the development of new residential areas, such as at Heathfield, Woodfield, Highfield, Maglin View/Green, Cois Caisleán, Lisheen Woods, Bothar An Crann and Codrum Hall during this period.

1 While this ED Boundary changed between 2016 – 2022 this figure based on CSO Table FP009 provides 2022 data for based on the 2016 ED boundary. The population for the 2022 ED boundary is 19,069.

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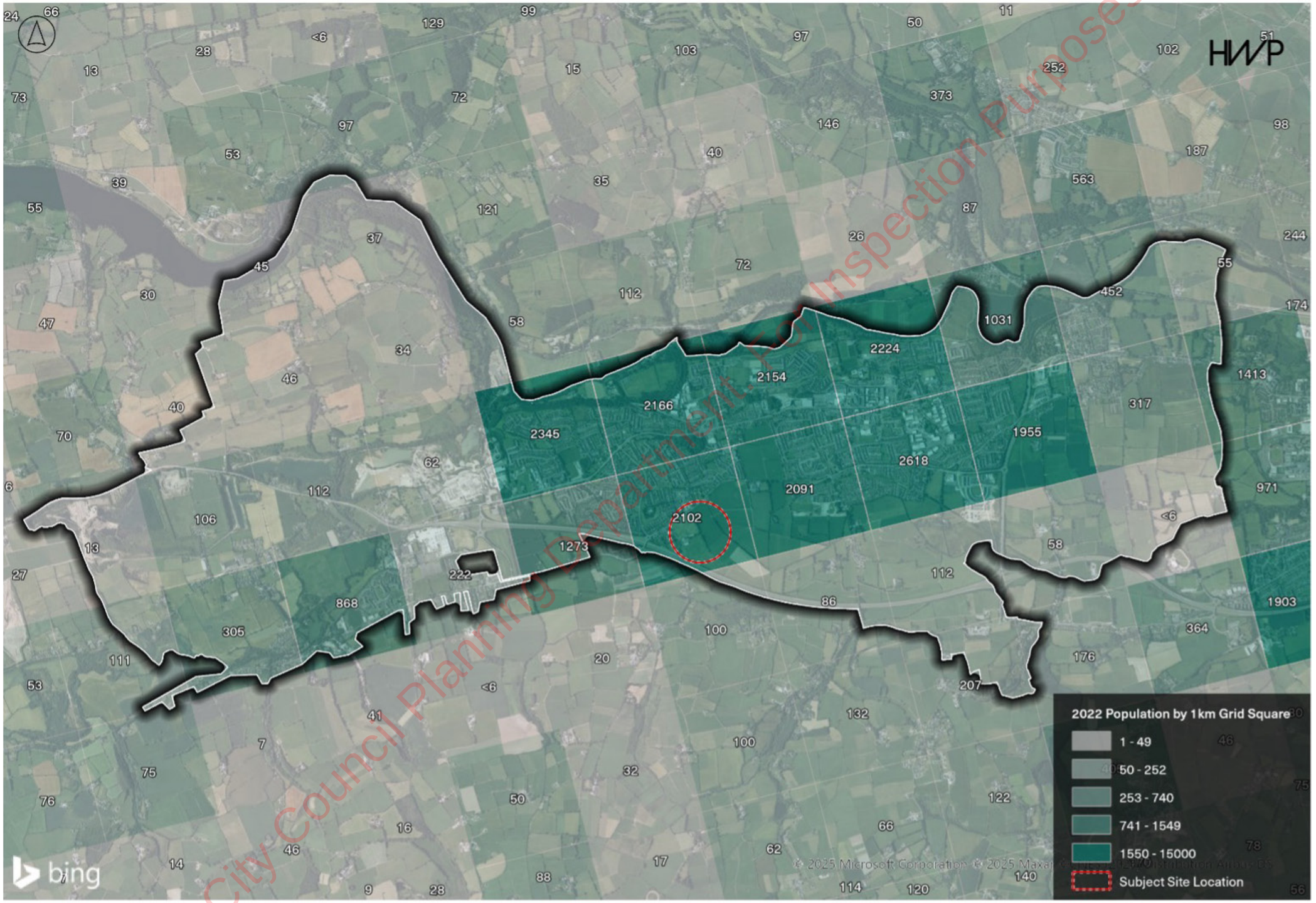

Figure 13.3 2022 Population per 1km Grid Square.

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Figure 13.3 indicates that higher population densities are experienced in the central and eastern portion of the study area. This reflects the presence of the belt of residential and built-up areas of the Urban Town of Ballincollig and the Key Village of Killumney/Ovens which is focussed along the corridor of the R608 regional road. The highest population concentration, reflecting recent national policy for compact settlements, is within the newer development of Heathfield (2,618).

The north-western portion of the study area comprises largely open agriculture fields in arable and grazing use with interspersed rural housing. Lands along the eastern study area boundary fall within the City Hinterland, where rural amenity and agriculture uses are prioritised in zoning policy. Prior to the Cork City boundary extension both areas formed part of the Metropolitan Area Greenbelt, notwithstanding the administrative area changes, both areas remain in effect part of the greenbelt to prevent urban sprawl.

From Table 13.2 it can be seem that the study area demographic is generally in line with that of the Cork City and Cork County Council areas reflecting a national trend of an ageing population, where declining birth rates, long life expectancy and low death rates.

However, from the population pyramid in Figure 13.4 it is clear that despite this general pattern there are differences between the study area population and the wider Cork City Council area population, with 5% more of the study area population being children under the age of 19 years and 3% more being adults in the 40 – 49 year category, presumably their parents. Conversely, in the wider City area there is 7% more younger adults between the ages of 20 – 40 years and more older adults over the age of 70 years.

Table 13.2 Census 2022: Population age group within study area, Cork City and Cork County and State

	Study Area	Cork City Council Area	Cork County Council Area	State
0 to 9 years	14%	11%	13%	12%
10 to 19 years	14%	12%	15%	14%
20 to 29 years	10%	16%	9%	12%
30 to 39 years	15%	16%	12%	14%
40 to 49 years	17%	14%	16%	15%
50 to 59 years	12%	12%	13%	13%
60 to 69 years	10%	10%	10%	10%
70 to 79 years	6%	7%	7%	7%
80 + years	2%	4%	4%	4%

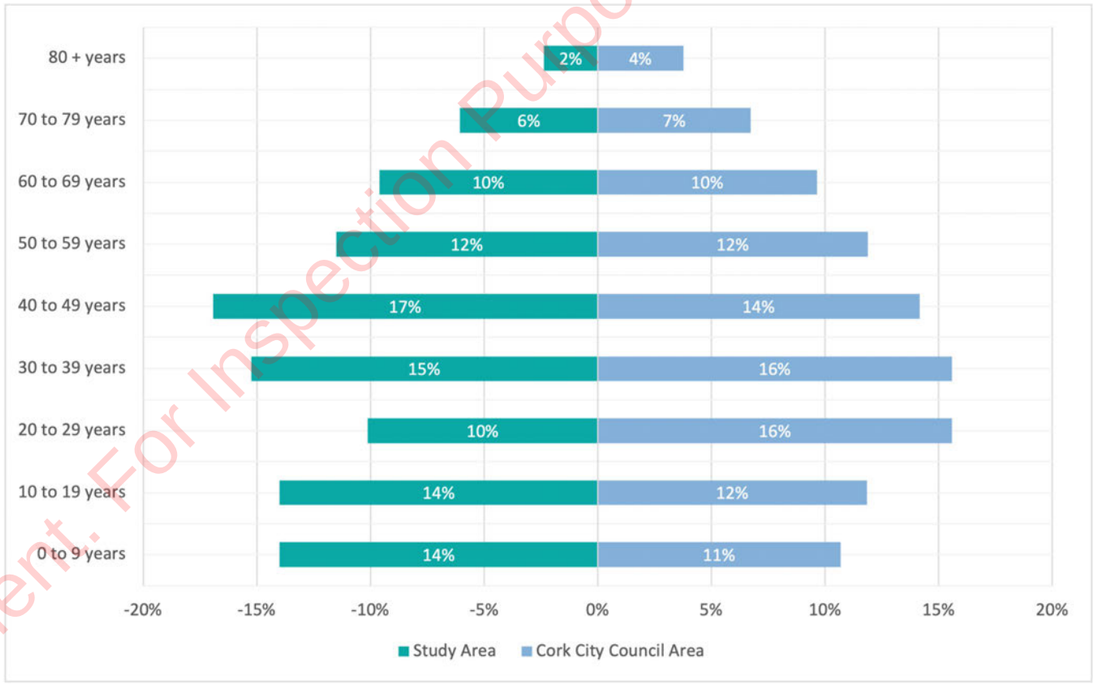

Figure 13.4 Study Area Versus Cork City Population Pyramid (Census 2022).

13.2.1.3 Households

The demography of study area community comprising a significant element of families with teenage and younger children is supported by the average household size figure of 2.85 persons, higher than either Cork City or Cork County averages and the state averages of 2.6, 2.8 and 2.7 respectively.

Table 13.3 Average Household Size in the Study Area, Cork City and County and the State

Area	Number of Households	Population	Average Household Size
Study Area	7,958	22,759	2.85
Cork City and Suburbs	82,817	217,296	2.6
Cork County Council Administrative Area	127,971	356,714	2.8
State	1,841,152	5,046,681	2.7

The higher average household size figure within the study area reflects the higher percentages of households with children at pre-school, early school, pre-adolescent and adolescent family cycle stages within the study area, when compared with Cork City and State averages. Notable also is the fact that there are proportionately fewer pre-family, empty nest and retired households.

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Table 13.4 Percentage of Population by Family Cycle Stage in the Study Area, Cork City and State

Family Cycle	Study Area	Cork City Council Area	State
Pre-Family	10.1%	12.9%	9.3%
Pre-School	10.1%	8.1%	8.1%
Early School	11.4%	9.2%	9.9%
Pre-Adolescent	13.6%	10.3%	11.9%
Adolescent	11.2%	10.7%	12.3%
Adult	25.3%	28.2%	27%
Empty-Nest	7.4%	8.4%	9.4%
Retired	10.8%	12.2%	12%

13.2.1.4 Travel Patterns

Table 13.5 below outlines travel mode statistics for commuting journeys to school, college and work. 70% of journeys use private motor vehicles, which is higher than the city and State averages. Conversely, fewer journeys are made using public transport and active modes of travel. These figures reflect the suburban nature of the study area.

Table 13.5 Commuting Modes for Persons aged 5+ in the Study Area to Work, School or College

Commute Mode	Study Area	Cork City and Suburbs	State
On-foot or Bicycle	10%	19%	15%
Public Transport	7%	9%	11%
Car, Motorbike, or Van	70%	56%	59%
Work From Home	9%	8%	7%

The Census POWSCAR data provides detailed information on commuter patterns between workers' places of residence and workplaces. While this has been captured for the 2022 Census the data is not publicly available. However, Cork City Council published the POWSCAR data from the 2016 Census in the Cork City Neighbourhood Profile Study, undertaken in support of the Development Plan Review Process.

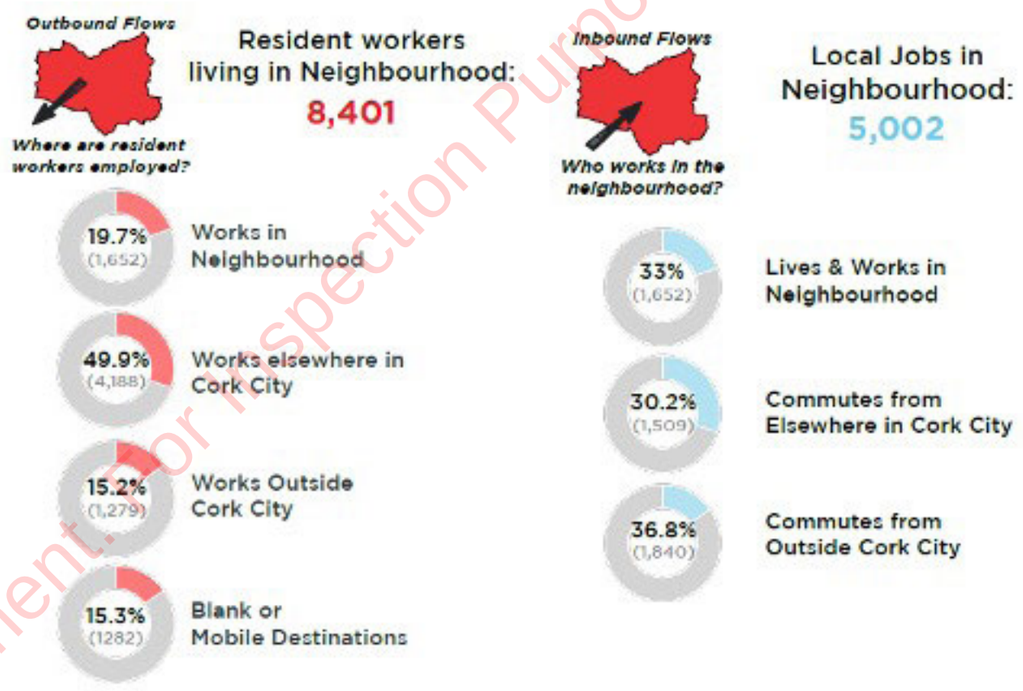

Figure 13.5 Commuter Flows in Ballincollig Neighbourhood – POWSCAR 2016 Data

Figure 13.5 is extracted from this study[2]. and indicates provides a detailed view of commuter flows in and out of the neighbourhood of Ballincollig at the time of the 2016 Census. There was a net outflow from the neighbourhood of 3,399 workers. Just 1,652 people lived and worked in Ballincollig (20% of the Ballincollig residents who were at work), whereas almost 50% commuted to work in the rest of Cork City. Conversely 67% of the jobs in Ballincollig were carried out by the 3,349 workers who commuted into Ballincollig from either the rest of the city or outside the city.

2 – Extracted from p223 of the Cork City Neighbourhood Profile Study, a Supporting Study for the Cork City Development Plan 2022

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13.2.1.5 Employment

As noted in Figure 13.5 within the Ballincollig neighbourhood of the study area there were 5,002 jobs recorded in the 2016 Census and 8,401 resident workers, giving a job to worker ratio of 0.595, representing an overall outflow of workers. The jobs ratio is lower than that of the Cork City average in both 2016 and 2022 as would be expected of a rural/suburban area.

Table 13.6 Jobs Ratio in the Ballincollig Neighbourhood 2016 and Cork City 2016 and 2022

	Ballincollig Neighbourhood (2016)	Cork City and Suburbs (2016)	Cork City and Suburbs (2022)
Labour Force (A)	8,401	87,354	89,992
Number of Jobs (B)	5,002	102,139	113,067
Jobs Ratio (B/A)	0.595	1.169	1.256

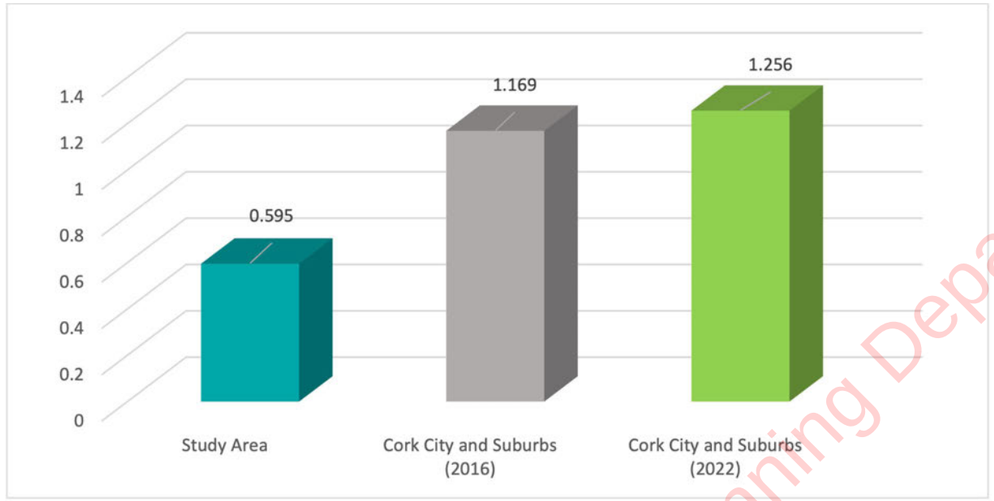

Figure 13.6 Jobs Ratio (Jobs to Resident Workers) 2016 and 2022

Table 13.7 Labour Force Statistics – CSO F7005

Residents in Area	At Work	Unemployed	Total Pop 15 year +	Labour Force	Labour Force Participation Rate
Study Area	10,887	487	17,769	17,769	64%
Cork City	103,249	8,991	186,939	112,240	60%
Cork County	161,174	10,452	283,550	171,626	61%
State	2,320,297	210,802	4,136,850	2,531,099	61%

Alongside this the 2022 Labour Force Participation Rate (the number of persons in the labour force expressed as a percentage of the total population aged 15 or over) in the Study Area was 64%, higher than the State or Cork County averages which were 61%. The participation rate within the study area was also significantly higher than the wider Cork City rate which was 60%. The high participation rate in the study area appears to arise from the fact that a reduced proportion of the resident population are students, retirees, unable to work due to sickness or disability and unemployed. This view is supported by the fact that the component of social housing in the study area, at 8%, is notable lower than that of Cork City as a whole at 14% and more in line with the Cork County Council figure of 7%.

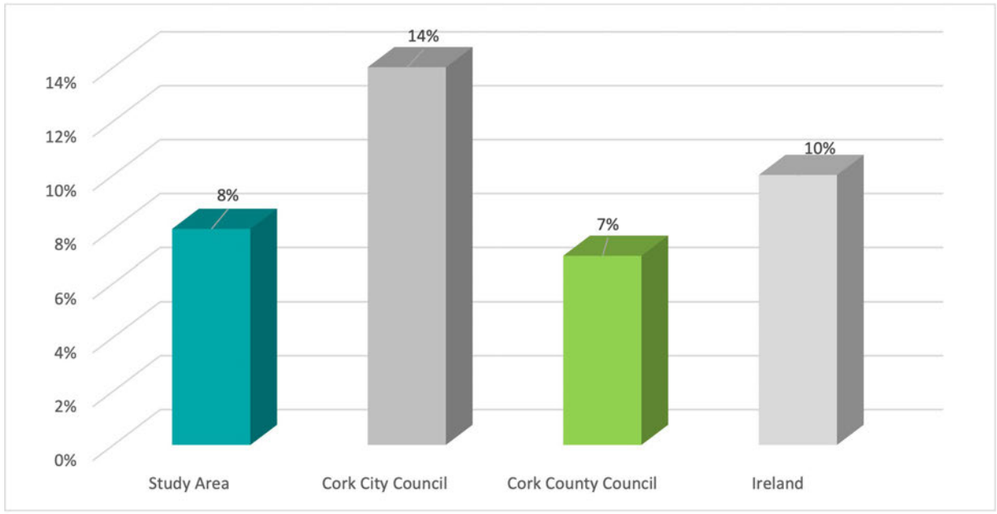

Figure 13.7 % of Total Households Living in Social Housing (Local Authority or Housing Body Rental)

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13.2.1.6 Affluence and Deprivation

The Pobal Deprivation Index shows the level of affluence and deprivation at CSO 2022 Small Area level. The Index is calculated using ten metrics from the Census data. These include educational attainment, employment status and the numbers living in individual households. Almost 19,000 small areas (comprising 50-200 households) were indexed leading to the development of a detailed map of the relative affluence and disadvantage.

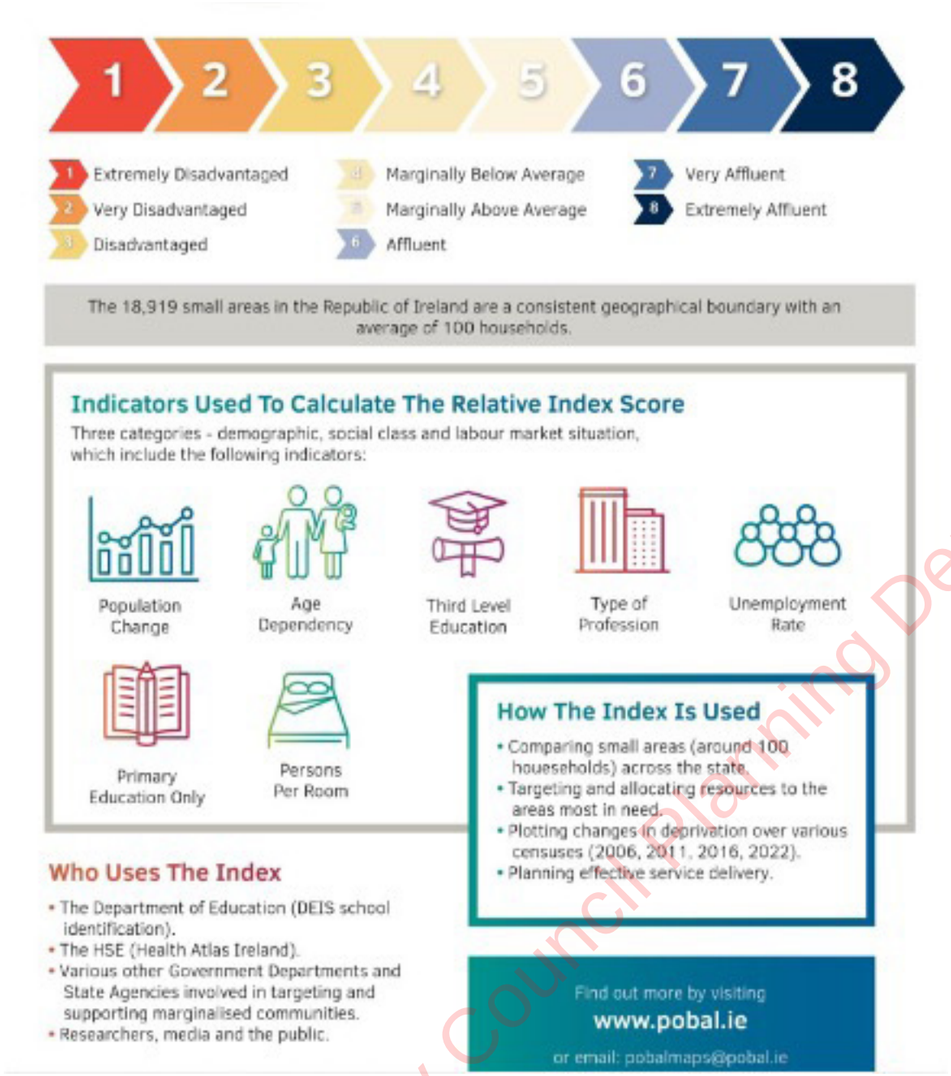

Figure 13.8 Pobal Deprivation Index.

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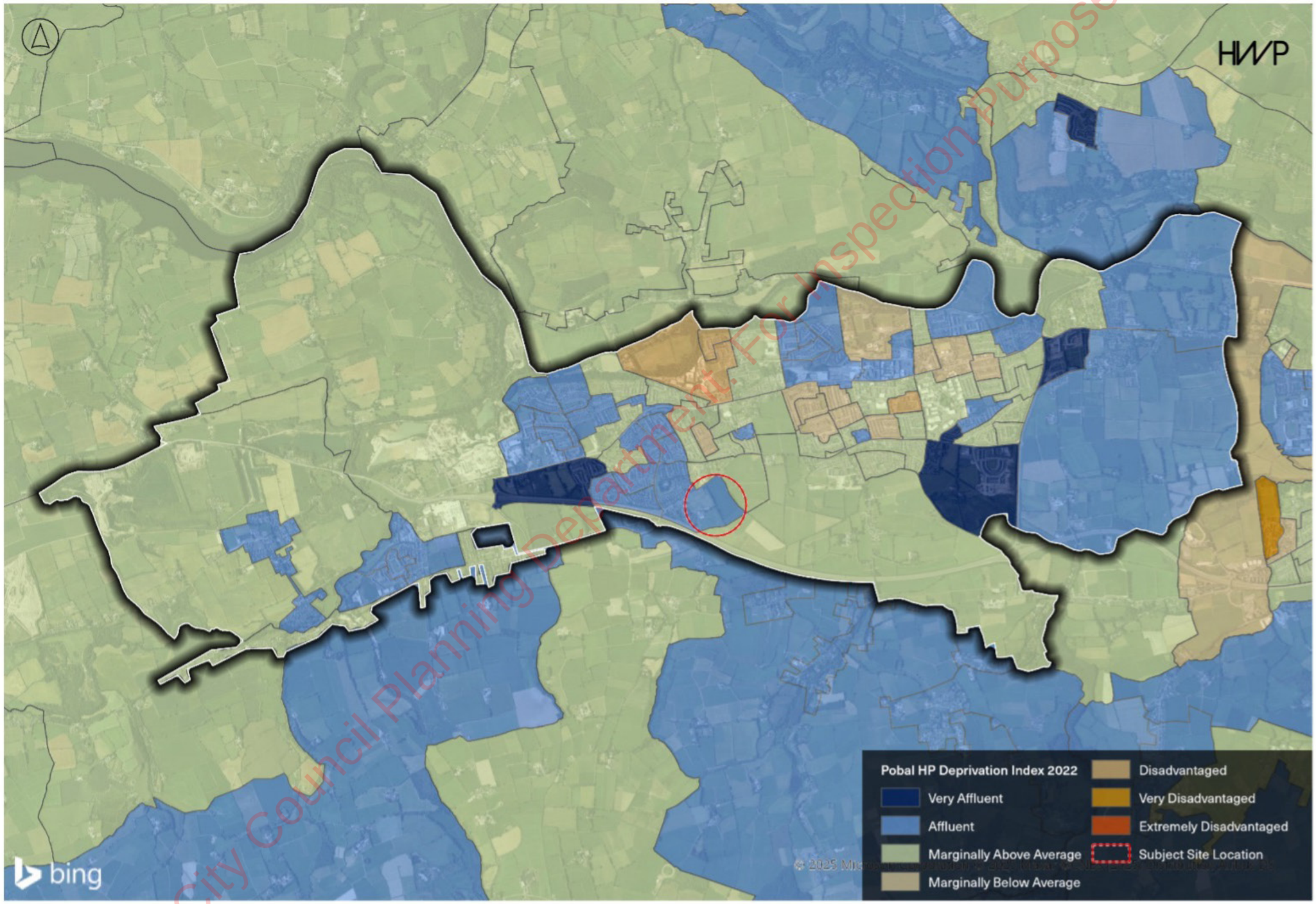

Figure 13.9 2022 Pobal Deprivation Index Indicators

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Figure 13.9 illustrates that the majority of the Small Areas within the subject site are either "Very Affluent" (4%), "Affluent" (40%) or "Marginally Above Average" (38%). Only 14% of the study area is "Marginally Below Average" and 4% is considered "Disadvantaged". No areas fall into the "Very Disadvantaged" or "Extremely Disadvantaged" categories. Pobal[3] notes that disadvantage remains a spatially entrenched phenomenon and is disproportionately experienced in small pockets in Dublin city centre, north and west suburbs, on the outskirts of Cork, Waterford and Limerick and in a small number of rural towns. However, as noted in the study area, Pobal identifies that in the commuter belts surrounding Dublin, Cork and Galway, new housing developments are leading to new areas of affluence being recorded outside of traditional suburban areas.

13.2.1.7 Major Accidents/Seveso

The subject lands are not situated within or in close proximity to any designated Seveso/Major Accidents Establishments. A review of the Health and Safety Authority's list of upper and lower tier Seveso establishments confirms that the most proximate Seveso establishments are the Tervas Ltd. (lower tier) site in Knockburden, Ovens, Co. Cork, approximately 3km to the south-west and the Grassland AGRO facility (lower tier) located on Carrigrohane Road approximately 5 kilometres east.

13.3 Community and Social Infrastructure

The existing community and social infrastructure assets in the local area has been identified in accordance with the categories outlined in the Table 13.8 below.

Table 13.9 Community and Social Infrastructure Categories

Category	Description
Amenity, Open Space and Sports	Parks, Playgrounds, Amenity Walks/Greenways, Pitches, Green Areas, Golf Courses, Sports Pitches, Sports Centres, Swimming Pools, Gyms
Childcare and Education	Childcare, Primary Schools, Post Primary Schools, Special Schools, Third Level Universities, Other Educational Institutions
Community facilities	Community Centres, Religious Facilities, Post Offices, Libraries.
Retail services	Supermarkets, Convenient Shops, Specialty Services, Restaurants/Take-aways, ATM, Petrol Station
Health	Hospitals, Health Centres, Clinics, Pharmacies, Addiction Services, GPs, Mental Health Services
Emergency	Fire Station, Garda Station
Public Transport	Bus and Train Routes

In general, the defined study area for this chapter was used for the purposes of assessing the community and social infrastructure serving the area of Ballincollig and Ovens. However, where specific social infrastructure types have established catchments, as is the case with schools[4], these have been used instead.

13.2.2 Amenity, Open Space and Sports

The study area and its surrounding areas are well served by a variety of recreational, amenity and sporting facilities. The area benefits from the presence of the Ballincollig Regional Park, a strategic recreational and amenity asset to the wider city which includes a skate park, multi-use games area and playground. The proximity to the Lee River to the north provides opportunities for water-based recreation with the Inniscarra Sailing and Kayaking Centre located to the north-west of the study area and the National Rowing Centre located beside Farran Wood and Zipit Forest Adventure, about 6 km to the west of the study area. In addition, the Lee Walk Forest Park and Lee River Walk provide riverside amenity areas, with the Curragheen Amenity Walk and Kilumney Park adding to the recreational options.

There is a wide variety of sporting facilities and organisations in the area including Ballincollig GAA, Drispsey GAA and Éire Óg GAA Clubs. Other sports clubs in the area include Ballincollig RFC, Cork City FC, Lakewood Sports & Social Club and UCC Sports Grounds Curaheen to the east of the study area. There is a range of golf related facilities including: Driving Ranges in Innicarra and Killumney, Ranges Pitch & Putt and Lee Valley Golf Club.

There are also several gyms, yoga and leisure facilities in the area including the Talbot Hotel, which also has a swimming pool, RB Fitness Adventure Centre and the Yoga Den. Local heritage amenity sites include St Senans Abbey and Kilcrea Castle and Friary. In addition to the facilities provided in the Regional Park children's recreational facilities also include the Ballincollig Playground at Innismore, Murphy's Farm and The Reel Cinema. Other important local amenities include the Curraheen Park Greyhound Stadium and Greenfields Allotments.

3 Presentation on 02/11/2023 by Martin Quigley, Director of Data and Analytics, Pobal

4 School demand is nationally planned based on Department of Education and Youth school catchments

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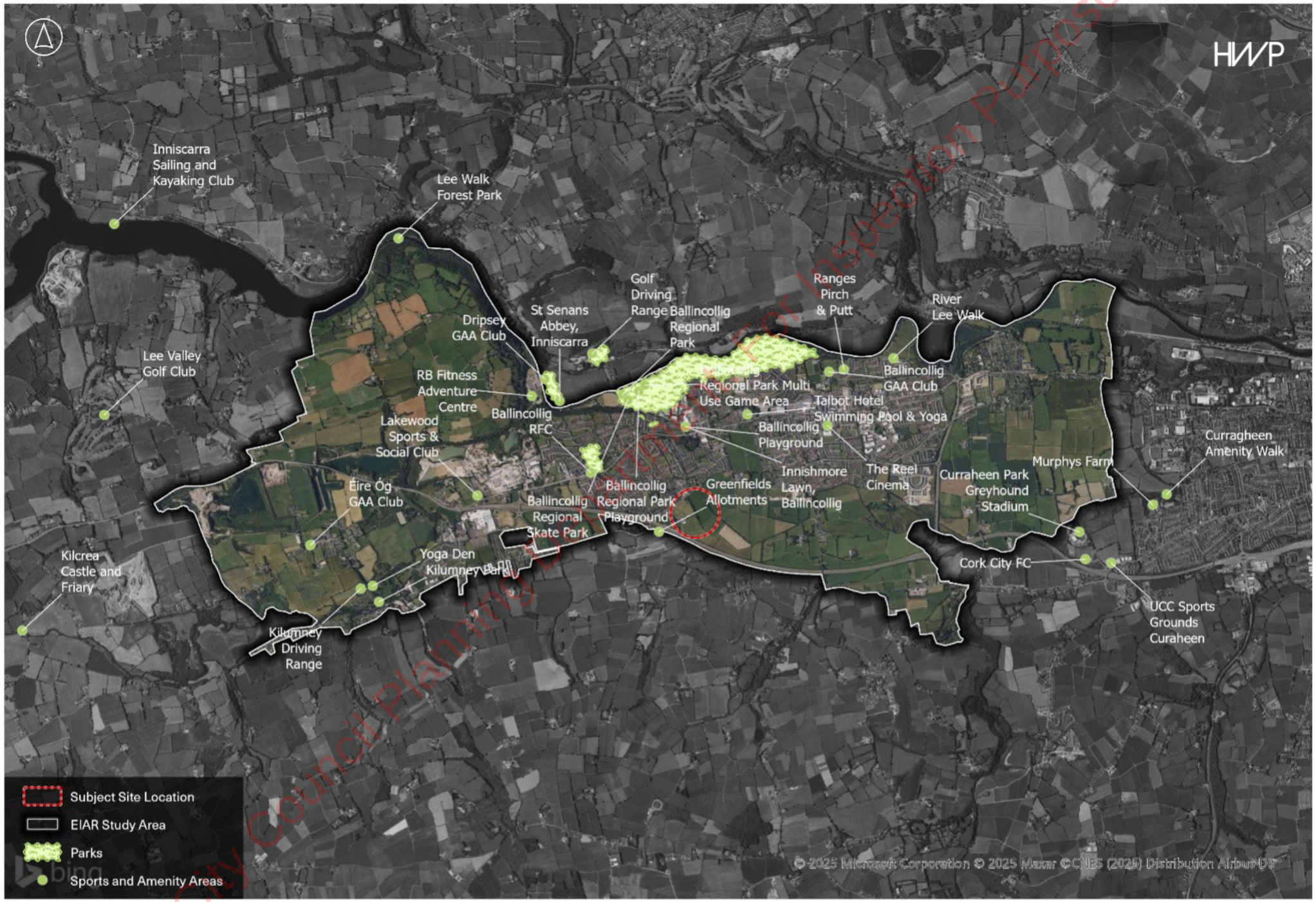

Figure 13.10 Recreation and Leisure Amenities in Local Area

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13.3.3 Childcare and Education

13.3.3.1 Primary Schools

The application is supported by a Schools Demand Assessment prepared by HW Planning (included as Appendix 13.1). This assessment is based on the established Department of Education and Youth School Planning Area for Ballincollig rather than the EIA Study Area. An overview of the primary schools within the School Planning Area is provided in Table 13.10. The information in Table 13.10 was obtained from a review of the Primary schools' enrolment figures 2023/2024/2025 database of the Department of Education and Youth[5].

Table 13.10 Summary of Existing Primary Schools in Study Area

School	Address	2023/2024 Enrolment	2024/2025 Enrolment
Cloghroe Mixed N S	Cloghroe	515	519
Gogginshill N S	Goggins Hill	237	223
Clogheen Mxd N S	Kerry Pike	183	169
Ovens N S	Knockanemore	436	442
S N Naomh Eoin B	Station Road	411	391
Scoil Naomh Mhuire C	Ballincollig	454	447
S N Baile Nora	Ballynora	300	307
Scoil Barra	Innishmore	438	448
Gael Scoil Ui Riordain	Carraig an Earra	725	731
Gaelscoil An Chaisleáin	Cumann Rugbaí Bhaile an Chollaigh	175	205 *(500)[6]
Total		3,874	3,882 *(4,177)

In total there are 3,882 no. primary school places in the School Planning Area. Although the development of a School Campus at Lisheens to permanently accommodate Gaelscoil An Chaisleáin is progressing which will increase that school's enrolment from 205 students to 500 primary students at the new school site. Once this is delivered there will be 4,177 primary school places within the area.

13.3.3.2 Existing Post-Primary/Secondary Schools

Post-primary schools by their nature are generally of a larger scale with fewer located within each School Planning Area and more inflow and outflows between areas. This is particularly so given Ballincollig's location within Cork City and proximity to other education service areas in the western suburbs of the city and the City Centre. Good public transport connectivity with the City Centre, presents existing residents of Ballincollig with a greater selection of post-primary schools than many comparable areas. However, for consistency and the purposes of this assessment, only the post-primary schools within the School Planning Area have been assessed. An overview of the post-primary schools within the study area is provided in Table 13.11. The information in Table 13.11 was obtained from a review of the Post-Primary schools' enrolment figures 2023/2024/2025 database of the Department of Education and Youth.

It indicated that in total there are currently 2,539 no. post-primary school places in the School Planning Area. Again the development of a School Campus at Lisheens to permanently accommodate Le Chéile students is progressing which will increase that school's enrolment from 195 students to 1,000 post-primary students at the new school site. Once this is delivered there will be 3,344 post-primary school places within the area.

Table 13.11 Summary of Existing Secondary Schools in Study Area

School	Address	2023/2024 Enrolment	2024/2025 Enrolment
Ballincollig Community School	Ballincollig	961	980
Coláiste Choilm	Ballincollig	1359	1,364
Le Chéile	Ballincollig	117	195 (1,000)* [7]
Total		2,437	2,539 (3,344)*

The location of existing primary and secondary schools in the area are identified in Figure 13.11. All of these facilities are situated within approximately 15 minutes driving distance from the subject site.

13.3.3.3 Potential Future Schools

In the Cork City Development Plan 2022-2028 (CDP), in addition to the 15 acre site at Lisheens, Ballincollig where the planned school campus is to be located, there are two further sites zoned for educational use within the Maglin Urban Expansion Area, as identified in Figure 13.11.

13.3.3.4 Special Schools

Our Lady of Good Counsel School, Innishmore Drive, Ballincollig, Cork, is a special primary school within the defined study area. According to the enrolment figures database of the Department of Education and Youth it had 68 no pupils attending in the 2024/2025 academic year.

Other Special Schools in the wider area include.

- St Gabriels Special School, Murphy's Farm, Curraheen Rd., Bishopstown, with 50 pupils enrolled,

The Marvel Club, based in Westcourt, Ballincollig operates as a social club and support centre for children with special needs. Similarly, the Field of Dreams and the Enable Ireland Lavanagh Centre, both located in Curraheen, immediately to the east of the study area, offer special needs support services.

5 https://www.gov.ie/en/collection/primary-schools/

6 The development of a School Campus to accommodate Gaelscoil An Chaisleáin is progressing that will make provision for 500 primary students at this new school site

7 The development of a School Campus to accommodate Le Cheile is progressing that will make provision for 1,000 secondary students at this new school site

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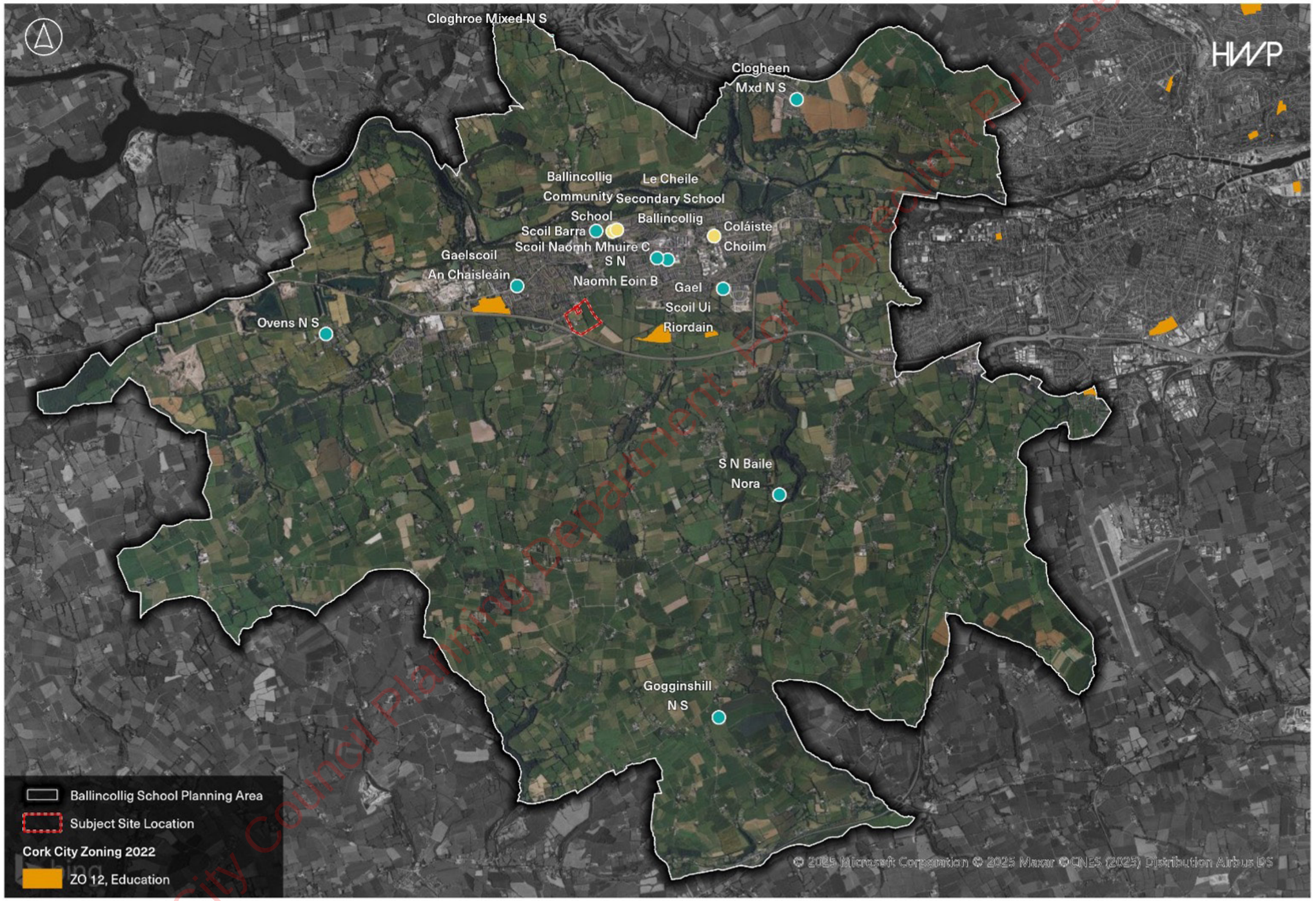

Figure 13.11 Existing Schools in the School Planning Area

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The School Demand Assessment considers that the Ballincollig SPA is well serviced by the existing and proposed primary and secondary school provision. It notes that the 2022 Census figures indicate a decline in the pre-school age cohort since the 2016 Census, which reduced from 2,243 children in 2016 to 2,194 children in 2022.

Although, there was a slight increase in primary school enrolments between the 2023/24 and 2024/25 academic years, this reduced pre-school age population will likely result in a decline in future primary school enrolments. The Department of Education and Youth's projection[8] is that primary school enrolment peaked nationally in 2018. A minor reversal in this trend was evident in 2022 due to increased inward migration, including enrolments of Ukrainian pupils who arrived since the crisis began. However, a continuous decline in new enrolments is now expected until 2036. Given the decline in the pre-school population evident in the 2022 census in Ballincollig, it is reasonable to expect the primary-school figures will fall as projected.

While there was a slight increase evident in the secondary school enrolment figures between the last two academic years, the Department of Education and Youth predicts that nationally enrolment in secondary level establishments is set to decrease after a peak in 2024/2025, indicating a lag before the pattern currently exhibited nationally in the primary school enrolments is evident in post-primary schools. While Ballincollig is a designated strategic growth area it experienced relatively modest growth since the last census. The planned school campus in Lisheens will have an overall capacity to accommodate 1,500 students. In view of the existing and planned capacity and projected future falls in student numbers, the potential school place demand generated by the proposed development would be unlikely to cause any undue pressure on the existing and planned school capacity. Additional lands in the Maglin Urban Expansion Area have been zoned for educational use to make provision for the continued future growth of this area.

13.3.3.5 Third Level Institutions

There are no third level institutions such as colleges or universities with the study area. However. Given Ballincollig's location in the western environs of Cork City, both University College Cork (UCC) and Munster Technological University (MTU) (formerly Cork Institute of Technology) are both within approximately 15-20 minutes journey time by frequent public transport and between 15 – 30 minutes journey time by bicycle.

8 Based on the Department of Education (now called the Department of Education and Youth) publication in 2023 - 'Projections of Full-Time Enrolment Primary and Post Primary Level 2023-2042'

13.3.3.6 Childcare

In addition to the proposed childcare facility in this application, there are also several other existing and permitted childcare facilities in the study area. In a submission to the LRD Stage 2 process, Cork City Childcare included a list of early year providers in the area, which has been used as the basis for this assessment. In addition, a review of the Tusla Childcare Register of Early Years Services by County (June 2025) and Tusla Inspection Reports was carried out to ensure the assessment was up-to-date. Based on this information it appears there are approximately 871 no. available childcare places across 16 no. childcare facilities in the study area (ref. Figure 13.12). However, 119 no. of these places are afterschool places for 4 – 12 year olds. Of the remaining 752 places, 53% cater for 2 – 6 year olds, with only 47% catering for 0-6 year olds.

Typically, attendances at childcare facilities can fluctuate significantly given the time of year with lower attendances likely during summer holidays and school mid-term breaks etc. The Cork City Childcare submission stated that across the study area only 2 of these 752 places remained available.

It should be noted that an additional 4 no. creches have been granted planning permission since 2020 in the study area. This are:

- **Ref 217517** – extension of duration for permission for a creche alongside a 156 no. unit residential development in Codrum Hall, Grange granted under Planning Ref. 06/12722 & ABP Ref. PL04.224953 and extended under Ref. 13/4725, 18/4980. (Cork County Council).
- **Ref 224345** – extension of duration for permission for a creche alongside 45 dwellings in Grange granted under Planning Ref. No. 07/11996 and extended under Pl.Reg.No.s 12/6410 (Cork County Council).
- **Ref 2341785** – for a change of plan to increase the permitted creche from an 80 space facility to a 107 space facility at Heathfield, Carriganarra, Ballincollig (Cork City Council).
- **Ref. 2443308** – for a 120 space creche off Maglin Road, Ballincollig. This creche may replace a 40- 50 space creche permitted under application ref 2342446 (Cork City Council).

The delivery of the 2 more recent permissions alone, would increase the childcare spaces within the study area by 227 spaces. A Childcare Needs Assessment prepared by HW Planning accompanies this application (included here as Appendix 13-2). Given the proposed provision of a 128 capacity creche as part of the subject application it concludes that the proposed development will not cause any undue pressure on the existing and planned childcare facilities. This is particularly so in the context of the decline in the pre-school age population cohort within the study area in the last intercensal period.

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Table 13.12 Existing Childcare Services in the Study Area (based of Cork Childcare Committee Submission Information and Tusla data)

Map Ref	Ref_no	Facility_N	Address1	Town	Age	Capacity	Places Available
*1	TU2015CC423	The Willows Montessori	The Willows	Cork	2 - 6 years	22	2
*2	TU2015CC204	Kindercare Childcare	Unit 5	Ovens	0- 6 years	190	0
*2	TU2015CC204	Kindercare Childcare	Unit 5	Ovens	4 - 12 years	22	0
3	TU2015CC295	Naionra na n'Óga - Lighthouse Centre	Unit 3a The Link Road Business Park	Ballincollig	3 - 6 years	12	-
*4	TU2015CC093	Child Vision Pre-School	c/o Guide Dogs	Ballincollig		11	0
*5	TU2015CC182	Positive Ideas T/A Highcare Childcare	Caisleaín Drive	Ballincollig	0- 6 years	160	0
*5	TU2015CC182	Positive Ideas T/A Highcare Childcare	Caisleaín Drive	Ballincollig	4-12 years	60	0
6	TU2015CC078	Bun an Cnoic	Grange Cross	Ovens	2 - 6 years	16	-
*7	TU2015CC089	Cheeky Cherubs Early Years Schools - Ballincollig	Highfield Park	Ballincollig	2 - 6 years	40	0
*7	TU2015CC089	Cheeky Cherubs	Highfield Park	Ballincollig	4- 10 years	24	0
*8	TU2015CC188	Innishmore Family Centre CLG	Innishmore	Ballincollig		68	0
*9	TU2015CC281	Na Seoda Oga	Ballincollig Community Hall	Ballincollig	2 - 6 years	38	0
*9	TU2015CC281	Na Seoda Oga	Ballincollig Community Hall	Ballincollig	4 - 12 years	25	0
*10	TU2015CC374	Spraoi Pre-school	9 The Paddocks	Ballincollig		19	0
11	TU2015CC076	Brothers of Charity Early Intervention Services	2 Glincool Drive	Ballincollig			-
*12	TU2016CC015	Rainbow Rascals Montessori School	22 Hawthorn Ave	Ballincollig	2 - 6 years	11	0
*14	TU2015CC142	Eileen's Playschool	8 Glincool Drive	Ballincollig		22	0
*14	TU2015CC033	Ballincollig Early Years Pre-School	The Village Centre	Cork		54	0
*15		Sherpa Kilds	Gaelscoil an Chaisleáin	Ballincollig	4 - 12 years	48	0
16	TU2015CC271	Ballincollig Montessori School	85 Beech Rd., Muskerry Estate	Ballincollig	2 - 6 years	29	-
Total Spaces						**842**	**2**
Total Pre-school						**723**	
Total Afterschool						**119**	**2**

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Figure 13.12 Existing and Permitted Childcare Facilities in the Study Area

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13.3.4 Community Facilities & Emergency Services

Due to its traditional service function as a Main Town in the County before becoming an Urban Town within the City, Ballincollig contains a wide-range of community-oriented facilities. These comprise a cluster of community facilities including Family Resource Centres at both Ballincollig and Innishmore, with Foróige based in Ballincollig Community Hall and Scout Hall. The town has several churches, banks, credit union, a post office, a library, a fire station and a garda station. There is an Age Action service and a number of elder care homes located in the town, and the Westgate Housing Project provides sheltered housing for the elderly. There is a Cork City Council Office and Regional Training Centre also located in the area. The previously referenced local sports clubs and schools form focal points of the local community and serve as key community assets. The study area benefits from its location proximate to Cork University Hospital, in the western suburbs of the city.

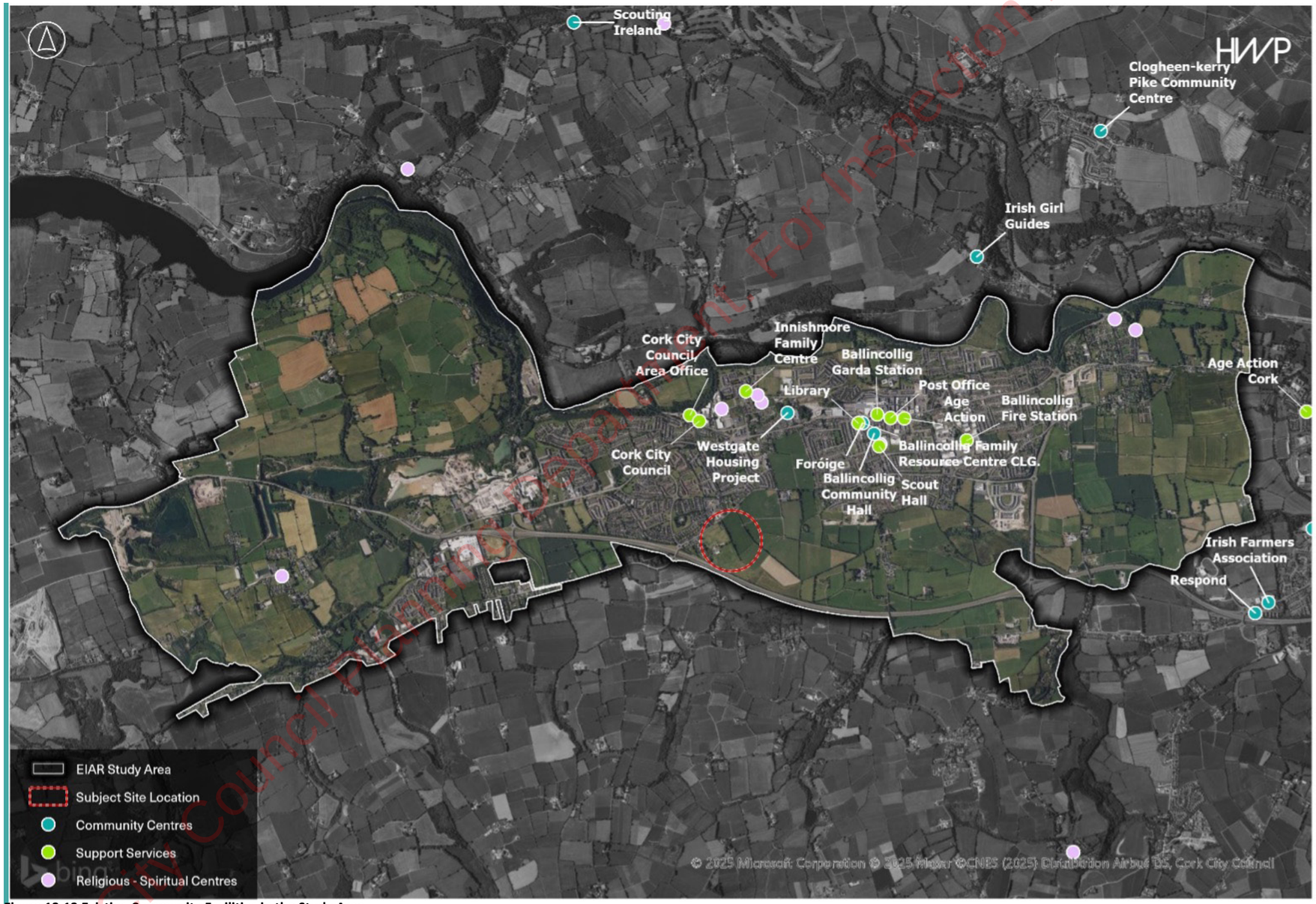

Figure 13.13 Existing Community Facilities in the Study Area

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13.3.5 Retail

Due to its strategic designation as an 'Urban Town' in the Cork City Development Plan 2022, Ballincollig provides for a wide range convenience, and comparison retail facilities. These include a range of units along Main Street and within the Ballincollig Shopping Centre, West Village Shopping Centre, Westpoint Trade Centre, Westpoint Business Park and Link Road Business Park. The study area also includes a number of retail outlets at Hobb's Yard, Waterfall to the south and Grange to the west.

Supermarkets in the study area include Aldi, Tesco, Lidl, Dunnes Stores and Supervalu amongst a wide variety of retail opportunities. There is also a broad range of cafes, restaurants and pubs in the area which support the local daytime and nighttime economies and typifies the self-contained nature of the settlement.

Figure 13.14 Existing Retail Outlets in theStudy Area

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13.3.6 Healthcare

The Urban Town of Ballincollig includes a range of local healthcare services and facilities for the surrounding area. Ballincollig provides a Primary Care Centre, several General Practitioner services, pharmacies, dentists, physiotherapists, chiropractors, opticians and chiropodists, counselling/mental health services as well as holistic practitioners.

There are also a number of nursing homes in the study area according to HIQA's records[9], specifically.

- Rosenalee Care Centre – Ballincollig (Capacity 66 residents),
- Powdermill Nursing Home - Ballincollig (Capacity 40 residents),
- Ballincollig Community Nursing Unit, Ballincollig (Capacity 100 residents)
- Norwood Grange Care Home, Waterfall (Capacity 30 residents)
- Bons Secours Care Centre and Village/ St Josephs, Lee Road (Capacity 103 residents).

Figure 13.15 Existing Healthcare Facilities in the Study Area

9 https://www.hiqa.ie/find-a-centre

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13.3.7 Public Transport

Ballincollig is particularly well served by several existing bus routes which provide the area with regular public transport links to all areas of Cork City. As tabulated in Table 13.13, Ballincollig Urban Town and strategic growth location is reflected in the settlement being one of the best served areas of the City in terms of public transport provision, with the 220 route offering a 24 hour service to the City Centre. The majority of bus services (220, 220X and 233) run along the Ballincollig Main Street, though the 233 also serves Carriganarra Raad/Station Cross to the south of the settlement, in proximity to the Maglin Urban Expansion Area. The 40 route travels along the N40 national road to the south, with a stop in Curraheen at the Maryborough Hospice Site, along the western periphery of the study area. The 208 service, a high frequency bus route also serving the hospice and City Centre, is not included in Table 13.13 however as the route is tangential to the study area.

Table 13.13 Existing Bus Services in Study Area[10]

Route No.	Route	Via	Frequency	Route Operating	No. of Services Daily
220/220	Ovens (EMC) - Crosshaven	Ballincollig, Mode; Farm Road, UCC, City Centre, Douglas, Maryborough Hill, Carrigaline.	Mon-Fri (Peak): Service every circa 15 mins. Weekends Service every 15 mins.	24-hour route	Mon-Fri: 78 no. services. Sat: 65 no. services Sun: 63 no. services
220X	Ovens to Crosshaven via South Mall	Ballincollig, Carrigrohane Road, City Centre, Douglas, Maryborough Hill, Carrigaline.	Mon-Fri (Peak): Service every circa 60 mins Weekends Service every 60 mins.	Mon-Fri: 6.50am – 23.20pm. Weekends 7.20pm – 23.20pm	Mon-Fri: 13 no. services. Sat: 13 no. services Sun: 0 no. services
233	Cork to Macroom and Ballingeary	Ballincollig, Ovens, Killumney, Crookstown.	Mon-Fri (Peak): Service every circa 60 mins Weekends Occasional Service.	Mon-Fri: 7.25am – 22.30pm. Weekends 7.10pm – 22.30pm	Mon-Fri: 14 no. services. Sat: 6 no. services Sun: 3 no. services
40	Tralee - Rosslare	Cork – Waterford	Mon-Fri (Peak): Service every circa 60 mins Weekends Service every circa 60 mins	Mon-Fri: 6.15am – 17.50pm. Weekends 6.15am – 17.50pm.	Mon-Fri: 11 no. services. Sat: 11 no. services Sun: 9 no. services

10 www.buseireann.ie

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Figure 13.16 Existing Public Transport Services in the Study Area

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Ballincollig is included as a key location on one of the twelve new 'Sustainable Transport Corridors' in the Draft BusConnects Cork (STC Route E – Ballincollig to City' which in turn links with STC F (Bishopstown to City). The BusConnects New Network for the Cork Metropolitan Area envisages that the bus service along the STC E corridor will have a 7.5m to 10 minute frequency, almost doubling the existing 15 minute frequency of the 220 route. In addition, a 30 minute frequency service will run along Carriganarra Road, similarly doubling frequency of the existing 233 route.

The Cork Metropolitan Area Transport Strategy (CMATS) 2040 envisages a Light Rail Transit for Cork with terminuses in Ballincollig and Mahon and serving the City Centre. The Luas Cork – Preferred Route Public Consultation closed on the 9th of June 2025. This includes a single track loop around Ballincollig, with 4 potential Luas stops, one along Killumney Road and Carrignarra Road and two along Main Street. Once BusConnects and the Cork Luas are fully realised, the Ballincollig to City Centre Corridor will benefit significantly from a high frequency public transport service.

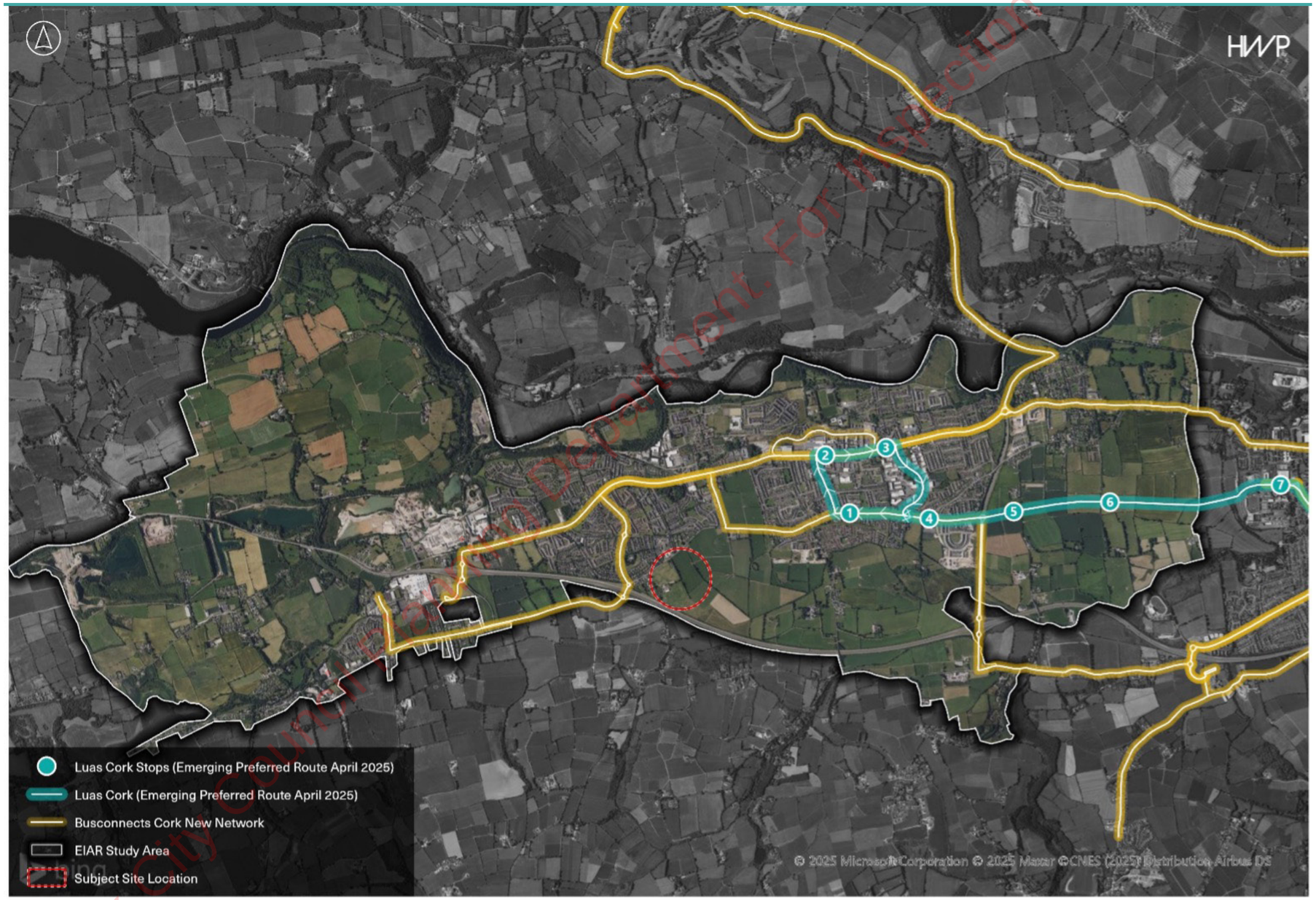

Figure 13.17 Potential Future Public Transport Services in the Study Area

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13.4 Impact Assessment

13.4.1 Do-Nothing Scenario

In the 'do nothing' scenario, the subject lands will remain undeveloped and there will be no additional impacts on population and human health factors. The development of the BusConnects and the Cork Luas plans will progress. Over time it is considered the do-nothing scenario will result in the inefficient use of serviced lands, which are identified for strategic growth, being part of the Maglin Urban Expansion Area in the Cork City Development Plan 2022. It will also represent a missed opportunity to integrate landuse and transport planning and maximised the benefit from the infrastructural investment in the LRT.

13.4.2 Impacts on Population and Human Health

13.4.2.1 Construction Phase

It is envisaged that the works will be carried out in phases over a period of 8-10 years. Therefore, there will be some overlap between operational and construction traffic journeys. Chapter 4 of this EIAR considers that with appropriate mitigation the potential impacts on the safety or operation of the road network will be negligible during the construction phase. The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts to nearby residents and on the operation of nearby road junctions. Construction of the proposed development will be implemented in accordance with the CEMP and CTMP which are included in Appendices 2-1 and 2-2 of this EIAR. These documents describe a suite of mitigation measures to be implemented and monitored during the construction phase of the development.

It is expected that the construction workers will travel from their existing residence rather than taking temporary accommodation in the local area. Impacts are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. The mitigation measures identified in the CEMP and CTMP, will minimise traffic and transportation impacts on the locality and minimise the numbers of HGV's and construction related vehicles accessing the site. It is predicted that the residual traffic and transportation impacts of the proposed construction phase will be negative, short-term, and not significant with respect to human health.

As described in Chapter 3 of this EIAR (Landscape and Visual) the construction phase of the development will require the erection of site hoarding, demolition, site clearance and levelling, haulage and storage of materials, general construction activity and the incremental growth of buildings on site. It is noted however that the proposed development would largely retain the site's key landscape elements/features, the hedgerows and hedgerow trees.

The magnitude of landscape change would be greatest in the immediate environs (e.g. the adjacent roads and nearby houses), reducing with distance from the site and site clearance works. The landscape sensitivity of the receiving environment is classified as 'medium' overall, however the sensitivity across the 12 viewpoints ranges from low (viewed from the N22/south of the site) to medium-high when viewed from Ballincollig Castle and McKee Avenue. Care has been taken with the design to minimise landscape impacts from these more sensitive viewpoints. Arising from this approach Chapter 3 considers that the significance of the temporary visual effects at the 12 viewpoints during the construction phase ranges from 'no effect' on the viewpoint from Ballincollig Castle to a 'slight negative' from places along Greenfields Road and the lane to the west of the subject site.

While the construction phase is likely to result in these short term, negative landscape impacts for the duration of the construction phase, these will be relatively localised to the site and the immediate vicinity. The adoption of standard best practice construction site management and the retention of the majority of hedgerows and certain trees on the site will mitigate these short-term negative impacts. The site is situated within an evolving developmental context with the construction ongoing at the permitted Cois Caislean Phase 1 and Phase2 and Heathfield Phase 4 residential developments to the east reflecting in a changing landscape context in the vicinity of the lands. It is concluded that the residual impacts of the proposed construction phase will be negative, short-term, and slight to imperceptible with respect to the visual impact on residents in the vicinity of the proposed development.

Chapter 5 of the EIAR, assess the potential impacts on human health by the implementation of services and utilities. Potential negative impacts on existing services such as water, communications, electrical infrastructure may occur to existing local services arising from connection works for the proposed development. The Chapter concludes however, that with the implementation of the proposed mitigation measures, the residual impacts on material assets will be short term and slight during the construction phase.

As detailed in EIAR Chapter 6 (Land, Soils and Geology), in the absence of appropriate mitigation measures, potential moderate negative construction related impacts affecting human health include contamination of soils through construction activity from spillages. However, with the mitigation measures proposed being enforced to reduce and/or avoid these potential impacts, and to address any potential waste soil management issues it is predicted that any interactions with population and human health considerations will be not significant, localised and temporary/short term in duration during the construction phase.

As detailed in EIAR Chapter 7 'Water (Hydrology & Hydrogeology)', with the proposed mitigation and monitoring measures adopted, it is predicted that any impacts on water quality, impacting human health, arising from the construction works will be localised, temporary in duration and not significant during the construction phase.

Chapter 10 of this EIAR prepared by AWN Consulting assesses the potential impacts of noise and vibration during the demolition and construction phase. A range of noise and vibration monitoring has been identified during the demolition and construction phase to ensure the construction and vibration thresholds are not exceed at the closest receptors. Overall, no significant noise and vibration impacts are predicted during the construction or operational phases of the proposed development or cumulative development.

As described in Chapter 11 of the EIAR the most significant interactions are between Population and Human Health and Air Quality. An adverse air quality impact during the construction phase can cause health and dust nuisance issues. There is a low risk of dust-related human health impacts during the construction phase of the proposed development. Best practice mitigation measures will be implemented during the construction phase to ensure that the impact of the proposed development complies with all ambient air quality legislative limits. Therefore, the predicted impact is direct, short-term, negative, localised and not significant with respect to Population and Human Health during the construction phase.

As predicted in Chapter 12 of the EIAR,' Climate', there is potential for an increase in greenhouse gas emissions to atmosphere during the construction of the development. However subject to the adoption of the recommended mitigation measures, climatic impacts corresponding to human health will be direct, long-term, negative and not significant.

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13.4.2.2 Operational Phase

Once constructed, the proposed development will be permanent and non-reversible. The proposed development will result in several significant long-term and permanent positive impacts for the local population including.

- The proposed development will provide a diverse range of housing and apartments which will positively serve all aspects of the current housing and rental markets and address the current accommodation shortage in the Metropolitan Cork Area.
- The proposed development will contribute towards the delivery of the long-held Council objective for the development of the Maglin Urban Expansion Area. This will result in the creation of a more compact settlement and assist in providing a critical mass of population to support planned strategic public transport investment, alongside local services and the local economy.
- The proposed development will deliver a portion of the Maglin Urban Distributor Road in accordance with Cork City Council strategic vision for the servicing of the wider Maglin Urban Expansion Area. .
- The proposed pedestrian and cycling connectivity enhancements being delivered within the proposed scheme will enhance accessibility to active travel and recreational infrastructure for the locality.
- The proposed layout provides for a large central area of landscaped open space adjacent to the proposed creche facility, with a proposed shop nearby. This will assist in achieving positive 'place-making' and 'on -site' services for future residents and surrounding areas.

As detailed in EIAR Chapter 3 (Landscape and Visual), the potential overall landscape impact of the operational phase of the proposed development has been classified as moderate – positive. However, it is noted that at the two viewpoints on the north side of Greenfield Road , opposite the site, the visual impact is classified as moderate - negative. However, the high-quality design of the scheme, comprehensive mitigation/replacement planting measures and the urbanising landscape character of the area it is considered these changes to the receiving environment are not inappropriate and offset by enhancements to the public realm. The delivery of the section of the Greenway along the western and southern perimeter of the subject site will not only serve as a valuable amenity for existing residents of the wider area but also as a high-quality visual amenity for future residents and to the scheme. The sites public open space, amenity and connectivity strategies will provide for attractive natural spaces for the local population contributing to significant, positive and permanent interactions with population and human health.

Chapter 4 of this EIAR (Material Assets - Traffic & Transportation) confirms that during the operational phase the proposed development is expected to result in a slight increase (10%) in the ratio of flow to capacity (RFC) at the road junctions in the vicinity of the site, which will junctions still operating within capacity. With the delivery of the planned new roads and upgrades to existing roads within the Maglin Urban Expansion Area it is anticipated that the performance of these junctions will be further improved. It is also anticipated that BusConnects will be delivered prior to the operational phase of the proposed development, resulting in a modal shift towards walking, cycling and public transport and leading to a reduction in dependency on private car single-occupancy use. This will also result in improvements in the performance of the junctions. In view of the above Chapter 4 considers that with the implementation of appropriate mitigation the overall impact on the local population arising from increased traffic congestion during the operational phase of the proposed development will be long term and slight.

As detailed in Chapter 5 of this EIAR (Material Assets – Services, Infrastructure & Utilities) the operational phase of the proposed development will result in the increase of generation of effluent and sanitary waste and result in the increase in water demand and service infrastructure. Irish Water have confirmed that will be sufficient capacity to accommodate the proposed development and it is predicted that residual impacts on human health will be neutral following the implementation of the stated mitigation and monitoring measures.

Chapter 6 (Land, Soils and Geology), states that with the mitigation measures proposed being enforced to avoid the potential for subsidence arising from stormwater, and the potential risk of contamination arising from spillage and leaks it is predicted that the potential impact on population and human health will be imperceptible.

Chapter 7 (Water (Hydrology & Hydrogeology)) of this EIAR, notes that with the implementation of the recommended mitigation measures, which have been incorporated into the site design, no increased flood risk is predicted elsewhere in the catchment. No significant impacts on groundwater are identified. Therefore, in terms of potential impacts on population and human beings, it is anticipated that any operational phase negative impacts on surface water quality will be imperceptible, localised and temporary and potential impact of groundwater/aquifers to be imperceptible, localised and permanent.

As detailed in EIAR Chapter 10 (Noise & Vibration), in the context of the existing noise environment, the overall contribution of traffic is not considered to pose any significant impact to nearby residential locations. The resulting residual effect is neutral to negative, imperceptible to not significant, and long-term.

Chapters 11 (Air Quality) notes that vehicles accessing the site will emit pollutants which may impact air quality and human health. However, the increased number of vehicles associated with the proposed development will not cause a significant change in air pollutant emissions in the locality. It has been assessed that emissions will be in compliance with the ambient air quality standards which are set for the protection of human health. Impacts will be long-term, localised, direct, negative and not significant.

Chapter 12 (Climate) considers the impact of the proposed development on climate change. The operational phase of a mixed-use residential development emits CO^2 through vehicular traffic into and out of the development and energy usage within the buildings. As evidenced by 2022 census information in Figure 13.5, Ballincollig's inward commuter flows are disproportionately car-dependant. The proposed development represents the concentration of growth on an undeveloped site within walking/cycling distance of this Urban Town that is a significant employment hub. The public realm upgrades proposed will promote sustainable commuting patterns and reduce car dependency and overall CO^2 emissions. Energy reduction measures from the buildings also forms a significant potential source of emissions. All buildings however are designed in compliance with the NZEB building regulations enforcing energy reductions of 70% and CO^2 reduction of 60% and mitigating the overall potential effects of the operational phase of the proposed development. It concluded that the residual climatic impacts on human health will be direct, long-term, negative and not significant.

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13.4.3 Impacts on Local Economy and Retail

13.4.3.1 Construction Phase

The duration of the construction phase is likely to result in moderate, short term positive impacts to the local economy. Construction workers will avail of local retail outlets and food establishments for refreshments in mornings and lunchtimes in particular. Supplies and materials for proposed construction works may also be supplied locally further resulting in positive impacts on the local economy. The construction phase will also provide for both direct and indirect construction related employment opportunities.

13.4.3.2 Operational Phase

The proposed development will result in moderate, permanent and positive impacts on the local economy. The 2022 Census indicates that the average household size the study area is approximately 2.85 no. persons per household. The proposed development of 544 no. dwellings will accommodate approximately 1,550 no. persons. The projected increase in population of Ballincollig will create additional demand for local retail and service provision, providing increased local employment opportunities. The proposed development will provide a diverse range of housing and apartments which will serve all aspects of the current housing market and address the current housing shortage in the Metropolitan Cork Area.

The location of the proposed retail/commercial unit at ground floor level in Block 3 and a creche facility will provide a communal node focused close to the central open space area at the heart of the scheme, to meet the needs of the area's growing population.

13.4.4 Impacts on Amenity, Open Space and Sports

13.4.4.1 Construction Phase

It is predicted that the proposed development will result in slight, negative short-term impacts on amenity, open space or sports facilities during the construction phase. The subject lands are in private agricultural use and are not publicly accessible. As detailed in the CEMP prepared by DOSA Consulting Engineers, earthworks will occur which will necessitate the removal of a number of existing trees from the site, resulting in some potential slight, short-term, negative visual impacts.

13.4.4.2 Operational Phase

Once operational, the projected increase in population may result in some short-term, slight negative impacts relating to an additional demand for the use of local amenities, open spaces and sports facilities. However, as described in Section 13.3 in this chapter, Ballincollig and the defined study area is well equipped with sufficient facilities to serve the existing and proposed population and benefits in particular from the presence of the Ballincollig Regional Park. Local sports clubs and centres such as Ballincollig GAA, Drispsey GAA, Éire Óg GAA, Ballincollig RFC, Cork City FC, Lakewood Sports and Social Club, Ranges Pitch & Putt, Lee Valley Golf Club, Inniscarra Sailing and Kayaking Centre will likely benefit from increased volunteers and participation resulting in increased membership and financial/social benefits.

The proposed development provides for the delivery of approximate 400 metres of the proposed greenway route (BC-GW4) as set out in the Cork Cycle Network Plan which will comprise a two-way cycle track along the proposed Western and Eastern Link roads to the north of the proposed site.

The proposed development also provides for retaining significant areas of hedgerow and replacement and additional tree planting in publicly accessible amenity areas, plazas public open spaces and public realm which will result in significant permanent and positive impacts to the visual and amenity context of the settlement. The public realm upgrades including the proposed Greenway will all positively contribute to walking and cycling in the area. It is concluded that the proposed development will result in significant, long-term, positive impacts on amenity, open space and sports provision in the area.

13.4.5 Impacts on Childcare and Education

13.4.5.1 Construction Phase

Childcare and Education

In the absence of appropriate traffic management and mitigation measures, the construction phase may result in some short-term, slight, negative impacts for the Gaelscoil Uí Ríordáin on Carriganarra Road and Eileen's Playschool off Maglin Road. Potential impacts include additional traffic congestion at drop-off/collection times, however given the distances involved there is limited risk of noise and dust emission impacts. The CEMP and CTMP prepared by DOSA Consulting Engineers details a suite of construction management and mitigation measures including procedures for the co-ordination of deliveries to ensure that vehicular movements occur at off-peak times where possible and not during drop-off and collection times of the school or childcare facility. It is concluded that the impacts of proposed construction phase will be not significant and neutral and not significantly negatively impact the operations of any existing schools or childcare facilities in the area subject the specified mitigation measures as described in the CEMP and CTMP being implemented.

13.4.5.2 Operational Phase

Childcare

The proposed development provides for a two storey 128 no. space childcare creche facility in the south-eastern, central area of the site, adjacent to the main proposed public open space and to the retail unit.

The creche will benefit from pedestrian and cycle connections throughout the site, promoting both accessibility and safety for future users. The proposed creche will result in a significant, positive, long-term impact, as the proposed creche will not only cater for the childcare needs of the proposed development but also the wider Ballincollig areas.

Given the above, the Childcare Needs Assessment prepared by HW Planning (included here as Appendix 13-2) concludes that the proposed development will not cause any undue pressure on the existing and planned childcare facilities. This is particularly so in the context of the decline in the pre-school age population cohort within the study area in the last intercensal period.

Schools

A School Demand Assessment has been prepared for the proposed development (re. Appendix 13.1). The assessment is based on the Dept. of Education and Skills Schools Planning Area rather than the EIA study area as this is the established catchment type used for such assessments. The demographic breakdown by school-going age cohort provided in Table 13.14 differs from that provided in Table 13.2 as this is based on the wider Schools Planning Area and the age categories are different to the 10 year interval used in Table 13.2.

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Table 13.14 2022 Census Data for Pre-school, Primary and Secondary School Age Cohorts – in the Ballincollig School Planning Area

School Cohort	Ballincollig SPA (%)	Cork City (%)	County Cork (%)	State (%)
Pre-school (0-4 year olds)	2,194 (7%)	5%	6%	6%
1y School (5-12 year olds)	3,926 (12%)	9%	12%	11%
2y School (13-18 year olds)	2,709 (8%)	7%	9%	8%

From this it can be seen that within the Ballincollig Schools Planning Areas 7 % of the population are of pre-school age, 12% are of primary school age and 8% are of secondary school age.

Of the proposed 544 no. residential units, 80 no. units (15%) are 1 bedroom units and are considered less likely to generate a demand or school places. It is also acknowledged that it takes a time period of multiple years for residential developments to become established and that the development will initially be occupied by younger couples, young professionals and empty nesters. Due to this, it is envisaged that demand initially will be primarily for childcare services and as the development becomes more established demand for primary and secondary will increase.

However, for the purposes of this assessment, the 'worst case scenario' has been assessed. According to 2022 Census figures, 12% of the study areas resident population is of primary school age (4-12 years) with approximately 8% of the population of secondary school age (13-18 years). Given the average household size in the wider study area is approximately 2.85 persons per household, the population uplift generated from the proposed 544 no. units would be circa 1,550 no. people. Taking the conservative figure based on all the units and the more realistic figure based on the exclusion of the 1 bedroom units the following school age population ranges are anticipated to be generated by the proposed development:

- An additional circa 159 - 186 no. children (12.%) of primary school age, and
- An additional circa 106 - 124 no. children of secondary school age in future years.

Projections from the Department of Education and Youth estimate that enrolment levels in schools will decrease in the coming years, initially in primary schools and subsequently in post-primary schools. The Department of Education and Youth[11] published the 'Projections of Full-Time Enrolment Primary and Post Primary Level 2023-2042' (2023) which outlines various scenarios of future intake for both primary and post-primary schools. The report demonstrates that primary school enrolment peaked in 2018 and following a minor reversal in this trend in 2022 reflecting the enrolment of Ukrainian pupils, a continuous decline in new enrolments is expected until 2036.

Figure 1 Actual and projected enrolments in primary schools, 1989-2051

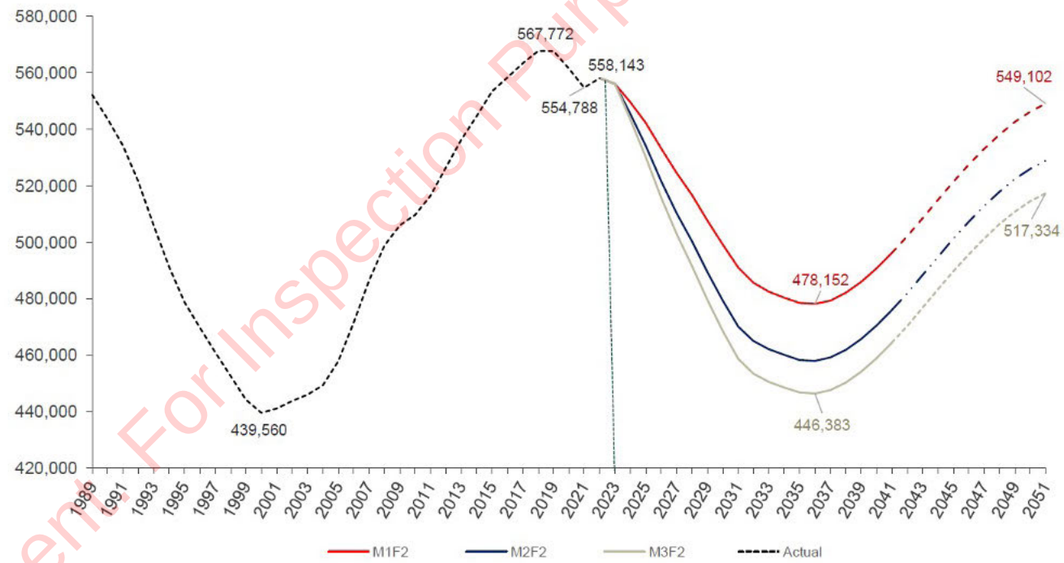

Figure 13.18 Projections of Enrolment at Primary Level, 1989–2051[12]

This projection is in line with the census data in Table 13.15 (extracted from Table 04 of the Schools Demand Assessment, which shows that despite a 12% population increase in the area there was a 2% decline in the pre-school age cohort between 2016 and 2022.

Table 13.15 Pre-school Population in Ballincollig School Planning Area 2016 – 2022 Census

Age	2016	2022	% of Population in 2022	% Change 2016 - 2022
0-4	2,243	2,194	7%	-2%

Post-primary school enrolment is not envisaged to peak until 2024/2025. Similar to trends for primary schools, a continuous decline in post-primary enrolment is then expected until 2036.

11 Previously called the Department of Education

12 (Source: Projections of Full-Time Enrolment Primary and Post Primary Level 2023-2042 - Department of Education 2023– now called the Department of Education and Youth)

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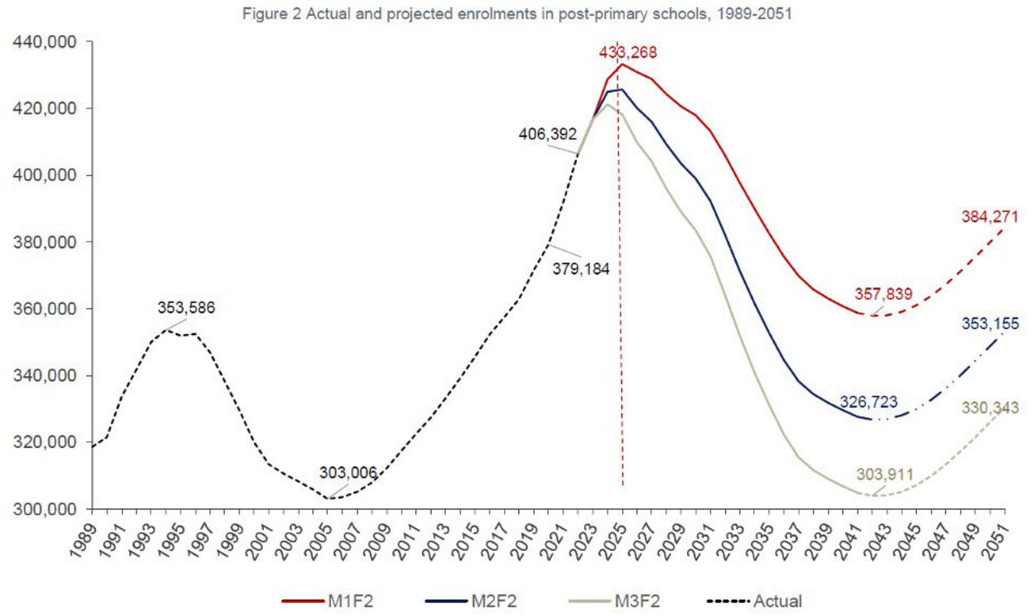

Figure 13.19 Projections of Enrolment at Second Level, 1989–2042 [10]

In advance of preparation of this LRD and EIAR, HW Planning contacted the Department of Education and Youth to query if there were any comments regarding the proposed development. At the time of preparation of this EIAR, no response was provided by the Department of Education and Youth.

As outlined in Section 13.3.3 in this chapter, Ballincollig is set to benefit from the delivery of a new school campus at Lisheens. In view of the existing and planned capacity and projected future falls in student numbers, the potential school place demand generated by the proposed development of between 159 and 186 no. primary school places and 106 - 124 no. secondary school places, would be unlikely to cause any undue pressure on the existing and planned school capacity.

13.4.6 Impacts on Community Facilities

13.4.6.1 Construction Phase

Without appropriate mitigation measures, some noise/dust pollution and traffic congestion may occur, which could result in some slight, short -term, negative impacts on local community uses. However, due to the nature of the uses/operations of the neighbouring community uses and the effective implementation of suite of mitigation measures proposed in the CEMP, any impacts will be short-term, neutral and imperceptible.

13.4.6.2 Operational Phase

Once operational the proposed development will likely result in an increased demand for local community services such as the local post office, community centre, churches and banks amongst other similar uses. The proposed development provides for various public open spaces, play areas, creche, a retail outlet and the amenity asset of the proposed Greenway serving as community assets to future occupiers of the development. It is predicted that that the operational phase will result in permanent, slight, neutral impacts on community facilities in the area.

13.4.7 Impacts on Health Services

13.4.7.1 Construction Phase

The subject site is not in immediate proximity to the nearest health outlet/service, therefore it is envisaged that the construction phase of the development will result in neutral, imperceptible and short-term impacts.

13.4.7.2 Operational Phase

Once operational, the population increase generated by the proposed development will result in increased demand for local healthcare services, particularly in the Ballincollig area. Given the wide variety of medical facilities in the study area, including a Primary Care Centre and the predicted demographics of the proposed scheme it is considered that the proposed development will result in permanent, neutral, and imperceptible impacts on local health services.

13.4.8 Impacts on Emergency Services

13.4.8.1 Construction Phase

The Garda Station is not located in proximity to the proposed development therefore no impacts are anticipated. The Ballincollig Fire Station is located on the Link Road, accessed via the Carriganarra Road. Without appropriate mitigation measures, the construction phase of the proposed development could give risk to increased traffic congestion on this road and nearby junctions, which could result in some slight, short -term, negative impacts on emergency uses. However, with the effective implementation of the suite of mitigation measures proposed in the CEMP and CTMP any impacts will be short-term, neutral and imperceptible for local emergency services.

13.4.8.2 Operational Phase

Ballincollig is well served by emergency services with Ballincollig Garda Station on Main Street and Ballincollig Fire Station on the Link Road. The closest hospitals to the lands include Cork University Hospital and the Bons Secours Hospital in the western suburbs of Cork City. Due to the scale and nature of the proposed development in addition to the availability of emergency services in the area, it is envisaged the proposed development will result in neutral, long-term and not significant impacts on emergency service provision.

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13.4.9 Impacts on Public Transport

13.4.9.1 Construction Phase

During construction, the proposed development may result in some temporary disruption and slight, negative short-term impacts to local public transport services due to increase amounts of traffic on the local road network. However, with the adoption of the mitigation measures identified in the CEMP and CTMP, it is envisaged the proposed development will result in no significant impacts on public transport provision.

13.4.9.2 Operational Phase

Once operational, it is predicted that the proposed development will initially result in slight, positive impacts on public transport provision. The proposed development will support the continued viability of public transport services and planned improvement of services in the area including BusConnects and Cork Luas which will both serve the subject site. The proposed development aims to reduce car dependency and support active travel and hybrid travel modes by prioritising walking and cycling mobility through the delivery of an extended section (c. 400m) of the BC-GW4 Greenway as set out in the Cork Cycle Network Plan.

13.5 Mitigation Measures & Monitoring

13.5.1 Mitigation & Monitoring

Full details of all mitigation and monitoring procedures during the construction phase are described in the various chapters of this EIAR and the CEMP which accompanies this LRD. The CEMP has been developed in response to the site-specific context with robust mitigation and monitoring measures being adopted to ensure that any negative impacts arising from the construction phase of the development on neighbouring properties or surrounding areas are minimised. Chapter 15 of this EIAR 'Summary of Mitigation Measures' details all proposed mitigation/monitoring measures to be implemented during construction and operational phases of the project.

The site layout responds to the site's topography and the evolving development context in the Maglin area of Ballincollig. The delivery of a section of the BC-GW4 Greenway and provision of pedestrian/cyclist connections throughout the residential development will result in significant positive and permanent impacts to pedestrian and cyclist mobility in the settlement. The proposed public open spaces, creche and retail unit will all significantly positively and permanently contribute to the communal and public facilities in the area.

13.6 Residual Impacts

Residual impacts refer to those impacts that remain following the implementation of mitigation measures. It is considered that subject to the mitigation measures outlined in the CEMP and EIAR being implemented the proposed development will result in many positive and permanent residual impacts including.

- The creation of a new community in the Maglin Urban Expansion Area of Ballincollig will develop in tandem with the delivery of a portion of the Maglin Urban Distributor Road in addition to pedestrian and cycle infrastructure. These will take the form of a number of proposed and planned greenways which provides dedicated walking and cycle connectivity within the Urban Town of Ballincollig. The proposed layout provides for high quality public open spaces promoting outdoor activities and exercise which will benefit existing and future residents of the settlement.
- The delivery of a new creche and retail/commercial unit will positively contribute to Ballincollig's childcare, economy and community facilities.
- The delivery of a diverse range of housing, duplexes and apartments positively contributing to housing supply for all aspects of the housing market.
- The provision of active recreational infrastructure in the form of the Greenway will provide real opportunities for modal shift and the promotion of walking and cycling as viable modes of transport in the wider Ballincollig area.

13.7 Cumulative Impacts

13.7.1 Construction Phase

Assessing the cumulative impacts of the construction phase of the development is contingent on the construction schedules of the permitted developments in the area identified in Chapter 1. For the purposes of this assessment of impacts a 'worst case' scenario has been assessed based on the projects stated in Chapter 1.

The subject site is situated within the evolving development context of the designated strategic growth area of the Maglin Urban Expansion Area. As referenced in the CEMP, the construction phase of the proposed development will be subject to strict mitigation and monitoring procedures. It is predicted that subject to the implementation of mitigation measures proposed, that the proposed development will result in no significant impacts relating to air quality, noise, vibration or traffic. Any negative impacts or nuisances experienced from construction activities which affect human health will be temporary/ short term in nature.

13.7.2 Operational Phase

Once constructed, the proposed development will be permanent and non-reversible. It is considered that any negative cumulative impacts relating to human health factors including traffic, road safety, air quality, landscape and visual, water quality, noise and vibration will be not significant.

The delivery of an additional 544 no. residential units to the private and social housing stock of the area, a retail unit, creche and pedestrian/cycle infrastructure upgrades is predicted to result in significant positive and permanent benefits in terms of wider human health considerations.

The potential cumulative impact of the relevant Plans for the area were assessed in the context of the policies and objectives of the Cork City Development Plan 2022-2028. The assessment of the potential impacts on the environment was undertaken utilising the Strategic Environmental Objectives (SEOs) detailed in the Table 5.1 of the 'Strategic Environmental Assessment Report' (SEA) for the Cork City Development Plan 2022-2028.

SEO PHH relating to 'Population and Human Health' aims to

- Promote economic growth to encourage retention of working age population and funding of sustainable development and environmental protection and management.
- Ensure that existing population and planned growth is matched with the required public infrastructure and the required services.
- Safeguard the City's citizens from environment related pressures and risks to health and well-being.

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The SEA considered 3 no. alternative scenarios for growth with the selected 'Alternative 3 Compact Liveable Growth' described as

> *'This alternative seeks to develop Cork City as a compact, sustainable city of scale and the regional driver of growth by creating sustainable, liveable, integrated communities and neighbourhoods while ensuring that at least half (50%) of all new homes are delivered in the existing built up footprint.*
>
> *A tiered approach to land use zoning us applied ensuring that new homes are provided at appropriate densities in brownfield and infill locations and in greenfield locations within and contiguous to existing City footprint.'*

Section 7 of the SEA of the Cork City Development Plan 2022-2028 indicates that preferred alternative Scenario 3 'Compact Liveable Growth' has a positive interaction with the status of SEO 'PHH'.

13.8 Difficulties in Compiling Information

There were no significant difficulties in terms of compiling information in preparation of this chapter. We consider that the data collected, and analyses outlined reflects an accurate representation of the population and human health considerations with respect of the proposed development.

13.9 References

Central Statistics Office (CSO) Census 2016 and 2022 data.

Cork City Development Plan 2022-2028.

Cork City Council's Planning Enquiry System.

Projections of Full-Time Enrolment Primary and Post-primary Level 2023-2042 - Department of Education and Youth (previously called the Department of Education).

2022 Pobal Deprivation Index.

https://www.gov.ie/en/collection/primary-schools/

https://www.gov.ie/en/collection/post-primary-schools/#20232024 and /#2024025

Tusla Childcare Register of Early Years Services by County (June 2025)

Cork Childcare Committee Submission to the Stage 2 LRD Process

www.hiqa.ie/find-a-centre

www.buseireann.ie

www.hsa.ie

13.10 Chapter Appendices

Appendix 13.1 - Schools Demand Assessment prepared by HW Planning

Appendix 13-2 - Childcare Needs Assessment prepared by HW Planning

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CHAPTER FOURTEEN

INTERACTION OF IMPACTS

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CHAPTER FOURTEEN

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CHAPTER 14 | Interaction of Impacts

14.1 Chapter Author

This Chapter has been prepared by Harry Walsh, (BA HONS, Master of Regional and Urban Planning, MIPI), Director at HW Planning.

14.2 Chapter Context

Article 3(1) of the EIA Directive states.

The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) population and human health;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape;

(e) the interaction between the factors referred to in points (a) to (d).”

Annex IV of the amended Directive states that a description of impacts should include:

“…the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project”

Table 14.1 as shown summarises the relevant interactions and interdependencies between specific environmental aspects.

14.3 Description of Significant Interactions

14.3.1 Landscape & Visual

14.3.1.1 Construction Phase

Chapter 3 of this EIAR assesses landscape impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with landscape impacts.

Population and Human Health - Potential temporary impacts to visual amenity in the area as a result from construction works, include the necessary removal of existing trees, construction traffic and earthworks. The construction phase of the development provides for mitigation/replacement planting which will mitigate the long-term impacts of the removal of existing vegetation and land cover.

Biodiversity – Site excavation works and the removal of existing tree cover, hedgerows and grassland habitat during the construction phase will result in interactions with biodiversity considerations and potential short term negative impacts on local flora/fauna species and the displacement of habitats.

Material Assets – Services /Water– The necessary earthworks/excavations to facilitate the proposed development including the proposed attenuation/drainage strategies will result in the permanent loss of the existing landscape of the site, representing an interaction between landscape and material assets impacts during the construction phase. Visual impacts will be mitigated through appropriate site management measures and work practices including the fencing off, of trees being retained and the phasing of construction activities being staggered.

Material Assets – Traffic and Transportation – The construction of the internal road network and provision of the vehicular access from Greenfields Road will result in landscape and visual impacts. As described in the EIAR Chapter 3, the lands are situated within an evolving landscape both in terms of the delivery of other housing projects and the urban expansion of Ballincollig.

Cultural Heritage – The altering of the landscape character of the site including earthworks, tree/plant removal and the setting of the replacement/supplementary planting regime may potentially impact currently undiscovered archaeology features. However as detailed in Chapter 9 (Cultural Heritage) geophysical survey and archaeological testing has taken place at the site and no archaeological finds or features were identified. Ballincollig Castle is situated approximately 400 metres east of the site. The Landscape & Visual Impact Assessment concludes that the impact of the proposed development on the setting of the Castle will be not significant/neutral.

Land and Soils – Bulk excavations will be required for the installation of foundations, service trenching and proposed landscaping measures. This will result in a permanent relocation of soil and subsoil. The excavations and earthworks during the construction phase will result in interactions with the existing landscape. The CEMP describes a suite of mitigation measures including stripped topsoil being re-used and incorporated within the landscaping strategy and features of the development to be delivered during the construction phase.

14.3.1.2 Operational Phase

During the operational phase of the development potential interactions are.

Population and Human Health/Traffic & Transport– The proposed development would deliver a large new residential neighbourhood providing a mix of housing along with amenity, community and physical infrastructure - as well as access to the facilities, services and amenities provided by the self-sustaining town of Ballincollig. The related change to landscape character, i.e. the planned expansion and consolidation of the urban area, public realm/road upgrades would have significant positive population and human health benefits (by providing homes offering a high level of residential amenities).

Biodiversity – The proposed development would largely retain the site’s key landscape elements/features, the hedgerows and hedgerow trees. As well as being of landscape and visual amenity value, these are important habitats, and their retention and protection, along with extensive new planting throughout the new neighbourhood, would have biodiversity benefits.

Material Assets – Services /Water/Land and Soils – The proposed landscape strategy seeks to capitalise on the site-specific context as a visual and recreational amenity. The landscape strategy for the site also incorporates natural drainage and Sustainable Urban Drainage (SUDs) measures, reflecting a positive integrated approach between the sites landscape, servicing and ecological strategies.

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Cultural Heritage – As stated previously, Ballincollig Castle is situated approximately 400 metres east of the site. However as detailed in Chapters 3 and 9 of this EIAR, the proposed layout and form of development will not negatively impact the setting of Ballincollig Castle or any other cultural heritage assets in the area.

Climate/Air Quality – The incorporation of walking and cycling routes within the sites landscape and connectivity strategies and the extensive replacement and supplementary planting proposals will enhance the local climate and air quality of the local area.

Potential impacts of landscape have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

14.3.2 Material Assets – Traffic & Transportation

14.3.2.1 Construction Phase

Chapter 4 of this EIAR assesses traffic and transportation impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with traffic/transportation impacts.

Population and Human Health – Construction traffic has potential to result in temporary negative impacts on local residents, businesses, schools and other uses in area by way of increased traffic volumes. The proposed upgrades of the proposed footpath and public sewer upgrades may result in some traffic disruption for a short period. As detailed in this document, the CEMP and CTMP which are both appended to this EIAR outline a suite of mitigation measures and traffic management measures for construction phase traffic.

Noise and Vibration - Construction traffic may give rise to local noise and vibration which may have an impact on the amenity of local residents and businesses.

Air Quality and Climate - Emissions from construction traffic may result in a decrease in local air quality. Increased greenhouse gas emissions from construction traffic may contribute to climate change.

Water (Hydrology and Hydrogeology) – In the absence of appropriate mitigation measures, construction vehicles at the site may give rise to hydrocarbon spills and other pollutants, potentially impacting on local water quality. However, with the proposed suite of mitigation measures detailed in the CEMP, no significant interactions are envisaged.

Land and Soils – Site excavations and earthworks will require HGV's, heavy machinery and vehicles to access the site during the construction phase. Increased traffic associated with the construction works would have the effect of compacting existing subsoil layers within the site. In the absence of appropriate construction management mitigation procedures, the regular movement of heavy machinery and plant to and from the site would also result in an increased risk to the integrity of the surrounding road network, as well as facilitating the unwelcome transfer of mud and dust to surrounding access routes. However, with the mitigation measures and traffic management measures proposed in the CEMP and CTMP, it is predicted that any interactions will not be significant, with any negative interactions being slight and short term.

Biodiversity – Any vehicular spillages or incidents resultant from refuelling on site would result in negative impacts on biodiversity. However, with the suite of mitigation and construction management measures identified in the CEMP, which will prioritise the minimisation of any potential negative impacts on existing ecology, it is not considered likely that there will be any significant interactions.

Material Assets – Services, Infrastructure & Utilities – During construction, interactions between Material Assets and traffic /transportation, may include road openings to install project utilities.

Landscape

14.3.2.2 Operational Phase

During the operational phase of the development potential interactions are.

Population and Human Health – Once operational the proposed development will result in increased traffic volumes accessing the site and on the surrounding road network. The proposed urbanisation of Greenfields Road and new junctions will likely slow-down of traffic speed. Users of the local road network may experience increased delays in car journeys. However, it is considered that the proposed footpath on Greenfields Roads and the delivery of the first section of the MUEA Sustainable Access Corridor will represent significant asset to the wider area facilitating walking and cycling as viable modes of travel. The proposed first section of the MUEA Sustainable Access Corridor can also accommodate any potential future public transport corridor which may serve the subject lands and the wider Maglin Urban Expansion Area.

Noise and Vibration – The proposed increase in traffic volumes during the operational phase of the development may result in some instances of local noise and vibration effecting the amenity of neighbouring properties and future residents of the development. In the context of the existing noise environment, as detailed in Chapter 10, the overall contribution of traffic is not considered to pose any significant impact to nearby residential locations. The resulting residual effect is neutral to negative, imperceptible to not significant, and long-term.

Air Quality – There is the potential for traffic emissions to impact air quality in the short-term over the construction phase, particularly due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed, and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the TII scoping assessment criteria in Chapter 11 of the EIAR. It can therefore be determined that the construction stage traffic will not be significant.

Climate - The increase in traffic volumes in the area resultant from the proposed development will impact the local climate. However, the predicted overall magnitude of the changes on climate will not be significant.

Water (Hydrology and Hydrogeology) - Increased traffic and parking at the site may give rise to hydrocarbon spills from vehicles. However, with the proposed mitigation measures outlined in the CEMP, it is not predicted such instances will occur.

Landscape – The proposed works to Greenfields Road and the MUEA Sustainable Access Corridor will result in interactions between landscape and traffic and transport impacts. As detailed in EIAR Chapter 3, the evolution of the landscape of the Ballincollig area is evolving in accordance with zoning objectives in the Cork City Development Plan providing for residential development, schools, recreational green routes and road infrastructure upgrade and the proposed development is in accordance with the evolving development context of the area.

Potential impacts of Material Assets – Traffic have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

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14.3.3 Material Assets – Services, Infrastructure and Utilities

14.3.3.1 Construction Phase

Chapter 5 of this EIAR assesses servicing impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with 'Material Assets – Services, Infrastructure and Utilities' impacts.

Population and Human Health – Potential impacts on existing services such as water, communications, electrical infrastructure resultant from connections from the proposed development to existing local services. However, with the proposed mitigation measures outlined, it is not expected that these impacts will be significant.

Material Assets – Traffic and Transportation - During construction, interactions between Material Assets and traffic / transportation include necessary periods of road openings to deliver utilities. During these times minor local traffic management measures will be implemented, resulting in slight temporary negative impacts. As referenced previously, the CEMP and CTMP detail the management of construction traffic matters. Due to the nature of the proposed development and that the majority of the utilises/service infrastructure is being delivered within the development site, it is not considered that there will be significant inconveniences caused or interactions between Material Assets and traffic /transportation considerations.

Water (Hydrology and Hydrogeology) - Works to provide connections to utilities and services, such as foul and surface water sewer, may have negative impacts on groundwater if spills of fuels or other contaminants occur. Stockpiling of materials or works may to drainage system may lead to temporary localised flooding if drains become blocked. However, with the mitigation measures proposed in the CEMP, it is predicted that any interactions will not be significant and temporary in nature.

Landscape/Land and Soils - The necessary earthworks/excavations to facilitate the proposed development will result in the permanent change of the existing landscape setting. Visual impacts during the construction will be mitigated through appropriate site management measures and work practices including the fencing off, of trees being retained and the phasing of construction activities being staggered to minimise negative impacts.

Biodiversity – During construction, in the absence of appropriate mitigation measures the necessary works to accommodate service infrastructure including vegetation removal, earthworks/excavation and refuelling on site may result in the displacement, deterioration or destruction of habitats, flora/fauna species and European sites As detailed in EIAR Chapter 8, with the proposed mitigation measures in place, any negative impacts will be localised and restricted to the development site during construction. A Natura Impact Assessment has also been prepared with respect of the proposed development (appended to Chapter 8) which concludes that no significant adverse effects arising from the proposed development are likely to occur in relation to the Natura 2000 sites.

Noise and Vibration – The implementation of service infrastructure and utilities may result in noise and vibration emissions during construction. The mitigation measures stated in the CEMP and EIAR Chapter 10, will mitigate any potential negative impacts relating the noise and vibration interactions during construction.

Air Quality and Climate - In the absence of appropriate mitigation measures, the installation of material assets including necessary excavation works and connections may result in temporary nuisances such as dust emissions which would negatively impact on air quality. However, with the proposed suite of mitigation and monitoring measures enforced, it is predicted that any negative impacts/interactions relating to air quality/climate will not be significant and temporary in nature.

14.3.3.2 Operational Phase

During the operational phase of the development potential interactions are.

Water (Hydrology and Hydrogeology) – Due to the increase in population generated from the proposed development and mixed-uses including the creche and community/commercial units, there will be increased demand for local water services. As referenced previously, Irish Water have confirmed via a Statement of Design Acceptance, that there will be capacity in the local water network to facilitate the proposed development.

Biodiversity– During the operational phase, in the absence of appropriate mitigation measures, potential negative interactions may occur including the potential disturbance to bats arising from artificial light spillage from the proposed public lighting scheme. Other potential interactions include impacts with European designated sites, resultant from the service/ water infrastructure proposed and the permeant displacement, deterioration, or destruction of habitats. It is predicted in EIAR Chapter 8, that the proposed development/servicing proposals will result in no significant negative impacts relating to biodiversity. A Natura Impact Assessment has been prepared with respect of the proposed development (appended to Chapter 8) which concludes that no significant adverse effects arising from the proposed development are likely to occur in relation to the Natura 2000 sites.

Landscape – The proposed utility/servicing proposals will result in an altered landscape with public lighting and proposed tree/ vegetation planting having an interdependency. The proposed public open spaces will be served by public lighting resulting in more useable communal areas of the development. The landscape strategy for the site also includes the provision of a variety of open spaces and recreational areas which have been incorporated within the sites drainage/SUDs strategies.

Population and Human Health – Interactions between population and human beings and material assets during the operational phase of the development will include the generation of effluent and sanitary waste and result in the increase in water demand and service infrastructure including telecommunications. Irish Water have confirmed, via a Statement of Design Acceptance that there will be sufficient capacity to accommodate the proposed development.

Potential impacts of Material Assets – Services have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

14.3.4 Land, Soils & Geology

14.3.4.1 Construction Phase

Chapter 7 of this EIAR assesses 'Land, Soils & Geology' impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Land, Soils & Geology impacts.

Population and Human Health – In the absence of appropriate mitigation measures, construction activities including construction traffic, demolition and site clearance/excavations may result in increased dust and noise levels in the locality as well as potential soil contamination interacting with population and human beings. Hydrocarbons will be used onsite during construction.

Water (Hydrology and Hydrogeology) - management of soil (stripping and storage) will interact with surface water quality in terms of potential soil erosion and siltation of the receiving surface water environment. The risk of soil contamination from hydrocarbons also presents a risk to the groundwater and surface water environments.

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Biodiversity - The proposed development provides for site clearance, rock breaking excavations, earthworks and tree/hedgerow removal which may result in disturbance/displacement of existing habitats/flora during the construction phase.

Cultural Heritage - There may be an impact to Cultural Heritage and Archaeology if previously undiscovered sub-surface remains are damaged or destroyed during site clearance and/or construction.

Air Quality - Fugitive dust emissions from the management of soils (stripping and storage) could affect air quality locally. Removal of excess soils and importation of quarry products will increase emissions from HGVs, affecting air quality locally.

Material Assets – Traffic and Transportation – The reprofiling of the site will require the removal of excess topsoil offsite, increasing HGV traffic and noise locally. The importation of concrete and aggregate will also increase HGV traffic and noise locally.

Landscape - The necessary earthworks/excavations to facilitate the proposed development will result in permanent changes to the existing landscape setting of the site. Soil and bedrock excavations will be required for site levelling, the installation of foundations, service trenching and proposed landscaping measures reflecting interactions between both areas. This will result in a permanent relocation of soil and subsoil at most excavation locations. The CEMP describes a suite of mitigation measures including stripped topsoil being re-used and incorporated within the landscaping strategy and features of the development to be delivered during the construction phase.

Material Assets – Services, Infrastructure and Utilities – To accommodate in the installation of utilities and service infrastructure during construction land excavations, site clearance/excavations. However, with the proposed mitigation measures to be enforced, it is not predicated that there will be significant negative interactions.

Noise & Vibration – The reprofiling of the site using large plant will increase noise levels during the construction stage. Much of this work will be completed with excavators, but rock breaker may be required in some of the deeper excavations.

14.3.4.2 Operational Phase

During the operational phase of the development potential interactions are.

Landscape - The proposed landscape strategy responds to the site's topography, with cut and fill generated from the site utilised elsewhere in the development where possible and incorporated into the landscape strategy for the site. The proposed landscape strategy seeks to respond to the site-specific context including by utilising appropriate areas for public open space and incorporating Sustainable Urban Drainage (SUDs) where appropriate.

Population and Human Health – It is not considered that there will be significant interactions between population/human health and land and soils during the operational phase.

Potential impacts of Land and Soils have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts are predicted.

14.3.5 Water (Hydrology and Hydrogeology)

14.3.5.1 Construction Phase

Chapter 7 of this EIAR assesses Water (Hydrology and Hydrogeology) impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Water (Hydrology and Hydrogeology) impacts.

Population and Human Health – In the absence of appropriate mitigation measures, any negative impacts or contamination affecting local watercourses or water supply could result in negative impacts relating to human health. Other potential health effects are associated with flooding. The proposed site design and mitigation measures ensures that the potential for impacts on the water environment is not significant.

Material Assets – Services, Infrastructure & Utilities – In the absence of appropriate mitigation measures, works to provide connections to utilities and services such as foul and surface water, may have negative impacts on groundwater if spills of fuels or other contaminants occur.

Biodiversity – Any negative impacts affecting water quality during construction activities may result in negative impacts on local biodiversity and wildlife. These include potential surface water run-off/discharge, wastewater/foul effluent from construction activities impacting the Cork Harbour SPA and Great Island Channel SAC and local watercourses. Chapter 8 of the EIAR (Biodiversity), predicts that with the proposed mitigation and monitoring measures in place, that there will be no significant negative interactions between biodiversity/ecology and Water (Hydrology & Hydrogeology) impacts.

Land and Soils – The thickness of soil over the bedrock aquifer informs the vulnerability ranking. Reprofiling of the site topography requires the removal of soil which will increase the aquifer vulnerability. Management of soil (stripping and storage) will interact with surface water quality in terms of potential soil erosion and siltation of the receiving surface water environment. However, it is predicted that with the suite of relevant mitigation measures proposed in the CEMP and this EIAR that there will be no significant interactions.

14.3.5.2 Operational Phase

During the operational phase of the development potential interactions are.

Population and Human Health – Increased demand for local water services. As referenced previously, Irish Water have confirmed via a Statement of Design Acceptance, that there will be capacity in the local water network to facilitate the proposed development.

Biodiversity – Any potential contamination of the western boundary watercourse and other watercourses in the area may result in negative effects on local biodiversity and wildlife.

Potential impacts of Water (Hydrology) have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

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14.3.6 Biodiversity

14.3.6.1 Construction Phase

Chapter 8 of this EIAR assesses Biodiversity impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Biodiversity impacts.

Material Assets – Services/Water – Any negative impact on water quality arising from accidental spillages may impact local biodiversity.

Material Assets – Traffic and Transportation –. Any vehicular spillages or incidents resultant from refuelling on site would result in negative impacts on biodiversity. However, with the suite of mitigation and construction management measures identified in the CEMP which prioritises the minimisation of potential negative impacts on existing ecology, it is not considered likely that there will be any significant interactions between biodiversity and traffic and transportation impacts during the construction phase.

Land and Soils/Landscape – The proposed site excavations/groundworks and removal of existing trees/grassland will result in the disturbance of existing habitats.

Noise and Vibration – Noise and vibration resultant from the construction phase may result in the disturbance of local habitats.

Air Quality and Climate – As detailed in EIAR Chapter 10, demolition and earthworks during construction phase present a risk of ecological impacts prior to mitigation measures being adopted. The dust emission magnitude from construction associated with the proposed development works can be classified as large. It is predicted that the proposed mitigation measures identified in the CEMP including dust management procedures will mitigate any significant negative interactions during construction.

14.3.6.2 Operational Phase

During the operational phase of the development potential interactions are.

Material Assets – Services/Water – In the absence of appropriate mitigation measures, the proposed development may result in negative impacts on local flora/fauna/habitats. The sites drainage strategy provides for natural drainage and SUDS measures which can provide opportunities for biodiversity enhancement. Mitigation measures include the provision of appropriate public lighting conducive with bats in the vicinity of the site.

Potential impacts of Biodiversity have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

14.3.7 Cultural Heritage

14.3.7.1 Construction Phase

Chapter 9 of this EIAR assesses Cultural Heritage impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Cultural Heritage impacts.

Land & Soils/Landscape – In the event an archaeological discovery is found during construction phase, archaeological investigations will take place which may have knock on effects relating the proposed land use/landscape of the scheme.

14.3.7.2 Operational Phase

Landscape - As stated previously, Ballincollig Castle is situated approximately 400 metres east of the site. However as detailed in Chapters 3 and 9 of this EIAR, the proposed layout and form of development will not negatively impact the setting of Ballincollig Castle or any other cultural heritage assets in the area.

Potential impacts of cultural heritage and archaeology have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

14.3.8 Noise & Vibration

14.3.8.1 Construction Phase

Chapter 10 of this EIAR assesses Noise and Vibration impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Noise and Vibration impacts.

Population and Human Health - Increased levels of noise and vibration during construction activities may result in negative impacts to the amenity of local residents. Noise and vibration sources from construction phase include demolition and piling, site clearance and ground preparation works and general construction activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum as far as practicable. For the duration of the construction period, construction noise impacts will be short-term and negative, depending on the proximity of the works to the site boundary.

During site clearance the residual effect is negative, significant to very significant and temporary noise impact at distances up to 10m for NSL01, NSL02 and NSL04 if all plant items were assumed to work simultaneously while adjacent to the closest boundary to the site. In line with DMRB Noise and Vibration (UKHE 2020) document, a significant effect relating to construction noise is deemed to occur where a moderate or major impact is likely to occur for a period of greater that 10 days/nights over 15 consecutive day/nights, or greater than 40 days over 6 consecutive months. In the case of this activity, it is unlikely the durations will be exceeded and hence the overall residual effect is categorised as negative, moderate and temporary. At all other NSLs at distances of 20m and greater the CNT would not be exceeded and the residual significance of effect and is negative, slight to moderate and temporary.

During super structure, compounds and landscaping the residual effect is negative, not significant to moderate and temporary at all NSLs (greater than 10m from works) during all phases of the construction.

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Material Assets – Services, Infrastructure & Utilities – The installation of utilities and services during construction may result in some interactions with noise and vibration emissions. However, with the proposed mitigation measures enforced it is not predicted that any significant interactions will take place during construction.

Material Assets – Traffic and Transportation –Noise and vibration generated from plant machinery and HGV movements may give rise to nuisances impacting the amenities of residents and businesses. It is predicted that with the proposed suite of mitigation measures, including the Construction Traffic Management Plan and CEMP, that the interactions between construction traffic and noise and vibration will not be significant and short term in nature.

Air Quality and Climate – Emissions such as dust and other nuisances may arise as a result of noise and vibration occurrences during construction, negatively impacting the local air quality and microclimate. However, it is not predicted that these interactions will result in any significant impacts given the mitigation measures proposed during construction regarding these areas.

Biodiversity – Noise and Vibration during construction may result in disturbance of flora/fauna and existing habitats during construction working hours.

14.3.8.2 Operational Phase

During the operational phase of the development potential interactions are.

Population and Human Health – The sites southern boundary is situated adjacent to the N22 national primary road. As detailed in Chapter 10 of this EIAR, the inward impact assessment has identified that units in the vicinity of the sites boundary with the N22 will achieve suitable internal noise levels with standard double glazing and the inclusion of a 2.5m high boundary solid screen (either by use of walls, proprietary timber noise barrier, earth berms or a combination of these elements, once a 2.5m height from existing topography to top of barrier is achieved) to the south the site boundary overlooking the N22. The resultant residual inward noise effect will be of neutral, not significant and long term.

Material Assets – Traffic and Transportation – As detailed in EIAR Chapter 10, the main potential sources of outward noise from the development during the operational phase is from additional traffic on surrounding roads, deliveries and waste collections.

Potential impacts of Noise & Vibration have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

14.3.9 Air Quality

14.3.9.1 Construction Phase

Chapter 11 of this EIAR assesses Air Quality impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Air Quality impacts.

Population and Human Health – Population and Human Health and Air Quality. An adverse air quality impact during the construction phase can cause health and dust nuisance issues. There is a low risk of dust-related human health impacts during the construction phase of the proposed development. Best practice mitigation measures will be implemented during the construction phase to ensure that the impact of the proposed development complies with all ambient air quality legislative limits. Therefore, the predicted impact is direct, short-term, negative, localised and not significant with respect to Population and Human Health during the construction phase.

Climate - Air Quality and Climate have interactions as the emissions from the burning of fossil fuels during the construction and operational phases generate both air quality and climate impacts. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

Land & Soils - Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between Air Quality and Land & 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 land and soils during the construction phase.

Biodiversity – Dust generation can occur during extended dry weather periods due to construction traffic along haul routes and construction activities such as excavations and infilling works. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability as well as other effects. There are no designated ecological sites within 250 m of the proposed development site area. Significant dust impacts are not predicted beyond this distance. Dust mitigation measures will be implemented on site as set out in Section 11.7. With the implementation of these mitigation measures dust emissions will be minimised and impacts will be direct, short-term, negative, localised and not significant with respect to biodiversity.

Material Assets – Traffic – 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 roads close to the site. In this assessment, the impact of the interactions between Traffic and Air Quality are linked but there is no potential for significant impacts from traffic on air quality. The effects are considered to be direct, short-term, neutral, localised and not significant during the construction phase.

Noise and Vibration – Emissions such as dust and other nuisances may arise as a result of noise and vibration occurrences during construction, negatively impacting the local air quality and microclimate. However, it is not predicted that these interactions will result in any significant impacts given the mitigation measures proposed during construction regarding these areas.

14.3.9.2 Operational Phase

During the operational phase of the development potential interactions are.

Population and Human Health /Material Assets – Traffic – Vehicles accessing the site will emit pollutants which may impact Air Quality and Human Health. However, the increased number of vehicles associated with the proposed development will not cause a significant change in air pollutant emissions in the locality. It has been assessed that emissions will be in compliance with the ambient air quality standards which are set for the protection of human health. Impacts will be long-term, localised, direct, negative and not significant. The operational phase of the development will result additional vehicular traffic in the area potentially resulting in an increase in emissions and negative impact on local air quality. However, the provision of pedestrian and cycle upgrades on Greenfields Road, the delivery of internal walkways, greenways and the MUEA Sustainable Access Corridor will provide significant benefits to the local population and provide for enhanced opportunities for sustainable modes of travel.

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Climate - Air Quality and Climate have interactions as the emissions from the burning of fossil fuels during the construction and operational phases generate both air quality and climate impacts. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

Potential impacts on Air Quality have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

14.3.10 Climate

14.3.10.1 Construction Phase

Chapter 12 of this EIAR assesses Climate impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Climate impacts.

Population and Human Health/ Material Assets – Traffic – Increased greenhouse gas emissions from construction traffic may contribute to climate change. The effects of the proposed development on climate are assessed by reviewing the change in annual average daily traffic on roads close to the site. In this assessment, the effects of the interactions between traffic and climate are considered to be direct, short-term, negative and not significant during the construction phase.

Waste management measures will be put in place to minimise the amount of waste entering landfill, which has higher associated embodied carbon emissions than other waste management such as recycling. The effect of the interactions between waste and climate are considered to be direct, short-term, negative and not significant during the construction phase.

Land, Soils, Geology and Hydrology - The impact of flood risk has been assessed and the surface water drainage network will be designed to cater for increased rainfall in future years as a result of climate change. The effect of the interactions between climate and land, soils, geology and hydrology are *direct, short-term, negative* and *imperceptible* during the construction phase which is overall not significant in EIA terms.

Air Quality - Air quality and climate have interactions due to the emissions from the burning of fossil fuels during the construction and operational phases generating both air quality and climate impacts. Air quality modelling outputs are utilised within the Climate Chapter. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

14.3.10.2 Operational Phase

During the operational phase of the development potential interactions are.

Population and Human Health/ Material Assets – Traffic – The increase in traffic volumes in the area resultant from the proposed development will impact the local climate. However, the predicted overall magnitude of the changes on climate will not be significant. The incorporation of walking and cycling routes within the sites landscape and connectivity strategies and the extensive replacement and supplementary planting proposals will enhance the local climate and air quality of the local area. Waste management measures will be put in place to minimise the amount of waste entering landfill, which has higher associated embodied carbon emissions than other waste management such as recycling. The effect of the interactions between waste and climate are considered to be direct, long-term, negative and not significant during the operational phase, which is overall not significant in EIA terms.

Air Quality - Air quality and climate have interactions due to the emissions from the burning of fossil fuels during the construction and operational phases generating both air quality and climate impacts. Air quality modelling outputs are utilised within the Climate Chapter. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

Potential impacts on Climate have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts/interactions are predicted.

14.3.11 Population and Human Health

14.3.11.1 Construction Phase

Chapter 13 of this EIAR assesses Population and Human Health impacts resultant from the proposed development. During the construction phase of the proposed development, in the absence of the effective implementation of appropriate mitigation measures, the following aspects may give rise to potential interactions with Population and Human Health impacts.

Air Quality and Climate – In the absence of appropriate mitigation measures the construction phase of the proposed development may result in some temporary negative impacts on air quality and microclimate including noise, vibrations, dust and emissions from construction vehicles. It is considered that the proposed mitigation measures detailed in this EIAR and the project CEMP will ensure that these impacts will not be significant.

Landscape – The construction phase of the project will result in the evolution of the local landscape and the existing visual character of the area.

Material Assets – Traffic and Transportation – Construction traffic has potential to result in temporary negative impacts on local residents, businesses, schools and other uses in area by way of increased traffic volumes. The proposed upgrades to Greenfields Road including the implementation of the proposed footpath and public sewer upgrades may result in some traffic disruption for a short period. As detailed in this document, the CEMP and CTMP which are both appended to this EIAR outline a suite of mitigation measures and traffic management measures for construction phase traffic.

Material Assets – Services - Potential slight and temporary negative impacts on existing services such as water, communications, electrical infrastructure resultant from connections, may occur from the proposed development to existing local services. The implementation of the proposed surface water/foul sewer upgrades to serve the development may result in some temporary disruption to the operations of the Greenfields Road and local road network.

Land and Soils - In the absence of appropriate mitigation measures, potential negative construction related impacts affecting human health include contamination of soils through construction activity from spillages. However, with the mitigation measures proposed being enforced to reduce and/or avoid these potential impacts, and to address any potential waste soil management issues.

Water (Hydrology and Hydrogeology) – In the absence of appropriate mitigation measures, any negative impacts or contamination affecting local watercourses or water supply could result in negative impacts relating to human health.

Noise and Vibration - Increased levels of noise and vibration during construction activities may result in negative impacts to the amenity of local residents. Noise and vibration sources from construction phase include demolition and piling, site clearance and ground preparation works, general construction activities. The application of binding noise limits and hours

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of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum as far as practicable. For the duration of the construction period, construction noise impacts will be short-term and negative, depending on the proximity of the works to the site boundary.

14.3.11.2 Operational Phase

During the operational phase of the development potential interactions are.

Landscape - Potential temporary impacts to visual amenity in the area as a result from construction works, include the necessary removal of existing trees, construction traffic and earthworks. The construction phase of the development provides for mitigation/replacement planting which will mitigate the long-term impacts of the removal of existing vegetation and land cover.

Air Quality and Climate/Noise and Vibration – During the operational phase the proposed residential, retail, and creche uses may result in impacts on local noise and air quality resultant from matters including additional traffic in the area and an increase of population. Due to the sites location within the defined boundary of the Ballincollig Urban Expansion Area and the variety of existing land-uses in the sites immediate vicinity, it is not considered that these impacts will be significant and are consistent with the urbanisation of the area as outlined in the Cork City Development Plan.

The sites southern boundary is situated adjacent to the N22 national primary road. As detailed in Chapter 10 of this EIAR, the inward impact assessment has identified that units in the vicinity of the sites boundary with the N22 will achieve suitable internal noise levels with standard double glazing and the inclusion of a 2.5m high boundary solid screen (either by use of walls, proprietary timber noise barrier, earth berms or a combination of these elements, once a 2.5m height from existing topography to top of barrier is achieved) to the south the site boundary overlooking the N22. The resultant residual inward noise effect will be of neutral, not significant and long term.

Material Assets – Traffic and Transportation - Once operational the proposed development will result in increased traffic volumes accessing the site and on the surrounding road network. The proposed urbanisation of Greenfields Road and new junctions will likely slow-down of traffic speed. Users of the local road network may experience increased delays in car journeys. However, it is considered that the proposed footpath on Greenfields Roads and the delivery of the first section of the MUEA Sustainable Access Corridor will represent significant asset to the wider area facilitating walking and cycling as viable modes of travel. The proposed first section of the MUEA Sustainable Access Corridor can also accommodate any potential future public transport corridor which may serve the subject lands and the wider Maglin Urban Expansion Area.

Material Assets – Services, Infrastructure & Utilities – The proposed development will result in additional demand for local water and services infrastructure. As referenced previously, Irish Water have confirmed via a Statement of Design Acceptance, that there will be capacity in the local water network to facilitate the proposed development.

Potential impacts on Population and Human Health have been assessed and considered within each chapter/discipline of this EIAR. With the proposed mitigation measures in place, no significant residual negative impacts are predicted.

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14.4 Summary of Significant Interactions

Table 14.1 Potential Interaction of Effects Matrix (Con = Construction, Op= Operational. If there is considered to be no potential for an effect, the box is left blank.)

Interaction	Landscape	Material Assets – Traffic & Transport	Material Assets – Services, Infrastructure & Utilities	Land & Soils	Water (Hydrology & Hydrogeology)	Biodiversity	Noise & Vibration	Cultural Heritage	Air Quality	Population & Human Health	Climate
Landscape		Op	Con & Op	Con & Op	-	Con	-	Con & Op	-	Con & Op	-
Material Assets – Traffic & Transport	Con & Op		Con	Con	-	Con	Con & Op	-	Con & Op	Con & Op	Con & Op
Material Assets – Services, Infrastructure & Utilities	Con & Op	Con		Con	Con	Con & Op	Con		-	Con & Op	-
Land, Soils & Geology	Con & Op	Con	Con		Con	Con	-	Con	Con	Con	Con
Water (Hydrology & Hydrogeology)	Con & Op	Con & Op	Con & Op	Con		Con & Op	-	-	-	Con	Con
Biodiversity	Con & Op	Con	Con & Op	Con	Con & Op		Con	-	Con	-	-
Noise & Vibration	-	Con & Op	Con	Con	-	Con		-	Con	Con & Op	-
Cultural Heritage	Con & Op	-	-	Con	-	-	-		-	-	-
Air Quality	Op	Con & Op	Con	Con	-	Con	Con	-		Con & Op	Con & Op
Population & Human Health	Con & Op	Con & Op	Con & Op	Con	Con & Op	-	Con & Op	-	Con & Op		Con & Op
Climate	Op	Con & Op	Con	-	-	Con	Con	-	Con & Op	Con & Op	

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CHAPTER FIFTEEN

SUMMARY OF MITIGATION & MONITORING MEASURES

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CHAPTER FIFTEEN

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CHAPTER 15 | Summary of Mitigation & Monitoring Measures

15.1 Introduction

15.1.1 Chapter Author

This Chapter has been prepared by Harry Walsh, (BA HONS, Master of Regional and Urban Planning, MIPI), Director at HW Planning.

15.1.2 Chapter Context

The 2022 EPA Guidelines regarding information to be contained in EIAR's, identifies the following strategies for the mitigation of effects.

Mitigation by Avoidance: Avoidance, usually referring to strategic issues – such as site selection, site configuration or selection of process technology - is generally the fastest, cheapest and most effective form of effect mitigation. Environmental effects and the consideration of alternatives need to be taken into account at the earliest stage in the site / route selection and project design processes. For example, the realignment of a transport corridor to avoid residential property, avoid habitat destruction or to reduce agriculture severance, etc. In many situations, mitigation by avoidance may be viewed as part of the 'consideration of alternatives'.

Mitigation by Prevention: This usually refers to technical measures. Where a potential exists for unacceptable significant effects to occur (such as noise or emissions) then measures are put in place to limit the source of effects to a permissible and acceptable level. Examples include the specification of process technology standards or building design to minimise height or contrasts of materials. Prevention measures are also put in place to prevent the effects of accidental events from giving rise to significant adverse effects. The installation of a fire-water retention basin is an example of mitigation against such risk by prevention.

Mitigation by Reduction: This is a very common strategy for dealing with effects which cannot be avoided. It tends to concentrate on the emissions and effects and seeks to limit the exposure of the receptor. It is generally regarded as the 'end of pipe' approach because it tends not to affect the source of the problems. As such this is regarded as a less sustainable, though still effective, approach.

Mitigation by Offsetting: This is a strategy used for dealing with significant adverse effects which cannot be avoided, prevented or reduced. It includes measures to compensate for adverse effects.

15.2 Mitigation & Monitoring Measures Proposed

15.2.1 Landscape & Visual

15.2.1.1 Construction Phase - Mitigation Measures

- Full implementation of the hedgerow and tree protection measures recommended in the Tree Survey by County Tree Care Ltd

15.2.1.2 Operational Phase - Mitigation Measures

No operational mitigation measures recommended.

15.2.2 Material Assets – Traffic & Transportation

15.2.2.1 Construction Phase - Mitigation Measures

A Construction and Environmental Management Plan (CEMP) has been prepared (Appendix 2-1) by the Applicants to ensure that proper procedures are put in place to minimise the impact of the construction stage on public roads and the surrounding environment in general. This CEMP is being submitted as part of this Planning Application to Cork City Council, which includes, inter alia, indicative phasing of the works, hours of operation, a traffic management plan, noise and dust mitigation measures etc. A Construction Manager will be appointed to liaise directly with the various sections of Cork City Council and develop the plan as required.

The construction management plan will take into account construction vehicle routing and timing to mitigate any issues with vehicles on public roads. The development will be progressed in phases to further manage the construction traffic:

The following mitigation measures shall be provided to minimise the impacts to the public road network during the construction phase:

- Good construction management practices will be employed such as fencing the site off from the public and neighbouring sites, adequate external/internal signage, secure internal site offices, dedicated construction access points all to facilitate the safety of construction staff and the public;
- Appropriate levels of staff parking and compounding will be provided to ensure no potential overflow or haphazard parking in the area. The site will be able to accommodate employee and visitor parking throughout;
- Set construction traffic routes to and from the site will be agreed with Cork City Council prior to the commencement of construction activities on site. Where necessary the time of day permittable for such routes will also be agreed upon and outside of the morning/evening peak hours;
- Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive on the street pavements;
- Wheel washers / judder bars will be placed at all site access points to minimise the migration of detritus onto the public roads. The roads will be inspected and cleaned on a regular basis; and
- Haul vehicles will be covered after loading to ensure there is no risk of construction material falling.

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15.2.2.2 Operational Phase – Mitigation Measures

Proposed Infrastructure under Proposed Development

The proposed road works under proposed development are illustrated in Appendix 4B. The works provide dedicated walking and cycling facilities from the development access to Greenfields Road. Additionally, two uncontrolled crossings and one signalised crossing will be constructed on Greenfields Road to provide safe crossing points for pedestrian and cyclists. Moreover, another two uncontrolled crossings will be provided on the New Link Road.

The proposed design took cognisance of the Design Manual for Urban Roads and Streets (DMURS). At the site entrances to the proposed development, priority will be given to pedestrian and cyclists. Raised areas at the site entrances will indicate priority for crossing pedestrians and cyclists. Corner radii have been reduced to shorten crossing points for pedestrians and slow vehicles further when making turning manoeuvres. The proposed footpaths tie in with existing footpaths on Greenfields Road.

The dedicated segregated cycle track will provide cyclists with a 2m wide one-way cycle track on both sides of the New Link Road and 3m wide two-way cycle track on the southeast side of Greenfields Road (adjacent to the site). The proposed road works will also tie-in to the proposed greenway route (BC-GW4) as mentioned in Section 4.3.5.4. Additionally, the proposed development will provide a greenway connecting between Greenfields Road and the New Link Road, and shared spaces for pedestrians/cyclists within the site. Dropped kerbs and transition areas will be provided to enable easy and safe access for cyclists to/from the cycle track. Dropped kerbs (where appropriate) and tactile paving have been designed in at the pedestrian crossing points.

The proposed roadworks will encourage a shift to more sustainable modes of transport and provide safer facilities particularly for children walking and cycling to school but also travelling to and from the town centre and beyond.

Maglin Urban Expansion Area

As detailed in Section 4.3.5.2, to accommodate the target population growth in Ballincollig, the Maglin Valley has been designated an urban expansion area, including the provision for a new residential neighbourhood.

Under the Cork City Development Plan 2022-2028, there are several road projects to be developed as part of the Maglin Urban Expansion Area. These off-site infrastructure projects are associated with the proposed number of housing units to be developed in the area. These include upgrading the Killumney Road, providing new link roads, and improving walking and cycling facilities.

After completion of those elements of vehicular infrastructure, it is anticipated that traffic along Killumney Road (i.e. Greenfields Road, Castle Road, Sunningdale, etc.) will reduce.

CMATS

The Cork Metropolitan Area Transport Strategy (CMATS) represents a coordinated land use and transport strategy for Cork Metropolitan Area (CMA). It sets out a framework for the planning and delivery of transport infrastructure and services to support the CMA's development in the period up to 2040.

As part of CMATS, there are a number of improvements to public transport, walking and cycling facilities in the immediate vicinity of the proposed development. The land use distribution chapter of CMATS indicates the proposed development is located adjacent to a proposed residential area.

Further to this, measures are outlined in CMATS to provide appropriate transit options for the proposed residential area. Included in CMATS is an indicative route showing Light Rail along the Killumney Road, just west of the proposed site and a proposed station nearby. BusConnects could be a precursor to Light Rail but either way, this development will be well served by these future public transport services.

Additionally, this development, can support the case for BusConnects/Light Rail along this route by improving its viability due to the potential increase in passengers from this area. These future projects will further assist in the modal shift from private car to public transport, walking and cycling.

Other Measures

A number of measures have been and will be implemented prior to the subject scheme opening which include:

- ***Parking***: All car parking and bicycle parking within the development will comply with the Development Plan. The residential development and non-residential development (i.e. creche and café) have also provide with cycle parking in excess of the Development Plan requirements. Additionally, the proposed development will provide 48 bicycle parking spaces for cyclists using the proposed greenway. This leads to a strong emphasis on bicycle parking, thus reducing the need for private single occupancy vehicles.
- ***Mobility Management Plan (MMP):*** A MMP will be rolled out with the aim of guiding the delivery and management of coordinated initiatives by the scheme promoter. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the developments. Details of the MMP are included in Chapter 4 of this EIAR.

Specific Measures

In order to achieve the long-term objectives and modal split targets, a number of specific measures are proposed to be put in place.

- ***Management of Co-ordination*** - A Mobility Management Plan Co-ordinator will be appointed as part of a residential committee or management agent. This may be a group of keen likeminded people that can assist in promoting. The implementation and management of the MMP will be the responsibility of the Mobility Management Plan Co-ordinator team on site. The role will be to assist in proving travel information and be a point of contact for any travel issues for all events and ensure the MMP is monitored and updated as required. The duties of a Mobility Management Plan Co-ordinator are:
  - » Liaising with Cork City Council and developers in progressing the future measures for the area;
  - » Support the implementation of various schemes aimed at encouraging the use of more sustainable travel methods;
  - » Use noticeboards to keep people up to date with accessible public transport provision, walking/cycling opportunities and available schemes. These can also be used in open spaces for residential information such in local commercial unit; and
  - » Potential to provide residential packs to new residents highlighting the bus routes, walking and cycling routes.

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- ***Car Sharing*** Initial contact has also been made with Go-Car (https://www.gocar.ie/). This is a membership based program where, once you join, you can rent a car or van for as little as an hour and up to a year. The service aims to reduce car dependency by promotion on demand cars near where you live, work and play so you can have a car close to hand should you need one. Once you've signed up you simply book the car you want for the time you need, unlock it using our app/membership card, take the keys from the glovebox and drive it as normal. To finish your booking you just drop the car back to where you picked up. The developer is keen to work with Go-Car to provide 3 spaces in the proposed development to provide this attractive service for residents. This can be reviewed based on usage and further spaces added if it is successful. There are approximately 700 go car locations in Ireland where cars can be collected or dropped with numerous locations in Cork. There are currently 2 go-cars located in Lidl Ballincollig as shown in Figure 4.14.
- ***Cycle/Pedestrian Facilities*** **-** There are a range of walking and cycle facilities in the area with links from the proposed development to these. Additional walking and cycling routes will be provided throughout the development.

15.2.3 Material Assets – Services, Infrastructure & Utilities

15.2.3.1 Construction Phase - Mitigation Measures

A Construction and Environmental Management Plan (CEMP) has been prepared has been appended to this EIAR in Appendix 2-1. The final CEMP, which will include any additional construction phase mitigation measures required pursuant to conditions attached to any grant of permission, along with all measures currently set out in the CEMP, will be implemented in full. Site inductions for all construction staff and sub-contractors aim to ensure all are aware of the procedures and best practices as outlined in the CEMP.

Control measures shall be put in place to protect surface waters from contamination prior to the commencement of any site works. Control measures will also be provided to control surface run-off during the construction phase. These proposed measures follow best practice and are set out in full in the CEMP.

For ease of reference, the principal mitigation proposed in relation to the type of construction activities to facilitate the development of material assets on the site include:

- Surface water shall be directed to settlement ponds where topographically feasible. Where this is not practicable the surface water shall be allowed to percolate to ground and/or be removed by tanker to a designated waste-water treatment plant if excessive build-up of surface water on site occurs.
- Protection of surface water gullies or drains using silt fences
- Use on-site bund structures (including incorporating existing ditches) on site to retain surface waters on site and to prevent runoff from the site.
- Minimal and short-term storage and the removal of excess materials (soil, stones, and construction wastes) off site in an efficient manner.
- Daily checks of surface water regime on site and logging of same.
- Works associated with excavations or earth moving not to be undertaken in periods of forecasted bad weather.
- Drainage channels beside construction roadways to direct surface water to settlement areas and allow for natural percolation to ground.
- Ensure good site management is maintained at all times during the construction phase including regular site clean-ups and use of appropriate bins.
- Chemicals or fuel/oils shall be stored in temporary bunded storage areas and plant is re-fuelled via delivery trucks in specific bunded re-fuelling areas, rather than the storage of large quantities of fuel on site in a designated bunded area.
- The pouring of concrete, application of chemicals, painting or any other activity that has the possibility of being toxic to aquatic life shall be undertaken in a controlled and isolated manner, preventing the possibility of any pathway to a surface water source.

The construction compound will be adequately served regarding foul drainage and water supply for construction staff. Effluent generated on site from the contractors' sanitary facilities will be discharged to a holding tank and removed off site by a licenced removal contractor in accordance with Cork City Council and Uisce Eireann requirements. The potable water supply to the compound shall be agreed between the site contractor and Uisce Eireann and shall be protected from possible contamination by construction activities.

The connection of all proposed utilities to existing infrastructure shall be in accordance with the relevant code of practice as listed below and coordinated by the relevant utility provider. Where the standards and codes below refer to or rely on additional codes, then these additional codes are deemed to apply to these works where they are relevant to the matter under consideration.

- "Code of Practice for Water Infrastructure", Doc No. IW-CDS-5020-03, July 2020 (Revision 2) – Uisce Eireann
- "Code of Practice for Wastewater Infrastructure", Doc No. IW-CDS-5030-03, July 2020 (Revision 2) – Uisce Eireann.
- Wastewater Pumping Stations & Rising Main Doc IW-TEC-800-02
- ESB Networks: "National Code of Practice for the Customer Interface", Doc No. DOC-030303-AEN, April 2021.

Construction Waste generated during the construction phase shall be managed in line with the CEMP "Construction & Demolition Waste Management on Site" Report appended to this EIAR in Appendix 2-1.

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid exceedance of the adopted construction noise threshold values at the nearest NSLs. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

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

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring.

Regular site audits will be undertaken during the construction phase to visually monitor the works and ensure compliance with all measures as set out in the CEMP.

Daily checks of the surface water regime put in place during the construction phase will be undertaken with detailed logs maintained.

Communications with utility providers will be maintained during construction. Supervision of work by the respective utility operator as required will be accommodated during the works.

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15.2.3.2 Operational Phase – Mitigation Measures

All installed assets including watermain, foul, storm and utility services will be and surveyed prior to being made operational. In relation to stormwater assets this will include pressure testing. Uisce Eireann assets (i.e. – foul sewer and watermain) will be tested in accordance with the codes of practice prior to being commissioned by Uisce Eireann. The purpose of this will be to identify any possible defects. Any defects will be made good prior to operation.

Waste generated by the development during operation will be removed by licensed waste contractors only and in accordance with the Operational Waste Management Plan compiled by AWN Consulting. Refer to Appendix 5-4.

Water conservation measures such as the use of low flush toilets and low flow taps will be incorporated into the proposed dwellings to reduce water volumes entering the foul water network. This measure will also reduce the demand on the public water supply.

The proposed storm water drainage system has been designed to cater for all surface water runoff from all hard surfaces within the proposed development including roadways, roofs, parking areas etc.

Surface water generated from the proposed residential development will be conveyed through a proposed surface water network including SuDS measures and an attenuation system on site prior to final discharge at Qbar greenfield run-off rates. Surface water discharge will also pass via a full retention fuel / oil separators (sized in accordance with permitted discharge from the site). Surface water discharge rates from the proposed surface water drainage network will be controlled by a vortex flow control devices (Hydrobrakes or equivalent) The storm water network and attenuation system are designed to accommodate the 100-year return period plus an additional 20% to account for the effects of climate change.

Watermain and foul sewer assets become the property of Uisce Eireann at operational phase and responsibility for same reverts to them. Water usage within the proposed development will be monitored by Uisce Eireann utilising water meters. The monitored water usage will be utilised to locate and isolate any leaks which may develop over time are present within the network.

The relevant service providers regarding power supply and telecommunications will be responsible for monitoring their respective services.

15.2.3.3 Monitoring

The Site Manager will undertake inspections at all outfalls from the construction works. Inspections will be carried out during and following heavy rainfall events. The Site Manager will organise monitoring of surface water quality at monitoring point SW5, as shown on Figure 7-3. Samples will be collected monthly and tested for turbidity and suspended solids. All sample results will be input to a database and compared to baseline monitoring data.

15.2.4 Land Soils & Geology

14.2.4.1 Construction Phase - Mitigation Measures

Measures to be employed during the construction stage to avoid, reduce and minimise the potential impacts on land, soil and geology are:

- A CEWMP has been prepared for the development. This will be updated and finalised prior to the commencement of construction. It is included in Appendix 2-1.
- The stripping of topsoil will be carried out in phases to minimise the areas exposed to wind and rain erosion. Topsoil will be carefully stored for later reuse in landscaping. Best practice will be employed in the stripping and stockpiling of topsoil. This will include:
  - » Careful selection of stockpile locations to: - avoid, as far as practical, double handling of materials; avoid steep slopes; avoid natural overland flow paths of stormwater runoff; provide shelter from the prevailing wind direction.
  - » Blading off the vegetative layer (for separate storage). Vegetation will not be incorporated in the stripped topsoil.
  - » Avoid stripping in inclement wet weather conditions. Wet soils are more difficult to work and handle and it is more likely to damage soil structure in wet conditions.
  - » Avoid extending topsoil stripping into the mineral soil layer.
  - » Limiting height of stockpiles to avoid anaerobic conditions occurring.
  - » Profiling of stockpiles to promote rainwater runoff.
  - » Placement of silt fencing downgradient of stockpiles to catch any fines carried by storm water runoff.
  - » Stockpiles will be allowed vegetate naturally, which will reduce erosion by wind and water.
- Where practical, stripped topsoil will be taken directly to on-site reuse locations for landscaping. It is estimated that 40% of the stripped topsoil will be reused in gardens and green spaces (i.e., 24,320m^3 of topsoil reused on site).
- Where it is apparent that there will be an excess of topsoil on the site, the Site Manager will identify an off-site destination so the topsoil can be taken directly off site and so avoid stockpiling and double handling. This could be another construction site where a topsoil shortfall is experienced or a permitted soil recovery site. It is estimated that 60% of the topsoil will be taken off site either as a waste or, where appropriate, as a by-product. Where the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 and following EPA guidelines. Where material cannot be reused off site, it will be sent for recovery or disposal at an appropriately authorised facility.
- The profiling of the site has balanced the cut / fill requirements such that removal of subsoil is not predicted. However, should off-site removal of overburden be necessary it will be managed in the same manner as outlined above for surplus topsoil.
- Excavated mineral soils will be managed in a similar manner to topsoil as outlined above. Excavated mineral soils will be:
  - » Stored on site where a later on-site reuse has been identified. Mineral soils will be stored separately from topsoil.
  - » Taken directly to their on-site reuse location when these locations are prepared to receive the fill material.
  - » If excess to on-site requirements, taken directly off-site, with the appropriate authorisations in place, for beneficial reuse at another construction site.
  - » Reused immediately on site, if suitable, in, for example, trench backfill.

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- Vehicles and plant will use haul roads to avoid compaction of soil. This will include tipper trucks removing excess soil off-site and the delivery of building materials to site. Where vehicles (dumper trucks and HGVs) need to access areas not yet serviced by haul roads, they will follow a demarcated route along which the haul road will later be constructed.
- To minimise soil erosion, earthworks will be suspended during extreme weather conditions. An extreme rainfall event will be classified as an event that corresponds to the Met Éireann Orange – Weather Alert for rainfall. The Site Manager will monitor the weather forecast to make preparations ahead of adverse weather conditions.

Met Eireann Orange Weather Alert for Rainfall
50 mm – 80 mm in 24 hrs
40 mm – 60 mm in 12 hrs or less
30 mm – 50 mm in 6 hrs or less

- Hydrocarbons (oils, diesel and chemicals) will be stored and managed in an appropriate manner to ensure no negative effects. Specific measures will include:
  - » Any storage of oils and diesel on site will be in steel or plastic tanks of good integrity and bunded to 110 % of tank capacity. All fuel and hydraulic fluids will be stored in the site COSHH store located in the site compound.
  - » Refuelling of site plant will be carried out at the site compound where a concrete refuelling pad will be provided adjacent to the fuel storage tank. When refuelling takes place directly from self-bunded mobile refuelling bowsers, spill kits will be readily available (kept in the machine). Refuelling of mobile plant will not take place within 50m of any sensitive receptor. Toolbox talks on refuelling will be given to delivery drivers in addition to plant operatives.
  - » Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
  - » Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
  - » Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
  - » Appropriate spill control equipment, such as oil soakage pads, will be kept in the site plant to deal with any accidental spillage. Spare spill kits will be kept at the construction site compound in the container adjacent to the fuel storage.
- Surface water management infrastructure will be installed as detailed in Chapter 7, which will avoid / reduce soil erosion.
- Concrete, concrete products and aggregates needed for the construction will only be sourced from authorised quarries, at which appropriate environmental controls are implemented per planning conditions.
- Monitoring and inspection of the soil stockpiles, slope cuts, fuel storage, refuelling operations, etc, will be carried out by the Client's Engineer and improvement made as required. Temporary supports for excavations will be used where considered necessary by the Client's Engineer.

Monitoring of the works will be carried out by the Client's Engineer, project engineer and geotechnical engineer. This will involve visual inspection of the works for soil storage, deep excavations and general site operations. During construction, monitoring will be conducted at excavations and fill areas, and within the soil stockpile areas. Inspections and testing of roads and foundations will be carried out during their construction to ensure that they can accommodate the design loadings. Excavations will be inspected to ensure no stability issues arise. Remedial measures, if required, will be implemented as appropriate.

15.2.4.2 Operational Phase - Mitigation Measures

The mitigation measures to be employed during the operational phase to address the identified potential impacts are:

- To avoid potential subsidence arising from stormwater management, use of infiltrating SuDS features will be minimal. Engineering solutions (6 No. attenuation tanks) will be the primary mechanism for controlling stormwater runoff to greenfield rates. The discharge from the tanks will be to the drain flowing to Lisheens Stream. This is in accordance with the recommendations in the Ballincollig drainage study.
- In addition to the SuDS approach, the foundations design will further reduce potential impacts of subsidence. Subject to detail design, foundations will be reinforced concrete rafts on end-bearing bored piles.
- Spillage and leaks of oil from cars parked in the development during the operational phase is unavoidable. To reduce the potential impacts, hydrocarbon interceptors will be incorporated into the site drainage design. The parking areas will also be paved, so impacts on soils and geology are unlikely. The hydrocarbon interceptors will be maintained by the Management Company during the operational phase.
- With regard to home heating, it is noted that heat pumps will be used at the development. The use of home heating oil should therefore not arise. It is, however, possible that some homeowners will use oil. Any leaks or spillage is likely to be small in scale. Although the likelihood is reduced, the potential impact remains, with long-term slight negative effects.
- Storm water and foul sewers will be tested. Any leaks would therefore be identified and repaired prior to being put into service. They will be maintained by the Management Company / Local Authority. Leakage, and subsequent pollution of the underlying geology, is therefore unlikely.
- Cut slopes will be shallow (less than 1.5m), so potential for slope failure is avoided.
- Radon barriers and venting are standard construction best practices to prevent radon gas ingress into buildings. This risk of radon ingress into living spaces is greatly reduced and unlikely to occur.

15.2.5 Water (Hydrology & Hydrogeology)

15.2.5.1 Construction Phase - Mitigation Measures

The mitigation measures to be implemented for the construction phase are set out below:

- Design considerations in the site layout to avoid and reduce impacts to surface water and groundwater include:
  - » The housing units are setback from the Lisheens Stream, providing a buffer of greater than 70m.
  - » The main field boundary drains on the site have been incorporated into the development layout.
- Following mobilisation to site, surface water management infrastructure will be the first works carried out. Additional controls will be installed as needed as construction progresses through the site, and/or as identified during site inspections of surface water management infrastructure.
- The attenuation tanks required for phase 1 of the development will be installed early in the construction sequencing to control runoff rates as the site gets developed. The attenuation infrastructure will be progressively expanded through the site ahead of housing construction. This will ensure that there is always adequate capacity in the system to deal with design flows.
- Foul sewage generated at the welfare facilities during the early construction phases will be piped to a sealed tank and collected by a waste collection contractor (with the appropriate waste collection permit) for discharge at a licensed WWTP. Once the development is connected to the Uisce Eireann network, the workers' welfare facilities will be piped to the on-site foul sewer network.

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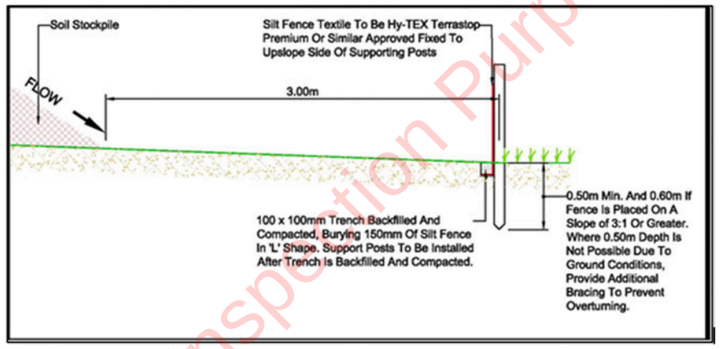
- During the construction phase, best practices will be employed to minimise the release of sediment laden storm water runoff, including;
  - » Areas stripped of vegetation will be kept to a minimum; enough to keep pace with house construction. On-going landscaping and restoration of completed units will be carried out. This will reduce areas of soil exposed to erosion.
  - » Stripped and excavated soils will be managed as described in Section 6.5.1. Soil stockpiles will be setback a minimum of 50m from any watercourse. Silt fencing will be erected downgradient to stockpiles to filter runoff water.
  - » Construction phase settlement ponds will be constructed to hold runoff water from earthworks areas. These will be located and moved as the development progresses through the site.
  - » Check dams and / or straw bales will be installed along the field boundary drains to slow flows and remove silt. Check dams will be constructed using clean stone and geotextile spanning across the drainage channel.
  - » The public road serving the site will be kept clean of mud and debris. A street sweeper will attend site regularly to clean the road when there are truck movements in and out of the site.
  - » Earthworks will be suspended during extreme weather conditions. An extreme rainfall event will be classified as an event that corresponds to the Met Éireann Orange – Weather Alert for rainfall. The Site Manager will monitor the weather forecast to make preparations ahead of adverse weather conditions.

Met Eireann Orange Weather Alert for Rainfall
50 mm – 80 mm in 24 hrs
40 mm – 60 mm in 12 hrs or less
30 mm – 50 mm in 6 hrs or less

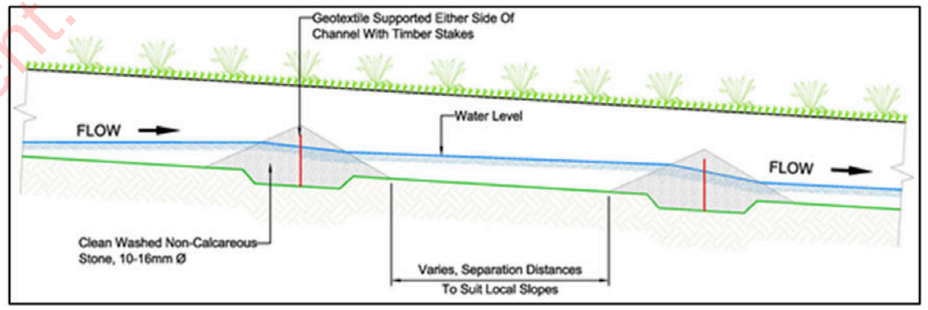
- If required, dewatering of the excavations will be to temporary silt traps. Flow from the silt traps, placed upgradient of the silt fencing protecting watercourses, will be diffuse.
- The release of cement to watercourses will be prohibited. Concrete pours will occur in contained areas using shuttering. Rinsing down of concrete trucks will be done at a dedicated location on site – adjacent to the construction site compound, or at a suitable alternative location, a minimum distance of 75m from any watercourse. Signage will be erected at each concrete pour location directing drivers to the rinse down area. This rinse down area will be removed at the end of the construction phase.
- Hydrocarbons (oils, diesel and chemicals) will be stored and managed in an appropriate manner to ensure no negative effects. These are detailed in Section 6.5.1.

The infrastructure to be used to manage and treat surface water, and to control erosion at the construction site are:

- To reduce the volume of water to be treated during construction and to reduce the erosion potential of exposed soils, clean surface water runoff will be diverted around earthworks areas. This will be done with the use of diversion channels. Diversion channels are shallow interceptor drains to divert overland flows.
- Silt fences will be erected on the downslope side of any earthworks areas to intercept any overland flows that could potentially be carrying silt / fines. These are constructed with geotextile embedded in the topsoil and supported with wooden pegs. See example below.



- Check dams will be installed at appropriate locations along the field boundary drains. These will be constructed using geotextile supported by two wooden pegs, sandwiched by clean washed filter gravel, as illustrated. Alternatively, straw bales will be used.



The Site Manager will undertake inspections at all outfalls from the construction works. Inspections will be carried out during and following heavy rainfall events. The Site Manager will organise monitoring of surface water quality at monitoring point SW5, as shown on Figure 7-3. Samples will be collected monthly and tested for turbidity and suspended solids. All sample results will be input to a database and compared to baseline monitoring data.

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15.2.5.2 Operational Phase - Mitigation Measures

Mitigation measures to be employed during the operation phase are:

- The runoff from the site will be controlled and managed using a suite of SuDS and engineering controls designed for a 1:100-year storm event plus a 20% allowance for climate change. These will include rainwater harvesting (water butts – to be retrofitted by homeowners), infiltration basins, filter drains, tree pits, raingarden / bioretention tree pits, green roofs and attenuation tanks fitted with flow control devices. Hydrocarbon interceptors will also be installed upstream of each attenuation tank. The overall management will limit discharge from the site to greenfield rates (i.e., 49.6 l/sec. The detail of the SuDS infrastructure is provided in the Drainage Assessment Report, prepared by DOSA and included in Appendix 7-4. Engineering details are provided in the Infrastructure Report, prepared by DOSA, and provided in Appendix 2-4.
- With the potential for oil spills and leaks from cars parked in the development, hydrocarbon interceptors and grit traps are included in the drainage design to protect the water quality in the Lisheens Stream. The hydrocarbon interceptors will be cleaned and maintained by the management company.
- The SuDS infrastructure proposed has regard to the underlying karst limestone bedrock. Infiltration to the subsurface has been avoided. Engineering solutions are proposed to manage stormwater runoff – 6 No. tanks are proposed. Discharge from the site will be to the existing field boundary drain located centrally along the southern boundary of the site. The discharge will be onto an area of stone riprap to dissipate energy and avoid bank erosion / scouring in the drain.
- The foul sewer for the facility will connect into the Uisce Eireann sewer network, which discharges to the Ballincollig WWTP – EPA license number D0049-01. This is a tertiary treatment plant with a capacity of 33,000 PE. According to the latest Annual Environment Report for this facility, the quality of the treated water discharged to the River Lee is compliant for all test parameters. Uisce Eireann has confirmed capacity in the Ballincollig WWTP to treat sewage from the Greenfield site – refer to Appendix A of the Infrastructure Report (provided in Appendix 2-4 of this EIAR).
- MWP has carried out a Site-Specific Flood Risk Assessment (SSFRA) for the proposed development. The SSFRA is provided in Appendix 7-3. The SSFRA had regard to findings of the Ballincollig drainage study, which identified flooding extending into the southeast corner of the site for a 1:100-year rainstorm event. The conclusion of the SSFRA is that, with the recommended mitigation (refer to Section 7.2.4), the development will not result in increased flood risk at or downstream of the site.
- Groundwater (aquifer) vulnerability will be temporary increased as the site is stripped and reprofiled for development. The progressive construction of paved roads, foundations and landscaping will provide protection to the aquifer.
- To conserve water usage (and consequently reduce the volume of foul sewerage generated), each house will be fitted with a water meter, aerated shower heads, aerated strainers in taps, duel flush cisterns etc.

15.2.6 Biodiversity

15.2.6.1 Construction Phase - Mitigation Measures

The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts. The following mitigation measures will be implemented.

Water protection

Water protection measures are included in Chapter 6 Lands, Soils and Geology and in Chapter 7 Water (Hydrology and Hydrogeology).

Lighting

Lighting associated with the site works could cause disturbance/displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success.

Lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting:

Lighting will be provided with the minimum luminosity necessary for safety and security purposes. Where possible, lighting will be restricted to the working area and using the cowl and angling noted above, will minimise overspill and shadows on sensitive habitats outside the construction area

During construction, lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on the retained treelines and hedgerows

Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Where possible, construction lights will be switched off when not in use; and
- Lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on the retained treelines and hedgerows. There will be no directional lighting focused towards these sensitive habitats and cowling and focusing lights downwards will minimise light spillage.

Works will primarily take place during hours of daylight to minimise disturbance to any nocturnal mammal species.

Protection of habitats

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 1st March to the 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided.

The Lisheens Stream is located at the southeast corner of the proposed development site and it is important that construction activities do not result in pollution of this watercourse, either through siltation, which interferes with water flow, vegetation growth and aquatic fauna, or pollution (e.g. chemical). Refer to **Chapter 7** *Water* for further details on mitigation measures for water.

To prevent incidental damage by machinery or by the deposition of spoil during site works, treelines and hedgerows which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. Detailed tree protection measures are included in Tree Survey (County Tree Care Ltd) which accompanies this application. All tree protection measures will be installed prior to the commencement of any construction works.

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Bats

During the site works, general mitigation measures for bats will follow Marnell *et al.* (2022), Kelleher and Marnell (2006) and NRA (2005c). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats or prevent avoidable effects resulting from significant alterations to the immediate landscape. All mitigation measures including detailed method statements will be agreed with the NPWS prior to commencement of works, which could affect any bat populations on site.

All buildings onsite will require demolition to facilitate the development. No signs of bats were recorded within these buildings. However, as a precautionary measure, the following measures will be implemented prior to and/or during demolition. Mitigation measures will be agreed with the NPWS prior to any demolition works and will include the following:

- In all cases immediately in advance of demolition a bat specialist will undertake an examination of the building. If bats are present at the time of examination it is essential to determine the nature of the roost (i.e., number, species, whether it is a breeding population) as well as its exact location.
- If bats are recorded in buildings earmarked for demolition, special mitigation measures to protect bats will be put in place and a license to derogate from the conservation legislation will be sought from the NPWS.
- The contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary.
- If roosting habitat for bats is removed, replacement habitat will be provided.

A number of trees will be removed prior to construction. While it is noted that mature/semi-mature trees with the potential to be of significant value as bat roosts are absent from the site, it is noted that small roosts within mature trees with dense ivy can be difficult to detect and may be used sporadically. Bats can use trees as temporary roosts and therefore the presence of occasional bats cannot be altogether excluded. Therefore, the following measures will be implemented during the removal of semi-mature and mature trees.

- The project ecologist will work with the contractor to ensure that trees earmarked for retention are adequately protected.
- Tree-felling will ideally be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.
- Tree will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety.
- Treelines outside the proposed development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage.
- During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused towards watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage.
- If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS.

As noted in **Section 8.4.3.5**, lighting mitigation measures will follow recommendations outlined in Bat Conservation Ireland (2010) and Bat Conservation Trust (2018).

Birds

As noted previously, where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the proposed development site boundary. If works are carried out during the breeding season, a pre-construction survey will be carried out by the project ecologist and if birds are detected appropriate mitigation measures will be implemented. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the proposed development site boundary.

15.2.6.2 Biodiversity Enhancement Measures

Bats

Although there are mature trees within the proposed development site, generally they lack the structural elements that would make them suitable for roosting bats. Therefore, the provision of bat boxes suitable for the species recorded within the site are recommended. Examples of same are listed below. The boxes have been selected to provide a range of roosting opportunities for different species and colony sizes. They can be sited on existing trees, however the pole mounted bat boxes will be used where necessary. The boxes will be installed by the project ecologist considering relevant factors including foraging resources, commuting routes, future landscape development, and lighting and will be regularly checked for usage as part of an ongoing ecological monitoring programme.

Vincent Pro Bat Box

Two Vincent Pro bat boxes will be provided. This box features three vertical chambers of different sizes, providing ideal roosting space for a variety of species. Beneath the crevice entrances is a ladder which provides a rough surface for bats to land. Limited cleaning is required for these boxes as the droppings will fall out of the bottom of the chambers. The front and top of the box are black which helps the box to absorb heat. This bat box can be used by Leisler's, Common Pipistrelle, Soprano Pipistrelle, Brown long-eared, Natterer's and Whiskered Bat.

Improved Roost-Maternity Bat Box

Two improved Roost-Maternity Bat Box will be provided. This box is suitable for larger roosts or maternity groups of the small crevice-dwelling bats such as pipistrelles. This has three separate crevices, each with different temperature characteristics and a wide entrance with accurately sized opening. Ideal for Pipistrelles and deters unwelcome birds etc. Internal ceramic heat sinks ensure improved temperature stability in crevices.

Bat Box 1FD

Two Bat Box 1FD will be provided. Suitable for Pipistrelle and Nathusius' Pipistrelle Bats as well as Daubenton's Bats and Long-Eared Bats. This is especially in mixed bat zones and for initial settlement attempts. The front panel can be removed for inspection and cleaning.

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Bat Colony Box 1FS universal

Two Bat Colony Boxes (1FS Universal) will be provided. This type of box is readily used for forming large colonies, by Daubenton's Bats and Brown Long-Eared Bats. Nursery roosts with between 70 and 100 animals are common. Thanks to the large interior and the integrated clinging options, for large numbers of individuals, this type of box is very attractive for forming nursery roosts and for rearing young. The box is suitable as a summer and temporary roost.

Other Mammals

Hedgehog boxes/highways.

Hedgehog highways will be provided between the properties to allow free movement of small mammals through the gardens/ development. This requires a small hole (c. 13cm by 13cm square) to be included at the base of garden fencing to provide passage for Hedgehogs along the boundary of development site.

Four SCHWEGLER Hedgehog Dome (or similar) will be provided. These will be located under the retained hedgerow habitat the east of the site and the retained treeline at the west. This dome encourages Hedgehogs to settle in a particular area and provides year-round shelter, including during the winter months. This will be located somewhere protected from wind and rain. Ideally this will be filled with hay (supplied with the dome) but alternatively use dry leaves and straw, as well as cut up newspaper and wood shavings.

These will be located adjacent or within suitable habitat but will not be situated near internal or external roads.

Birds

Swift

The swift is a Red List bird of conservation concern in Ireland because its population has declined by over 40% in the last 15 years. Conservation actions across the country are helping to recover populations. Swifts are faithful to their nest sites. Nest box projects, especially built-in nest boxes, can provide safe long-term homes for new breeding pairs of Swifts.

Commercial Swift nest bricks are made from hollow brick or concrete composite designed to allow access by Swifts and manufactured to modern building regulation standards. They can be integrated into the walls of buildings during the construction phase.

Twenty Swift bricks (Manthorpe Swift Brick or similar) will be installed on the apartment blocks at the southeast of the site under the guidance of the supervising ecologist. These will be installed following the Swift Conservation Ireland Guidelines (2019). These will be placed at least 5m above ground level with an open area of the building i.e., free of overhanging ledges, vegetation, and other obstacles. There will be no directional lighting in the vicinity of this area. Bricks will be positioned in rows to encourage colonial nesting. It is noted that Swift bricks will not overheat in the way that externally fitted boxes do and therefore they can be placed on any aspect of the building.

Swifts look for nest sites at locations with established colonies. Swifts are known to occur in the Ballincollig area (Source NBDC), although none were recorded during the site surveys. To increase the chances of attracting Swifts to a new nest location, a recording of a Swift call should be played. Swift calls can be broadcast from a small speaker placed as close as possible to the nest box or brick. New nest box sites where no lures are played are less likely to be successful in attracting nesting Swifts. This will be carried out under licence of the National Parks and Wildlife Service (NPWS).

Other breeding birds

In order to enhance the site for nesting birds eight nesting bird boxes (a range of bird box types) will be installed at the proposed development site. Three 1B Schwegler nest box will be installed high on retained trees. The 1B nest boxes will be installed at a height of 1.5 metres whilst the large bird nest boxes should be positioned at least 3m in height. Three 1ZA Schwegler wren roundhouses will be located in hedgerows, thickets and overgrown areas. The 1ZA will be hung in hedgerows along the northern and western boundaries.

Treecreepers like to nest in narrow gaps or clefts such as behind the bark in mature trees. Many woodlands and gardens do not possess suitable habitats such as these due to changes in woodland management, so the addition of a specialist nest box such as this Treecreeper FSC Nest Box provides an excellent alternative. Two Treecreeper FSC Nest Box will be provided. This box is manufactured from FSC certified wood and has a hinged lid for inspection or cleaning. The shape of the box is specially designed to be suitable for this particular bird, fitting snugly against a tree trunk with an entrance right next to the bark.

Four Swallow nest cups will be installed to provide alternative nest sites for swallows. These will be installed on the new site buildings under ecological supervision.

Log Piles/Loggeries

Building invertebrate habitats can provide shelter to many beneficial insects and offer a great foraging habitat for birds and other mammals.

Dead wood is one of the most valuable habitats for urban wildlife. The decline of the availability of deadwood is linked to the decline of many woodland birds due to the loss of foraging opportunities provided by this habitat.

Key points

- Install the logs vertically
- Site the loggery in a shaded part of a site
- Do not use concrete to bed the logs in. The beetles require the logs to be in contact with the soil
- Do not use well-rotted logs as they will have little wood left as food

Four log piles will be installed under retained hedgerow and treeline habitats. Log piles are suitable for invertebrates, small mammals and birds and can be easily installed in wooded areas of parks or open spaces. They are really just stacks of logs piled up and allowed to rot down. Left undisturbed they will support a good range of biodiversity.

Insect hotels

Three insect hotels will be installed on meadow grassland areas. Insect hotels are excellent for attracting a wide range of invertebrate species. Perforations allow for insect access and a chamber with bamboo below for solitary bees. This can be positioned anywhere in the site where pollination is to be encouraged. The nesting tubes are ideal for solitary bees to build their nests in, the vertical slots are designed to encourage butterflies, other refuge holes are perfect for ladybirds and lacewings and the pinecones offer an excellent habitat for a range of other species.

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Invasive species

Cherry Laurel

There is no statutory obligation to remove Cherry Laurel. Cherry Laurel should be removed with great care given its location in proximity to tree earmarked for retention..

Treatment programmes can be divided into 3 main stages: initial removal, control of stems and roots, and follow up. The following treatment options have been widely tested and measured for effectiveness across Ireland. In almost all cases, failures can be accredited to poor application of a particular technique and/or logistical difficulties, rather than the control method itself. Care should be taken when embarking on a control programme and resources should be identified and allocated for repeated treatments.

Cut and remove stems by hand or chainsaw, cutting as close to the ground as possible to remove above ground growth. Chip or remove the cut material from the area to allow for effective follow-up work and prevent regrowth. Chipped material can provide good weed barrier around ornamental garden areas. Flailing has also been effectively used in Ireland to treat young or immature growth. Although not suitable on all sites and locations, especially steeply sloping or wet sites, it is very effective as it breaks up woody stems upon contact.

The removal of above ground growth will not prevent regrowth as Cherry Laurel will regrow from cut stems and stumps. There are four recommended methods to achieve successful management after the initial cut and removal:

1. Digging the stumps out. The effectiveness of this technique is increased by removing all viable roots. This can be done manually or with a tractor and plough. To avoid regrowth, stumps should be turned upside down and soil should be brushed off roots.

2. Direct stump treatment by painting or spot spraying freshly cut low stumps with a herbicide immediately after been cut. Glyphosate (20% solution), tryclopyr (8% solution) or ammonium sulphate (40% solution) are known to be effective during suitable weather conditions i.e. dry weather. The herbicide concentrations used and timings of applications vary according to which chemical is used. Use of a vegetable dye is recommended to mark treated stumps and all stumps should be targeted. A handheld applicator will help avoid spray drift onto surrounding non-target species. Always read the label and follow the manufacturers guidelines when using herbicides. Remember that using

3. A variation on the stump treatment method is stem injection, using a 'drill and drop' methodology, whereby, if the main stem is cut and is large enough for a hole to be drilled into it, the hole can be used to facilitate the targeted application of glyphosate (25% solution).

4. Stump regrowth and seedlings can be effectively killed by spraying regrowth with a suitable herbicide, usually glyphosate. Best practice spraying protocols should be carefully followed. General broadcast spraying is not as effective as stump spot treatment and has the potential to impact on surrounding non-target species. Cherry Laurel leaves are thick and waxy. For herbicide treatment to be effective each individual leaf needs be thoroughly wetted with herbicide to kill the plant.

Winter Heliotrope

There is no statutory obligation to remove Winter Heliotrope. Winter heliotrope *(Petasites fragrans)*, a member of the Asteraceae family, is a low-growing herbaceous plant originating in North Africa. It is established widely in Ireland being frequent along roadsides, hedgerows, woodland edges and waste ground. As apparently only the male plant that is present in Ireland, its spread is confined to vegetative means. Winter heliotrope should be removed with great care given its location within treeline, woodland and scrub habitats. Where it is concluded that Winter Heliotrope at the proposed development site should be removed, the following treatment methods are recommended.

Due to the extensive rhizome network, physical removal of winter heliotrope is really only practical on a limited scale. Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from fragments of roots, it may be best to tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant. Other means of disposal include burial of material at a depth of at least 2m, incineration or disposal to licensed landfill. There is no evidence that the material would withstand composting though this approach would probably only be suitable for limited infestations.

An application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008), though the Royal Horticultural Society (2008) recommends spraying in mid- summer or later but before the foliage begins to die back.

Azolla sp.

This species was not recorded within the proposed development site boundary. However, this is present on the Lisheens Stream downstream of the proposed development site. Biosecurity protocols will be followed on any works to the adjoining drainage ditch to ensure this invasive species is not spread further outside the proposed development site.

15.2.6.3 Operational Phase - Mitigation Measures

Lighting

The primary lighting mitigation which will be implemented for this project relates to bats, as these are considered the most sensitive species in relation to night-time lighting. It is noted however that the mitigation proposed will also lessen in the impact in relation other nocturnal species such as Badger and Otter. The lighting scheme has considered best practice, as published by the UK Bat Conservation Trust (2018), in respect of mitigation strategies, to minimise the impact of outdoor lighting upon bat populations. The external lighting design concept is to illuminate lighting levels outlined within BS EN 17037:2018 external lighting. The following mitigation measures have been incorporated into the site lighting plan as specified in DOSA lighting plan.

- The location of lighting within the greenfield area has been confined to internal roads and footpaths
- Warm White type, have been specified, with a Colour Temperature of 2,700 kelvin, as is considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations.;
- LED luminaires have been specified due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights have been carefully considered to minimise light spill. Specialist bollard and ground recessed lighting have been included where possible;
- Lanterns are of the fully cut off type with no light output above the horizontal plane;
- Screening by existing trees and newly planted trees will prevent light spillage onto boundary habitats; and
- Exterior lighting will be controlled from a timeclock, daylight sensor and manual switching that will be located within the external mini pillars.

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15.2.7 Cultural Heritage

Targeted archaeological testing confirmed the presence of seven archaeologically significant features - five (F2–F6) in Field 1 and two (F7–F8) in Trench 20 of Area A. These features will be excavated in advance of construction and preserved by record.

Licensed archaeological monitoring of all topsoil removal will be undertaken during construction. If archaeological features or deposits are revealed, the NMS and the Planning Authority will be consulted as outlined in Framework and Principles for the Protection of the Archaeological Heritage (1999). All newly identified archaeological sites will be preserved in situ or by record and sufficient time and resources will be allowed to resolve all archaeological matters. Preservation by record will require the excavation of the archaeological material and such material will be fully resolved to professional standards of archaeological practice (Policy Guidelines on Archaeological Excavation – Department of Arts, Heritage, Gaeltacht and the Islands). This work will be funded by the developer.

15.2.8 Noise & Vibration

15.2.8.1 Construction Phase - Mitigation Measures

Mitigation measures for the demolition and construction phases are set out below in order to reduce potential impacts as far as practicable to within the adopted design goals for noise and vibration.

The assessment detailed in Chapter 10 has determined that construction activities can typically operate within the adopted construction noise threshold levels at the closest off-site NSLs when carried out at distances greater than 60m from the main phases of the construction works.

Vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 10.3 to avoid any cosmetic damage to buildings.

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid exceedance of the adopted construction noise threshold values at the nearest NSLs. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

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

Further comment is offered on these items in the following paragraphs.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring.

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item will be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action will be to identify whether said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control at source. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

The following best practice migration measures will be considered:

- Site compounds will be located away from noise sensitive boundaries within the site constraints.
- The use of lifting bulky items, dropping and loading of materials within these areas will be restricted to normal working hours.
- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant will be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling, ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen will be wrapped around the source. BS 5228 -1:2009+A1 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice, screens constructed of materials with a mass per unit of surface area greater than 10kg/m2 will give adequate sound insulation performance.

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Post-mitigation construction noise calculations assume a partial line of sight (-5dB) is achieved using a solid 2.4m high standard construction site hoarding.

Annex B of BS 5228-1:2009+A1:2014 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials.

In addition, careful planning of the site layout will also be considered. The placement of temporary site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening during the phasing of works.

Liaison with the Public

A designated Community Liaison Officer (CLO) will be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the CLO. In addition, prior to particularly noisy construction activity the CLO will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Vibration Mitigation

On review of the likely vibration levels associated with construction activities, it may be concluded that the construction of the proposed development is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period: -

- A clear communication programme will be established to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars;
- Appropriate vibration isolation shall be applied to plant, where feasible;
- Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. The potential for cumulative works occurring both within the site and at any external sites with potential to generate significant noise effects will be reviewed in terms of limiting the duration and scale of these effects.

Noise Monitoring

During the demolition and construction phase, the appointed contractor will monitor noise at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise will be monitored in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017).

The selection of monitoring locations will be based on the closest NSLs to the proposed works which have the potential to exceed the CNT, i.e., at NSL01, NSL02 and NSL04 to the southwest, west and north site boundaries.

Any Noise Monitoring Terminal (NMT) (number and locations to be agreed post-consent with Local Authority), to be installed will have the following specifications (or similar approved):

- Logging of two concurrent periods, e.g., 15-minute & hourly.
- Daily automated Charge Injection Calibration (CIC).
- E-mail alert on threshold exceedance.
- E-mail alert on low battery and low memory.
- Remote access to measured data.
- Live display of noise levels.

In addition, it is recommended that spot-check noise measurements are conducted on a monthly basis. These spot checks can be organised to coincide with works that have the potential to generate high levels of noise on site in order to confirm the potential extent of effects.

A monthly noise monitoring report should be prepared by the contractor. Reports should identify any exceedances above nominal limit values and attempts to clarify the causes. Where remedial measures are required and identifiable, these should also be clearly stated.

Vibration Monitoring

Where the excavation works take place within 50m of vibration-sensitive locations (VSLs) e.g. NSL01, NSL02 and NSL04 vibration monitoring shall be installed, with the number and locations to be agreed with Local Authority.

Vibration monitoring stations should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.

The mounting of the transducer to the vibrating structure will need to comply with BS ISO 5348: 2021: Mechanical vibration and shock – Mechanical mounting of accelerometers.

In summary, the following ideal mounting conditions apply:

- The transducer and its mountings should be as rigid as possible;
- The mounting surfaces should be as clean and flat as possible;
- Simple symmetric mountings are best;
- The mass of the mounting should be small in comparison to that of the structure under test;
- The monitoring equipment should be set to monitor vibration in 5-minute periods;
- E-mail alert on threshold exceedance;
- E-mail alert on low battery and low memory;
- Remote access to measured data;
- Live display of vibration levels.

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In addition, it is recommended that spot-check vibration measurements are conducted on a monthly basis. These spot checks can be organised to coincide with works that have potential to generate high levels of vibration on site in order to confirm the potential extent of effects.

A monthly vibration monitoring report should be prepared by the contractor. Reports should identify any exceedances above nominal limit values and attempts to clarify the causes. Where remedial measures are required and identifiable, these should also be clearly stated.

15.2.8.2 Operational Phase - Mitigation Measures

An initial site noise risk assessment has been carried out in respect of the proposed development. The assessment has classified the site as having 'low to high' noise risk. This was determined through on site noise monitoring. Further discussion is presented in terms of the likely noise impact of both the external and internal areas of the proposed development. It is necessary to provide a suitable 2.5m site boundary treatment to the immediate southern boundary of the proposed site but it is not necessary to provide enhanced acoustic glazing beyond standard double glazing to ensure that, when windows are closed, the internal noise environment is good. The noise level internally with the windows open will be higher than ideal at the southern facing bedrooms at the units to the immediate southern boundary of the site, overlooking the N22. However, inhabitants will have the option to close the window to reduce the noise level internally with mechanical ventilation.

15.2.9 Air Quality

15.2.9.1 Construction Phase - Mitigation Measures

The proposed development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of demolition, earthworks, construction and trackout activities (see Section 11.5.1.1). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC (2018), DLRCC (2022)), the UK (IAQM (2024), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Community engagement includes explaining the nature and duration of the work to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.

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.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have 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.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Fully enclose sites or specific operations where there is a high potential for dust production and the site is actives for an extensive period.

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 15 kph 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 (public transport, cycling, walking, and car-sharing)

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.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition

- Prior to demolition blocks should be soft striped inside buildings (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- During the demolition process, water suppression should be used, preferably with hand-held spray. Only the use of cutting, grinding or sawing equipment fitted or used in conjunction with a suitable dust suppression technique such as water sprays/local extraction should be used.

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- Drop heights from conveyors, loading shovels, hoppers and other loading equipment should be minimised, if necessary fine water sprays should be employed.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers 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
- 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 power materials, ensure bags are sealed after use and stored appropriately to prevent 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.

Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent the 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 permit.
- Access gates to be located at least 10 m from receptors where possible.

Monitoring

The following monitoring measures are proposed to ensure the dust mitigation measures are working satisfactorily:

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- 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.

15.2.9.2 Operational Phase - Mitigation Measures

No site-specific mitigation measures are proposed for the operational phase as impacts are predicted to be not significant.

15.2.10 Climate

15.2.10.1 Incorporated Design Mitigation

A number of measures have been incorporated into the design of the development to mitigate against the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated into the design of the development to avoid potential flooding impacts as a result of increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the proposed development to climate change (Section 12.6.3.2).

In relation to operational energy usage information as detailed in the Scheme Sustainability & Climate Resilience Statement prepared by DOSA has been used to inform this assessment. The development has been designed in line with the requirements of Nearly Zero Energy Buildings (NZEB) Standards and the requirements of the Cork City Development Plan 2022 – 2028. Section 2.1 of the Climate Action & Energy Statement for the proposed development outlines the relevant climate specific objectives of the development plan for the area. The incorporated design measures as part of the proposed development's sustainability strategy are outlined below:

- Design Longevity and Passive Performance: The development will feature a flexible, futureproof design aimed at maximising its lifecycle. Passive design strategies, such as optimal façade orientation and enhanced building fabric (with U-values exceeding regulatory standards), will be employed to reduce energy demands. The design will also prioritise airtightness to achieve excellent air permeability performance.
- Daylighting and Visual Comfort: Natural daylight will be maximised in accordance with European, CIBSE, and BRE guidance. High-performance glazing will be used to improve visual comfort and support occupant well-being.
- Façade Optimisation: Advanced computer modelling will be used in collaboration with the project Architect to optimise façade design, enhancing daylight penetration, natural ventilation, and solar benefits specific to the site context.
- Whole-Site Sustainability: Sustainable practices will extend beyond the building envelope to encompass site-wide construction, commissioning, and handover processes, reinforcing environmental performance throughout the development lifecycle.
- Resource Efficiency – Reduce, Reuse, Recycle: Circular economy principles will be integrated across all project phases—design, construction, and operation—to minimise waste and environmental impact.
- Thermal Modelling and Climate Resilience: Dynamic Thermal and Energy Simulations will be conducted to ensure a low-carbon, low-energy design. Residential units will prioritise natural ventilation and undergo compliance assessments for overheating under Part L and long-term climate impacts using CIBSE 2020/2050 weather files.

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- Energy Efficient Building Services: Mechanical and electrical systems will be designed to minimise energy use while maintaining high air quality. Measures include:
  - » Efficient use of natural light to reduce artificial lighting;
  - » Use of high-efficiency LED fittings with dimming, daylight sensing, and occupancy detection;
  - » A Lighting Management Plan in common areas to reduce unnecessary energy use;
  - » Elimination of fossil-fuel-based systems in favour of heat pumps and other low carbon heating technologies;
  - » Selection of Triple E-registered products to ensure high-performance, energy efficient installations.
- Renewable Energy Integration: Where technically and economically feasible, renewable energy solutions will be incorporated, such as roof-mounted photovoltaic (PV) arrays and heat pump systems, to offset primary energy use and further reduce emissions.
- Building Energy Rating (BER) Target: All residential units will be designed to achieve an 'A-rated' BER, ensuring high energy efficiency and offering future residents predictable, low operating costs and environmental assurance.
- Water Conservation and Management: The development will include a water-efficient design, utilising low-flow sanitary appliances (e.g. dual-flush toilets, spray taps), leak detection linked to the Building Management System (BMS), and measures to reduce potable water consumption.
- Sustainable Transport Infrastructure: The strategy encourages a modal shift away from private car usage by integrating access to public transport and active travel modes. EV charging infrastructure will be installed in accordance with Policy in CAP27 and Part L 2022 to support the transition to electric vehicles.
- Material and System Lifecycle Optimisation: A whole life-cycle approach will inform the selection of building materials and plant. Embodied carbon will be reduced through the avoidance of heavy or high-carbon components, minimisation of mechanical systems where possible, and careful selection of materials with strong environmental credentials. Low-GWP refrigerants with minimal leakage rates will be used to mitigate environmental impacts.

These identified measures will aid in reducing the impact to climate during the operational phase of the proposed development in line with the goals of the Climate Action Plan and the Cork City Development Plan 2022-2028 and Cork City Climate Action Plan 2024-2028.

In addition to the above, in relation to promoting a modal shift and more sustainable methods of transport, the proposed development is located in Ballincollig which is particularly well served by several existing bus routes which provide the area with regular public transport links to all areas of Cork City. Additionally, Ballincollig is included as a key location on one of the twelve new 'Sustainable Transport Corridors' in the Draft BusConnects Cork (STC Route E – Ballincollig to City)which in turn links with STC F Bishopstown to City). Locating the proposed development in an area with connectivity to more sustainable transport methods will promote a modal shift away from private passenger cars which will benefit climate through a reduction in transport related GHG emissions.

15.2.10.2 Construction Phase - Mitigation Measures

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. The following measures to reduce the embodied carbon of the construction works are:

- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled.
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.
- Sourcing materials locally where possible to reduce transport-related CO2 emissions.
- Target embodied carbon rates for detailed design (LETI, 2020).

The carbon emissions have been calculated assuming the building foundations and external walls are made up of lightweight concrete blocks. Additionally, the calculations assume the use of ready-mix concrete with a 0% recycled cement content. In order to reduce carbon impacts from the proposed development, the use of alternative materials with lower embodied carbon emissions such as timber frame walls rather than traditional concrete block walls or concrete with a 50% recycled cement content for example will help to reduce the impact of the development on climate. Alternative material types with lower embodied carbon should be investigated during the detailed design phase of the proposed development.

In terms of impact on the proposed development due to climate change, during construction the Contractor will be required to mitigate against the effects of extreme rainfall/flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction. During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

Throughout detailed design and construction phase, guidance documents to inform with design detail decisions shall be reviewed e.g. the EU Commission *Technical Guidance on Adapting Buildings to Climate Change* (European Commission (2021a), LETI emergency design guide (LETI, 2020), and the latest IPCC report.

Monitoring and reporting of the embodied carbon in the construction phase will be conducted. The aim of monitoring will be to seek further ways to minimise climate impacts. Monitoring will include contractual obligations, in line with the most recent Climate Action Plan and sectoral targets, for the successful tenderer to ensure that the proposed development stays in line with updated aims. Commitments to monitor GHG emissions during the construction phase will also be secured through the final Construction Environmental Management Plan (CEMP). Monitoring will include embodied carbon of construction materials, water usage, power and fuel usage, and waste generation (including reuse and recycling rates). Where monitoring shows that the proposed development is not meeting its targets, further mitigation will be put in place.

Monitoring should also include reviewing potential for extreme weather events which may cause damage during construction. Contractors' Environmental Management System (EMS) will include measures to address risks during such events i.e. flooding

15.2.10.3 Operational Phase - Mitigation Measures

The proposed development has been designed to reduce the impact on climate as a result of energy usage during operation. These measures are outlined in Section 12.8.1 above as incorporated design mitigation. No further operational phase mitigation is proposed.

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